

Diploma in Electrical and Electronics Engineering (EE)

I SEMESTER		II SEMESTER		III SEMESTER		IV SEMESTER		V SEMESTER		VI Semester	
Sub Code	Subject	Sub Code	Subject	Sub Code	Subject	Sub Code	Subject	Sub Code	Subject	Sub Code	Sub Name
HU-101	Basic English	HU-201	Advanced English	SC-301	Applied Engineering Mathematics	SC-401	Advanced Engineering Mathematics	ME-501	Industrial Management and Entrepreneurship	EE-601	Industrial Training
SC-102	Basic Engineering Mathematics	SC-202	Engineering Mathematics	EC-302	Digital Electronics	EE-402	DC Machines and Batteries	EE-502	AC Motors		
SC-103	Basic Physics	SC-203	Applied Physics	EC-303	Electronic Devices & Circuits	EE-403	AC Machines	EE-503	Power Electronics		
SC-104	General Engineering Chemistry	SC-204	Engineering Chemistry & Environmental Studies	EE-304	Electrical and Electronic Measuring Instruments	ME-414	Basic Mechanical Engineering	EE-574	Electrical Traction and Automation		
EC-105	Basic Electrical & Electronics Engineering	CS-205	Programming In C	EE-305	Electrical Circuits	EE-405	Electrical Power Systems	EE-584	Electrical Estimation and Utilization		
ME-106	Basic Engineering Drawing	ME-206	Advanced Engineering Drawing	EC-306	Electronic Devices Lab	EE-406	Electrical Engineering Drawing	EE-594	Electric Vehicles		
ME-107	Basic AutoCAD Lab	ME-207	Advanced AutoCAD Lab	EE-307	Circuits Lab	EE-407	DC Machines Lab	EE-575	Switchgear and Protection		
EC-108	Basic Electrical & Electronics Engineering Lab	EE-208	Basic Electrical Workshop Lab	EC-308	Digital Electronics Lab	EE-408	Electrical CAD Lab	EE-585	Advanced Protection of Power Systems		
SC-109	Basic Science Lab	SC-209	Applied Science Lab	EE-309	Electrical Measurements Lab	EE-409	AC Machines Lab	EE-506	AC Motors Lab		
CS-110	Basic Computer Science Lab	CS-210	Programming In C Lab	HU-310	Communication and Life Skills Lab	HU-410	Employability Skills Lab	EE-507	Power Electronics Lab		
EE-111	Skill Upgradation	EE-211	Skill Upgradation	EE-311	Skill Upgradation	EE-411	Skill Upgradation	EE-508	Programmable Logic Controllers Lab		
								EE-509	Electrical Installation Lab		
								EE-510	Project Work		
								EE-511	Skill Upgradation		

C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

I SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Credits	Examination Scheme							
			Instruction periods per week			Total Periods per semester		Continuous internal evaluation			Semester end examination				
			L	T	P			Mid Sem 1	Mid Sem 2	Internal evaluation	Max Marks	Min Marks	Total Marks	Min marks for Passing including internal	
1	HU-101	Basic English	4	1	0	75	3	20	20	20	40	14	100	35	
2	SC-102	Basic Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35	
3	SC-103	Basic Physics	4	1	0	75	3	20	20	20	40	14	100	35	
4	SC-104	General Engineering Chemistry	4	1	0	75	3	20	20	20	40	14	100	35	
5	EC-105	Basic Electrical & Electronics Engineering	4	1	0	75	3	20	20	20	40	14	100	35	
6	ME-106	Basic Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50	
7	ME-107	Basic AutoCAD Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
8	EC-108	Basic Electrical & Electronics Engineering Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
9	SC-109	Basic Science Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
10	CS-110	Basic Computer Science Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
11	EE-111	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics			--	-	
	Activities: student performance is to be assessed through Rubrics														

HU-101 - Basic English

Course Title	Basic English	Course Code	HU-101
Semester	I	Course Group	Foundation
Teaching Scheme in Minutes (L:T)	4:1:0	Credits	3
Methodology	Communicative Language Teaching + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

Prerequisites: Basic knowledge of English Language

COURSE CONTENTS

MODULE 1: VOCABULARY

Duration: 12 Periods – (L 8 P 4)

1. How to Use a Dictionary
 - a) How to locate a word
 - b) Different kinds of dictionaries
 - c) Uses of dictionaries and digital dictionaries
2. Building Vocabulary
 - a) Words from other languages – Greek, Latin, French, Sanskrit, Hindi, and Telugu.
 - b) Words from names of people (Eponyms) with focus on terms used in science and technology.
 - c) Word Forms – Focus on words from Science and Technology.
3. Words Often Confused
 - a) Homonyms, Homophones.
 - b) Heteronyms, Heterophones
 - c) Capitonyms

MODULE 2: READING

Duration: 12 Periods – (L 8 P 4)

1. Purpose of Reading
2. Types of Reading
3. Types of Paragraphs and Questions (F I V E)

MODULE 3: SPEAKING

Duration: 12 Periods – (L 8 P 4)

1. Need for English
2. Classroom English

3. Expressing Feelings
4. Expressing Likes & Dislikes
5. Making Requests
6. How to Introduce Oneself
7. Expressing obligations.

MODULE 4: GRAMMAR I

Duration: 12 Periods – (L 8 P 4)

1. Basic Sentence Patterns
2. Tenses
3. Voice

MODULE 5: GRAMMAR II

Duration: 15 Periods – (L 10 P 5)

1. Adjectives
2. Prepositions
3. Asking Questions

MODULE 6: WRITING

Duration: 12 Periods – (L 8 P 4)

1. Paragraph Writing – I
2. Paragraph Writing – II
3. Letter Writing – I
4. Letter Writing – II

COURSE OUTCOMES

No.	At the end of the course, the students will have the ability to:
101.1	Use a dictionary and acquire vocabulary for social interaction.
101.2	Comprehend, identify main ideas, make inferences, visualize, and answer questions. Analyze and evaluate the written material.
101.3	Speak and write grammatically correct sentences, communicate effectively, express their likes, dislikes, feelings, make requests, express obligations and introduce themselves.
101.4	Use verbs in the different tenses according to the situations. Use Voice to express an action clearly
101.5	Describe people and objects, ask questions, use prepositions and write grammatically correct sentences.
101.6	Convey ideas in the form of paragraphs and letters

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
101.1	-	-	-	-	3		3	5,7
101.2	-	-	-	-	3	2	3	5,6,7
101.3	-	-	-	-	3	3	3	5,6,7
101.4	-	-	-	-	2	2	3	5,6,7
101.5	-	-	-	-	2	2	3	5,6,7
101.6		-	--	--	2		3	5,7

Test	Units	Marks	Pattern
Mid Sem- I	1. Vocabulary 2. Reading	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
Mid Sem - II	1. Speaking 2. Grammar-1	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
Slip Test 1	1. Vocabulary 2. Reading	5	2 questions out of 3 questions
Slip Test 2	1. Speaking 2. Grammar-1	5	2 questions out of 3 questions
Assignment	One assignment per one semester	5	Different assignments of higher order questions that develop problem solving skills and critical thinking should be given
Seminars	One seminar per one semester	5	Oral presentations using audio–visual equipment, charts, etc.
	Total	60	

MID SEM - I EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	
MID SEM - II EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	

SEMESTER END EXAM							
Sl. NO.	Unit No.	Question to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9 (a)	13 (a)	
2	II						
3	III		2		10 (a)	14 (a)	
4	IV						
5	V		3	5, 6	9 (b)	13 (b)	
					11 (a)	15 (a)	
					11 (b)	15 (b)	
6	VI			7, 8	10 (b)	14 (b)	
					12 (a)	16 (a)	
					12 (b)	16 (b)	
Total Questions		8		8	8		

Legend:

Remembering: one mark

Understanding: three marks

Application: five marks

Suggested Student Activities:

- Practice conversation / dialogue / speech and answer the questions.
- Group discussions.
- Seminars.
- Review a movie.
- Review a book.
- Narrating a story.
- Chain stories.
- JAM.
- Speak about incidents /events /memories /dreams /role model.
- Interviews of famous personalities.
- Reading for main ideas and specific details.
- Summarizing.
- Picture description.
- Writing a recipe.
- Describing a process.
- Giving directions using maps.
- Surveys.
- Filling forms.
- e-mail etiquette.
- Preparing reports on field visits, experiments, projects.
- General English for competitive exams – Practice the previous year's question papers of SSC, RRB, TS TRANSCO, TSGENCO, etc.

REFERENCES:

1. Practical English Grammar by A.J Thomson and A.V. Martinet
2. A Course in Phonetics and Spoken English by J. Sethi and P.V Dhamija
3. Word Power Made Easy by Norman Lewis.
4. Keep Talking by Friederike Klippel.
5. More Grammar Games by Mario Rinvoluti and Paul Davis.
6. Essential English Grammar by Raymond Murphy.
7. Spoken English-A Self Learning Guide to Conversation Practice by V Sasi Kumar.

E-learning resources:

1. www.duolingo.com
2. www.bbc.co.uk
3. www.babbel.com
4. www.merriam-webster.com
5. www.ello.org
6. www.lang-8.com

7. youtube.com
8. Hello English (app)
9. mooc.org
10. <https://onlinecourses.nptel.ac.in>
11. <https://www.indeed.com/career-advice/>
12. Dictionary.com
13. Online Dictionaries
14. <https://englishsentences.com>
15. <https://englishcub.com/vocabulary/dictionary-thesaurus.htm>
16. TEDx talks.
17. Toastmasters International on YouTube.

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION – I
HU-101-BASIC ENGLISH

Time: 1 Hour

Total Marks: 20

PART - A

1 X 4 = 4

Instructions: Answer all the questions. Each question carries one mark.

1. Choose the correct guide words for the following words.

1. Pool:

a. Play, Portico	b. Poem, Poet
c. Prosper, Pull	d. Porpoise, Pout

2. Monkey:

a. Money, Monk	b. Mole, Mount
c. Moon, Most	d. More, move

2. _____ is the Unit of Electric Current in SI Units named after Andre Marie Ampere.

3. Read the following passage and answer the question.

There once was a Bald Man who sat down after work on a hot summer's day. A Fly came up and kept buzzing about his bald pate, stinging him from time to time. The Man aimed a blow at his little enemy, but his palm came on his head instead; and again the Fly tormented him. But this time the Man was wiser, and said: "You will only injure yourself if you take notice of despicable enemies."

- i) How can you say that the man has become wiser?

4. Read the following passage and answer the question.

An Eagle was soaring through the air when suddenly it heard the whizz of an Arrow, and felt itself wounded to death. Slowly it fluttered down to the earth, with its life- blood pouring out of it. Looking down upon the Arrow with which it had been pierced, it found that the shaft of the Arrow had been feathered with one of its own plumes. "Alas!" it cried, as it died. "We often give our enemies the means for our own destruction."

- i) What did the eagle discover before its death?

PART - B

3 X 2 = 6

Instructions: Answer the following questions. Each question carries three marks

5. a) Read the following and use correct words in the blanks.

I went to _____ (meat/ meet) the _____ (Principle / Principal) but he was on _____ (live/ leave) for a _____ (weak / week). I had to _____ (weight / wait) in the room before I was _____ (allowed / aloud) to go out.

(OR)

b) Use the following set of words in sentences of your own to express the difference in the meaning.

i) break - brake

ii) stationery - stationary

iii) waste - waist

6. a) Read the passage and answer the questions.

When I woke up it was broad daylight and the weather had cleared. The storm abated. The Ship was lifted off at night from the sand where she lay by the tie and was driven up almost as far as the rock where I have been bruised by the dashing. As the ship was upright and within a mile, I wish to board it to save necessary things for my use.

(i) How was the weather in the morning?

(ii) What had happened to the ship at night?

(iii) Why did he wish to board the ship?

(OR)

b) Read the passage and answer the questions.

O. Henry's original name was William Sidney Porter, he was born on 11th September, in 1862, Greensboro, North Carolina, U.S. He died on 5th June, 1910, New York. He was an American short story writer whose tales romanticized the commonplace - in particular the life of ordinary people in New York City. His stories expressed the effect of coincidence on character through humour, grim or ironic, and often had surprise endings, a device that became identified with his name and cost him critical favour when its vogue had passed.

(i) Who was William Sidney Porter?

(ii) What did his stories deal with?

(iii) What was the name he took up to write stories?

PART-C

5 X 2 = 10

Instructions: Answer the following questions. Each question carries five marks

7. a) Write the basic uses of a dictionary.

(OR)

b) How will you look up the word, "Travel", in the dictionary.

8. a) Read the passage and answer the questions.

An owl is a bird. There are two basic types of owls: typical owls and bam owls. Owls live in almost every country of the world. Owls are mostly nocturnal, meaning they are awake at night. Owls are predators – they hunt the food that they eat. Owls hunt for mince and other small mammals, insects and even fish. Owls are well adapted for hunting. Their soft, fluffy feathers make their flight nearly silent. They have very good hearing which helps them to hunt well in the darkness. The sharp hooked beaks and claws of the owl makes it very easy to tear apart their prey quickly, although owls also eat some prey whole.

Owl's eyes are unusual. Like most predators, both the eyes of the owl face front. The owl cannot move its eyes. Owls are far – sighted, which means they can see very well far away.... But they can't see dose very well at all. Fortunately, their distant vision is what they use for hunting and they see far away even in low light. Owls have facial disks around their eyes, tufts of feathers in a circle around each eye. These facial disks are thought to help the Owl's hearing. Owls can turn their heads 180 degrees is all the owl needs to see what's going on all around it. Perhaps because of the Owl's mysterious appearance, especially its round eyes and flexible neck, there are a lot of myths and superstitions about Owls. Many cultures believe that Owls are unusually wise. Because owls are nocturnal, some cultures associate owls with bad omens. The screech of the bam owl is considered by many to sound early human, like a person screaming. However, owls probably do not interact with fates of human at all. In fact, some owl species may become extinct because of humans.

- (i) How can you say that an owl is a predator? List a few special features present in predators.
- (ii) What helps owls in hunting?
- (iii) Why are myths and superstitions associated with an owl?
- (iv) Pick out the words from the passage which means:
 - a) A sign of something that will happen in the future.
 - b) In a strange frightening mysterious way.
- (v) What will you do if you see an owl with owlets in your college premises?

(OR)

b) Read the passage and answer the questions.

Marie Curie was born in Poland in 1867. She was the youngest of five children. Her father was a professor. Marie won a gold medal when she graduated from high school. She and her sister did private tutoring to earn money. At Sorbonne University she studied Mathematics and Physics. She earned a master's degree in Physics and with the help of a scholarship earned a master's in Mathematics. Later she received a doctorate in Physics. She met Pierre Curie and married him in 1895. Together they discovered two new radioactive elements. They named them Polonium and Radium. They received the Nobel Prize in the year 1903 for the discovery of Radioactivity along with Hennery Becquerel. In 1911 she received another Nobel Prize for the discovery of Polonium and Radium. In 1923 the French government gave her a pension of forty thousand Francs a year in recognition of her lifetime work in France. Many people have benefited from the discoveries made by Pierre and Marie Curie.

- (i) When and where was Marie Curie born?
- (ii) Why were they awarded the Nobel Prize?
- (iii) Write the antonyms for the following words:
 - a) Benefit b) Youngest
- (iv) Why did the French government give her a pension?
- (v) How can you say many people have benefitted from discoveries made by Pierre and Marie Curie?

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION – I
HU-101- BASIC ENGLISH

Time: 1 Hour

Total Marks: 20

PART - A

1 X 4 = 4

Instructions: Answer all the questions. Each question carries one mark.

1. Write a sentence to express the trait you like in your friend.
2. Rewrite the sentence using a word of obligation.
 - a) The teacher advised the students to work hard in order to get good marks.
3. Read the following sentence and write the sentence pattern.
 - a) I teach students.
 - b) Farmers are hard working.
4. Fill in the blank with the appropriate form of the verb.
 - a) He _____ (live) in that house since 2015.

PART - B

3 X 2 = 6

Instructions: Answer the following questions. Each question carries three marks.

5.
 - a) Write one expression used by the teacher.
 - (i) When the Class is noisy.
 - (ii) When a student is distracted.
 - (iii) When a student is permitted to leave early.
- OR**
- b) Write the feelings you express in the following situations.
 - (i) The train you have been waiting for hours has been cancelled.
 - (ii) Your mother says she is proud of you.
 - (iii) You forgot that a holiday was declared and went to college.
 6.
 - a) Change the voice of the following sentences.
 - (i) He eats only vegetarian food.
 - (ii) Ethical hacking has been learnt by Gaurav.
 - (iii) Submit your application.

OR

- b) Fill in the blanks with simple past and past continuous forms of the verbs given in the brackets.

When the children ____i____ (Play) in the park, they ____ii____ (hear) the whimper of a small puppy. The friends ____iii____ (search) under the bushes and

____iv____ (find) a white puppy. When they ____v____ (try) to pacify it a big dog suddenly ____vi____ (appear).

PART-C

5 X 2 = 10

Instructions: Answer the following questions. Each question carries five marks.

7.

- a) Write three difficulties faced by students while learning English. Give suggestion to overcome these difficulties.

OR

- b) Write your introduction in a formal situation (You are Anish studying in class XII)

8.

- a) Write a sentence using each of the given sentence patterns.

- a) S V b) S V O c) S V S C d) S V O OC
e) SVIODO

OR

- b) Write your routine using ten verbs.

BOARD DIPLOMA EXAMINATION (C-21)
END SEMESTER EXAMINATION
HU-101- BASIC ENGLISH

Time: 2 Hours

Total Marks: 40

PART – A

8 X 1 = 8

Instructions: 1. Answer all the questions.

2. Each question carries one mark.

1. Read the sentence and capitalize the words which represent the name of a country, month:
 - a. He bought a jersey in jersey.
 - b. They may come in may.
2. Rewrite the following sentence in the form of a request: to a friend, to your teacher.
Lend me your pen.
3. Frame “Yes” or “No” question for the following statement.
I have understood the problem.
4. Write the feeling you undergo in the following situation.
You see a small child working in a hotel at mid night while returning from a party.
5. Fill in the blanks with suitable prepositions.
Sreeni was angry _____ her mother _____ not permitting her to go to a late-night party.
6. Write a sentence about your teacher using two adjectives.
7. Write the salutation written to your friend while writing a letter.
8. Read the given paragraph and write the topic sentence.

The white Rhino is the largest mammal weighing around 300 Kgs. It has become endangered as humans hunt it for its horns. It has a wide mouth used for grazing and is the most social of all rhino species. White rhinoceroses are found in grassland and savannah habitat. [Herbivore grazers](#) that eat grass, preferring the shortest grains, the white rhinoceros is one of the largest pure grazers. It drinks twice a day if water is available, but if conditions are dry it can live four or five days without water. It spends about half of the day eating, one third resting, and the rest of the day doing various other things.

PART- B

4 X 3 = 12

Instructions: 1. Answer the following questions.

2. Each question carries three marks.

9.
 - a) Read the following passage and answer the questions.

During the summer holidays, I lost my phone. And for the week that I was phoneless, it felt like a disaster. I love my phone. It gives me quick access to information and allows me to constantly be looped in with my friends, to know exactly what is going on in their lives. So, when I didn't have my phone for a week, I felt a slightly sense of FOMO, or if you are not up to speed with the lingo, fear of missing out. By the end of the week, I would have got used to not having a phone and I would have enjoyed the break from social media. But there was still a lingering sense of sadness at the back of my mind that there would be conversations I had missed, messages that there would be conversations I had missed, messages that had been sent, funny videos shared and night time chats that I would probably never get to see.

- i. What felt like a disaster to the writer?
- ii. Why does the writer love his phone?
- iii. How did the writer feel without the phone?

OR

- b) Read the following passage and frame two "Wh" questions and one "Yes No" questions:

Dr Seuss was born on March second 1904. He was an American cartoonist and writer. His real name was Theodor Seuss Geisel. He was born in Springfield, Massachusetts. Dr Seuss liked draw and write even as child. The first book that Dr Seuss wrote was titled "And to think that I saw it on Mulberry Street". He wrote it while on a ocean voyage, returning from a trip to Europe. The rhythm of the ship's engine gave him the feeling for the poetry rhythm in the story. Dr Seuss was not a real doctor. He added the "Dr" to his name to honour his dad, who wanted Theodor to become a doctor. Even though he never became a real doctor, he did write books that helped millions of kids to read. Dr Seuss had also used other names, pen names to write books. These names include Theophrastus Seuss, Theo Le Sieg which is his real name spelled backwards, and Rosetta stone. Dr Seuss wrote more than sixty children's books including some which have been made into movies such as "The Lorax", "The Cat in the Hat", "Horton Hears a Who", and "How the Grinch Stole Christmas". He wrote lots of books for children, even though he and his wife never had children of their own. He died at age 87 in San Diego California, USA.

10.

- a) Write as directed.

- a) Write a sentence expressing what you like about the rainy season.
- b) Rewrite the sentence using a word of obligation:

The Doctor told the patient to reduce the intake of salt, if he wants the healthy life.

- c) Write two hobbies you would express while giving your introduction.

OR

- b) Write a paragraph in 100 words about a festival you like.
- 11.
- a) Fill in the blanks with the proper order of adjectives given in brackets
- a) He ate _____ (green/ English / round / some) apples.
- b) She has _____ (lot of / old / interesting) books.
- c) My grandmother had always been _____ (slightly bend / fat / short).

OR

- b) Fill in the blank with adjectives or prepositions.
- Tiger is a _____ animal that lives _____ forests. It is _____ animal as it feeds _____ other animals. Tigers are very _____. The body _____ tigers is red or orange with black stripes.
- 12.
- a) Write a letter to your friend asking him to write about his college.

OR

- b) Write a paragraph on the importance of physical exercise.

PART-C

4 X 5 = 20

*Instructions: 1. Answer the following questions.
2. Each question carries five marks.*

- 13.
- a) Write about five different kinds of dictionaries.

OR

- b) Read the following passage and write three “Wh” questions and two “yes No” questions.

One of the results of Technology and population growth is increase of pollution throughout the world. According to United Nation’s report the future of all life on earth will be endangered. If man does not control contamination of the environment, It is time, we learn the full extent of the dangers that face mankind.

For instance, here in Egypt, look at River Nile. It is strange to see how everything is thrown into it as if it were litter basket. Instead of keeping it clean and pure, we pollute it. We our-selves, not our enemies, dirty it with our own hands. Some farmers wash themselves, their clothes, their animals, their pots and pans in its water. They even throw away their dead animals, and birds into it. Some people living in cities and towns throw their old tyres and broken bottles and rusty tins into it. Factories throw their waste chemicals and garbage. In this way the Nile water gets poisoned, kills fish, poisons land, weakens crops and destroys health.

So, it would be foolish to shut our eyes to the dangers of the pollution that man causes to the very thing on which his life depends. Please keep Nile clean.

- 14.
- a) Write five problems faced by students while learning English. Write your suggestions to overcome these problems.

OR

- b) Write a paragraph about Covid-19 pandemic in 150 words.
15. a) Describe your favourite place using ten adjectives.

OR

- b) Fill in the blanks with suitable prepositions.
He lives _____ (in / on) a beautiful cottage _____ (beside / besides) the river. There is a pathway _____ (between / among) the two flower beds leading _____ (to / from) the cottage. He has been living there _____ (since / for) his childhood.
16. a) Write a letter to your friend advising him to work hard to get good marks.

(OR)

- b) Write a letter to the editor of The Times of India about the problems faced by the students during the recent monsoon.

SC-102-BASIC ENGINEERING MATHEMATICS

Course Title	Basic Engineering Mathematics	Course Code	SC-102
SEMESTER	I	Course Group	Foundation
Teaching Scheme in periods (L : T : P)	4:1: 0	Credits	3 Credits
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the basic knowledge of Algebra, Trigonometry in Mathematics at Secondary school level

Course Outcomes: COs

At the end of the course, the student will have the ability to:

CO 1	Solve simple problems using concepts of Logarithms& Partial Fractions
CO 2	Determine the inverse of a square matrix using matrix algebra
CO 3	Calculate trigonometric ratios of allied and compound angles and Solve simple problems using concepts of multiple and sub multiple angles
CO 4	Understand the concepts of properties of triangles and determine various forms of complex numbers
CO 5	Transform sum or difference of trigonometric ratios into product and vice versa and also solve some problems in inverse trigonometric functions
CO 6	. Solve simultaneous Linear Equations using the concepts of Matrices and Determinants and solve some problems in solutions of triangles

Course Content:

Algebra

Unit-I

Duration: 08Periods (L: 06– T: 02)

1. Logarithms:

Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation – Solve some simple problems.

2. Partial Fractions:

Definition of Rational, proper and improper fractions of polynomials. Resolving rational fractions into their partial fractions covering the types mentioned below:

$$\begin{array}{ll} \text{i)} & \frac{f(x)}{(x+a)(x+b)(x+c)} \\ \text{ii)} & \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\ \text{iii)} & \frac{f(x)}{(x^2+a)(x+b)} \\ \text{iv)} & \frac{f(x)}{(x+a)(x^2+b)^2} \end{array}$$

UNIT-II

Duration: 16 Periods (L: 12 – T:

04)

- 1. Matrices and Determinants:** Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, difference, scalar multiplication and product of matrices. Transpose of a Matrix- Symmetric, Skew symmetric matrices- Minor, cofactor of an element-Determinant of a square matrix up to 3rd order -Laplace's expansion, properties of determinants. Singular and non-singular matrices- Adjoint and multiplicative inverse of a square matrix –related problems.

Trigonometry:

Unit-III

Duration: 14 Periods (L: 12 – T:

02)

- 1. Compound angles:** Formulae of Sin (A±B), Cos (A±B), Tan (A±B), Cot(A±B), and related identities with problems - Derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.-Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc.,
- 2. Multiple and sub multiple angles:** Trigonometric ratios of multiple angles 2A, 3A and submultiples angle A/2 with problems - Derive useful allied formulas like

$$\sin^2 A = \left(\frac{1 - \cos 2A}{2} \right) \text{ etc., - Solve simple problems using the above formulae}$$

Unit – IV

Duration: 10 Periods (L: 08– T:

2.0)

- 1. Properties of triangles:** Statements of Sine rule, Cosine rule, Tangent rule and Projection rule and solve some simple problems using above rules

2. **Hyperbolic functions:** Definitions of hyperbolic functions – $\sinh(x)$, $\cosh(x)$, $\tanh(x)$ etc., - identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
3. **Complex Numbers:** Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form, Exponential (Euler) form of a complex number.

Algebra & Trigonometry

Unit – V

Duration: 13Periods (L: 11 – T: 2.0)

1. **Transformations:** Transformation of products into sums or differences and vice versa - Simple problems - Solve problems by applying these formulae to sum or difference or product
2. **Inverse trigonometric functions:** Define inverses of six trigonometric functions along with their domains and ranges - Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions - with examples - State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ etc - solve simple problems. like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ where $x \geq 0$, $y \geq 0$, $xy < 1$

Unit – VI

Duration: 14 Periods (L:11– T:03)

1. **Solution of Simultaneous equations using Matrices & Determinants.:** System of linear equations in 3 Variables-Solutions by Cramer's rule, Matrix inversion method – Examples- Elementary row operations on Matrices -Gauss-Jordan method to solve a system of equations in 3 unknown variables
2. **Solutions of triangles:** Solve a triangle when (i) Three sides (SSS) (ii) Two sides and an Included angle (SAS) (iii) One side and two angles are given (SAA) - Simple problems.

References

1. Text Book of Matrices – by Shanti Narayan
2. Plane Trigonometry - by S. L. Loney
3. NCERT Mathematics Text Books Of Class XI, XII.
4. Intermediate Mathematics Text Books (Telugu Academy)

Suggested E-Learning references

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E-books: www.mathebook.net

Suggested Learning Outcomes:

At the end of the course, the student will have the ability to:

Algebra

UNIT – I

1.0 Use Logarithms in engineering calculations

- 1.1 Solve some simple Logarithm problems. Using logarithm properties
- 1.2 Distinguish natural logarithms and common logarithms.
- 1.3 Explain the meaning of e and exponential function.
- 1.4 Understand logarithm as a function and its graphical representation.

Resolve Rational Fraction into sum of Partial Fractions in engineering problems

- 1.5 Define the following fractions of polynomials:
 - i) Rational
 - ii) Proper and
 - iii) Improper
- 1.6 Resolving rational fractions of the type mentioned below into partial fractions

$$\begin{array}{ll} \text{i)} & \frac{f(x)}{(x+a)(x+b)(x+c)} \\ \text{ii)} & \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\ \text{iii)} & \frac{f(x)}{(x^2+a)(x+b)} \\ \text{iv)} & \frac{f(x)}{(x+a)(x^2+b)^2} \end{array}$$

UNIT – II

2.0 Use Matrices for solving engineering problems:

- 2.1 Know the matrix and types of a matrix.
- 2.2 Compute sum, difference, scalar multiplication and product of matrices.
- 2.3 Know the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.
- 2.4 Define the transpose of a matrix and write its properties.
- 2.5 Define symmetric and skew-symmetric matrices.

- 2.6 Resolve a square matrix into a sum of symmetric and skew- symmetric matrices with examples in all cases.
- 2.7 Define minor, co-factor of an element of a 3x3 square matrix with examples.
- 2.8 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.
- 2.9 Distinguish singular and non-singular matrices.
- 2.10 Apply the properties of determinants to solve problems.
- 2.11 Compute Adjoint and multiplicative inverse of a square matrix.

Trigonometry:

UNIT – III

3.0 Solve simple problems on Compound Angles

- 3.1 Understand the compound angles and able to write the formulae of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and $\cot(A \pm B)$
- 3.2 Able to derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\tan 15^\circ$ and $\sin 75^\circ$, $\cos 75^\circ$, $\tan 75^\circ$ etc.
- 3.3 Derive identities like $\sin(A+B)$, $\sin(A-B) = \sin^2 A - \sin^2 B$ etc.,
- 3.4 Solve simple problems on compound angles.

Solve problems using the formulae for Multiple and Sub- Multiple Angles

- 3.5 Derive the formulae of multiple angles $2A$, $3A$ etc and sub multiple angles $A/2$ in terms of angle A of trigonometric functions.
- 3.6 Derive useful allied formulas like $\sin^2 A = \left(\frac{1 - \cos 2A}{2} \right)$ etc.,
- 3.7 Solve simple problems using the above formulae

UNIT – IV

4.0 Appreciate Properties of triangles:

- 4.1 Understand the sine, cosine, tangent and projection rules. Solve some simple problems

Represent the Hyperbolic Functions in terms of logarithm functions

- 4.2 Understand $\sinh x$, $\cosh x$ and $\tanh x$ and list the hyperbolic identities.
- 4.3 Represent inverse hyperbolic functions in terms of logarithms.

Represent Complex numbers in various forms:

- 4.4 Understand the complex number, its modulus, and conjugate and list their properties.

- 4.5 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples.

UNIT – V

5.0 Apply Transformations for solving the problems in Trigonometry:

- 5.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.
- 5.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

Use Inverse Trigonometric Functions for solving engineering problems:

- 5.3 Know the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.
- 5.4 Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions - with examples.
- 5.5 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ etc.
- 5.6 Solve some problems like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ where $x \geq 0, y \geq 0$
And $xy \leq 1$

UNIT – VI

6.0 Apply Matrices and Determinants in solving system of Linear Equations:

- 6.1 Solve system of linear equations with 2 and 3 unknown variables using Cramer's rule.
- 6.2 Solve system of linear equations with 2 and 3 unknown variables by matrix inversion method
- 6.3 State elementary row operations.
- 6.4 Solve a system of linear equations in 3 unknown variables by Gauss- Jordan method

Apply Properties of Triangles to solve a triangle.

- 6.5 Solve a triangle when
- Three sides (SSS)
 - Two sides and an included angle (SAS),
 - One side and two angles are given (SAA).

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests
5. Seminars
6. Home Assignments.
7. Mathematics- for preparing competitive exams and solve some arithmetical ability exam Questions

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	1					3	1,2,7
CO2	3	2					3	1,2,7
CO3	3	2					3	1,2,7
CO4	3	2					3	1,2,7
CO5	3	2					3	1,2,7
CO6	3	2					3	1,2,7

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
		11(b)			15(b)		
6	VI		7,8	10(b)	14(b)		
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEMESTER EXAMINATIONS - I
SC-102 - BASIC ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Find the value of $\log_8 2$
2. Define Proper fraction and give an example.
3. If $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -1 \\ 3 & 2 \end{bmatrix}$ Then Compute $3A + 5B$.
4. Find the value of $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$.

PART-B

Instructions:

1. Answer All questions

02 X 03 = 06

2. Each question carries **THREE** marks

- 5.
- a) Resolve: $\frac{x}{(x-1)(x-2)}$ into partial fractions

OR

- b) Find the value of $\log_2 16 + 3\log_8 32$

6.

- a) If $\begin{pmatrix} 2 & 1 & 2 \\ 1 & 4 & 1 \\ 1 & 3 & 2 \end{pmatrix}$, then Compute $A^2 + 2A - 3I$, where **I** is a unit matrix of order 3

OR

- b) Find x if $\begin{vmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{vmatrix} = 48$

PART C

Instructions:

1. Answer All questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7.

a) Resolve $\frac{9}{(x-1)(x+2)^2}$ into Partial fractions:

OR

b) Prove that $\log\left(\frac{75}{60}\right) - 2\log\left(\frac{5}{9}\right) + \log\left(\frac{32}{243}\right) = \log 2$

8.

a) If $A = \frac{1}{3} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$, then show that $A^{-1} = A^T$

OR

b) Show that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$.

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BOARD DIPLOMA EXAMINATIONS (C21)
MID SEMESTER EXAMINATION
SC-102- BASIC ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions 04 X 01 = 04

2 Each question carries **ONE** mark

1. Write the formulae for Sin (A - B) and Cos (A - B)
2. If Tan A = 2, Find the value of Cos2A.
3. Write the formula for Cosine rule.
4. Find the Modulus of $\frac{2}{3+2i}$

PART-B

Instructions: 1. Answer All questions 02 X 03 = 06

2. Each question carries **THREE** marks

5.

a) Show that $\frac{\cos 27^\circ + \sin 27^\circ}{\cos 27^\circ - \sin 27^\circ} = \tan 57^\circ$

OR

b) Prove that $\cos 20^\circ \cos 30^\circ \cos 40^\circ \cos 80^\circ = \frac{\sqrt{3}}{16}$.

6.

a) Write any 3 formulae from Hyperbolic functions.

OR

b) Find the modulus of $\frac{1}{2+4i}$

PART C

Instructions:

1. Answer All questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7.

a) Prove that $\frac{(\tan A + \sec A - 1)\cos A}{\sin A + \cos A - 1} = \frac{1 + \sin A}{\cos A}$

OR

b) Prove that $\cos^2 A + \cos^2 (60^\circ + A) + \cos^2 (60^\circ - A) = \frac{3}{2}$

8.

a) Find the additive and multiplicative Inverse of $4 + 3i$

OR

b) Express the complex number $\frac{1+i}{1-i}$ in Exponential form

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BOARD DIPLOMA EXAMINATION (C-21)
SEMESTER END EXAMINATION
SC-102- BASIC ENGINEERING MATHEMATICS

Time: 2 hours

[Total Marks: 40]

PART-A

Instructions: 1. Answer **ALL** questions 08 X 01 = 08

2 Each question carries **ONE** mark

1. Define proper fraction.
2. Write the formula for $\cos(A + B)$ and $\tan(A + B)$
3. Define solution of a triangle.
4. Find the value of $\log_4 16$.
5. Convert $\sin 6\theta + \sin 8\theta$ in to product
6. If $\sin^{-1} \frac{3}{5} = A$ then find $\cot A$.
7. List the elements of a triangle ABC.
8. What is the formula for the solution of triangle ABC when three sides are given

PART-B

Instructions: 1. Answer All questions 04 X 03 = 12

2. Each question carries **THREE** marks

9 (a) Resolve : $\frac{9}{(x-1)(x+2)^2}$ into Partial fractions:

9 (b) Prove that $\frac{\sin 8\theta + \sin 6\theta}{\cos 8\theta + \cos 6\theta} = \tan 7\theta$

10 (a) Express $\frac{9}{4+3i}$ in the form of $a + bi$.

Or

10(b) Solve the triangle ABC with $a=2$, $A=30^\circ$, $C=30^\circ$.

11(a) Prove that $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$.

Or

11(b) Prove that $\tan^{-1} \frac{2}{7} + \tan^{-1} \frac{1}{5} = \tan^{-1} \frac{17}{33}$.

12(a) Solve $\begin{bmatrix} 3 & 2 \\ 2 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$.

Or

12 (b) Find the angle C in any triangle ABC if $b = \sqrt{2}, c = \sqrt{3}, B = 45^\circ$.

PART C

Instructions:

1. Answer All questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13(a) Find the Adjoint of the matrix $\begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 1 \\ 0 & 3 & 3 \end{bmatrix}$

Or

13 (b) Prove that $\sin \theta + \sin(120^\circ + \theta) - \sin(120^\circ - \theta) = 0$

14 (a) Prove that $\cos 6^\circ \cdot \cos 42^\circ \cdot \cos 66^\circ \cdot \cos 78^\circ = \frac{1}{6}$

(b) Solve: $x + y + z = 6, x + 2y + 3z = 14, x + 4y + 9z = 3$ by using inverse Matrix method.

15(a) In any triangle ABC prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$

15(b) if $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$ then prove that $xy + yz + zx = 1$

16(a) Solve: $x + 2y - z = -3, 3x + y + z = 4, x - y + 2z = 6$ by Cramer's Rule.

Or

16 (b) Solve the triangle ABC with $a = 1, b = 2, c = \sqrt{2}$.

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SC-103 BASIC PHYSICS

Course Title	Basic Physics	Course Code	SC-103
Semester	Semester-I	Course Group	Foundation
Teaching Scheme in Pds(L:T:P)	4:1:0	Credits	3
Type of course	Lecture+Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites: High School Science and Mathematics

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Physics in different areas of engineering and technology.

Course outcomes: On successful completion of the course, the student will have the ability to attain below Course Outcomes (CO):

CO1	Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
CO2	Apply laws of Vectors as tools to solve engineering problems
CO3	Explain friction on horizontal and inclined surfaces, analyze projectile and circular motions and apply the formulation to projectiles and central forces and solve engineering problems
CO4	Explain Hooke's law, properties of fluids viz surface tension, viscosity and significance of Reynolds's number and apply Bernoulli's principle to solve engineering problems
CO5	Apply conservation laws to various energy sources
CO6	Apply Heat and thermodynamic processes and formulate to understand engineering problems

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	-	2
CO2	3	1	-	-	-	-	2
CO3	3	1	-	-	-	-	2
CO4	3	1	-	1	-	-	2
CO5	3		-	-	1	-	2
CO6	3	1	-	-	-	-	2
	3	1		1	1		2

SC-103 - BASIC PHYSICS

Course Contents

1. UNIT - 1 UNITS, DIMENSIONS AND MEASUREMENTS

Duration: 12 periods

Physical quantity – Fundamental and derived quantities, unit – definitions – system of units – Advantages of S.I. units

Dimensions and dimensional formula – definitions, units and dimensional formulae for physical quantities, Dimensionless quantities, Principle of homogeneity, Applications of dimensional analysis – Checking the correctness of physical equations – conversion of unit from one system to another system – problems on density, force and energy

Error in measurement – accuracy and precision of instruments, rules for representing significant figures-Numerical problems

2. UNIT – 2 VECTORS

Duration: 13 periods

Scalar and Vector quantities – definition and examples, representation of a vector, Classification of vectors - Proper vector, Equal vectors, Unit vector, Negative vector, null vector and Position vector, Resolution of a vector.

Lami's theorem, Parallelogram law of vectors – statement- expression for magnitude and direction of resultant vector –derivation- illustrations(working of sling and flying bird), Representation of a vector in unit vectors $\mathbf{i}$, $\mathbf{j}$ and $\mathbf{k}$. – numerical problems.

Scalar product of vectors- application to work done by force and power – properties of scalar product. – Numerical problems.

Vector product of vectors– Right hand thumb rule and right hand screw rule - application to torque - properties of vector product - Application to area of parallelogram and triangle -numerical problems.

3. UNIT -3 MECHANICS

Duration: 13 periods

Concept of Friction - Normal reaction, Angle of friction, Motion of a body over a rough horizontal surface - expressions for Acceleration, Displacement, Time taken to

come to rest - derivations, inclined plane - Motion of a body over a smooth inclined plane and rough inclined plane–forces acting on the body -angle of repose, Application of friction – brake system in bicycle– numerical problems

Projectile motion – definition – examples, Horizontal projection - Oblique projection, Expression for path of a projectile in oblique projection –derivation, Maximum height, Time of ascent, Time of descent, Time of flight, Horizontal range and maximum horizontal range in oblique projection– derivations, numerical problems

Circular motion – definition of angular displacement, angular velocity, angular acceleration, frequency and time period, Relation between linear and angular velocity – derivation – related numerical problems, Central force – examples, Expressions for centripetal and centrifugal forces (no derivation), Applications of centripetal and centrifugal forces - Banking of roads and its expression, bending of cyclist and principle of centrifuge - related numerical problems.

4. UNIT – 4 PROPERTIES OF MATTER

Duration: 12 periods

Elasticity – Elastic body –definition - examples, Stress and Strain – definitions and expressions, types of stress and strain, elastic limit - Hooke's law – statement – modulus of elasticity, significance of stress and strain curve -Young's modulus – Derivation, numerical problems

Cohesive and Adhesive forces - Surface tension - Capillarity –angle of contact – definition- examples for capillarity- Formula for Surface tension based on capillarity (no derivation), effect of temperature and impurity on surface tension, applications and illustrations of surface tension, numerical problems.

Viscosity - Newton's formula for viscous force – derivation - Coefficient of viscosity - Poiseuille's equation (formula only), Effect of temperature on viscosity of liquids and gases, applications of viscosity, numerical problems.

Concept of fluid motion –streamline and turbulent flow, Reynold's number, equation of continuity, Bernoulli's theorem (only formula) and applications - related problems.

5. UNIT – 5 CONSERVATION LAWS AND ENERGY SOURCES

Duration: 12 periods

Work, Power and Energy – explanation, Potential Energy and Kinetic energy– examples – expressions for Potential energy and Kinetic energy– derivations, Work-Energy theorem – derivation, Law of conservation of energy – examples, Law of conservation of energy in the case of freely falling body – proof – Illustration of

conservation of energy in the case of simple pendulum, Nonrenewable and renewable energy sources – definition and applications (solar cooker, wind mill and biogas plant), Green House effect, Energy conservation (saving) methods - domestic and industrial, related problems

6. UNIT – 6 HEAT

Duration: 13 periods

Heat – thermal expansion of solids – Coefficients of expansions, different scales of temperature- Centigrade and Fahrenheit and their relationship, Bimetallic strip – applications in daily life - electric heater thermostat- circuit breaker-iron box, Boyle's law – statement, concept of absolute zero - Absolute scale of temperature, Charles' laws, Ideal gas equation – derivation - value of universal gas constant 'R', Gas equation in terms of density, Isothermal and Adiabatic processes - Differences between isothermal and adiabatic processes, Internal energy and External work done, Expression for work done – derivation, first law of thermodynamics –application of first law to isothermal and adiabatic processes, second law of thermodynamics, specific heats of a gas, related numerical problems.

LEARNING OUTCOMES:

Upon completion of the course the student shall be able to

UNITS, DIMENSIONS AND MEASUREMENTS

- 1.1 Define Physical quantity, fundamental quantity and derived physical quantity.
- 1.2 Classify system of units (FPS, CGS, MKS and SI) and outline advantages of S.I. units.
- 1.3 Write S.I. units of physical quantities.
- 1.4 Define Dimensions and dimensional formulae of physical quantities.
- 1.5 List dimensional formulae of physical quantities.
- 1.6 List dimensionless quantities.
- 1.7 Explain Principle of homogeneity of dimensions.
- 1.8 List the applications of dimensional formulae.
- 1.9 List the limitations of dimensional analysis.
- 1.10 Apply dimensional formulae to check the correctness of physical equations and to convert a unit from one system to another system (density, force and energy).
- 1.11 Define accuracy and precision of instruments, random and systematic errors.
- 1.12 List the rules for representing significant figures.
- 1.13 Solve simple numerical problems.

VECTORS

- 2.1 Define Scalar and Vector quantities with examples.

- 2.2 Represent a vector graphically and label vector characteristics.
- 2.3 Classify Vectors - Proper vector, Equal vector, Unit vector, Negative vector, Null vector and Position vector.
- 2.4 Resolve a Vector into two orthogonal components.
- 2.5 Explain Lami's theorem.
- 2.6 Explain Parallelogram law of vectors and develop expressions for magnitude and direction of resultant vector.
- 2.7 Illustrate parallelogram law of vectors (working of sling and flying bird).
- 2.8 Represent a vector in terms of unit vectors ($\hat{i}, \hat{j}, \hat{k}$).
- 2.9 Explain Scalar product of vectors.
- 2.10 Apply scalar product to work done by force and power.
- 2.11 List the properties of scalar product.
- 2.12 Explain vector product of vectors.
- 2.13 Explain right hand thumb rule and right hand screw rule.
- 2.14 Apply vector product to explain torque.
- 2.15 List the properties of vector product.
- 2.16 Extend vector product to area of parallelogram and area of triangle.
- 2.17 Solve related numerical problems.

MECHANICS

- 3.1 Explain concept of friction.
- 3.2 Explain Normal reaction and Angle of friction.
- 3.3 Derive expression for acceleration of a body on a rough horizontal surface.
- 3.4 Derive expressions for displacement and time taken to come to rest by a body over a rough horizontal surface.
- 3.5 Explain and label the forces acting on a body moving over smooth and rough inclined planes.
- 3.6 Define angle of repose.
- 3.7 Apply friction in brake system of moving vehicles such as bicycle.
- 3.8 Explain and classify Projectile motion with examples.
- 3.9 Derive expression for path of a projectile in oblique projection.
- 3.10 Develop formulae for Maximum height, Time of ascent, Time of descent, Time of flight, Horizontal range and maximum horizontal range of a projectile in oblique projection.
- 3.11 Explain circular motion and define angular displacement, angular velocity, angular acceleration, frequency and time period.
- 3.12 Develop a relation between linear velocity and angular velocity.
- 3.13 Explain Central force with examples and outline expressions for Centripetal and Centrifugal forces.
- 3.14 Apply centripetal and centrifugal forces to banking of roads, bending of cyclist and centrifuge.

3.15 Solve related numerical problems.

PROPERTIES OF MATTER

- 4.1 Define Elasticity and elastic bodies with examples.
- 4.2 Define Stress and Strain with their expressions.
- 4.3 Explain types of stress and strain.
- 4.4 Define Elastic limit.
- 4.5 Explain Hooke's law.
- 4.6 Outline the significance of stress and strain curve.
- 4.7 Develop a formula for Young's modulus of a wire having circular cross-sectional area.
- 4.8 Compare Cohesive and Adhesive forces.
- 4.9 Explain Surface tension and illustrate Surface tension with examples.
- 4.10 Define capillarity and angle of contact.
- 4.11 Outline the formula for Surface tension based on capillarity ($T = \frac{1}{2} h d \rho g$).
- 4.12 Effect of temperature and impurity on surface tension of a liquid.
- 4.13 Explain Viscosity.
- 4.14 Develop Newton's formula for viscous force and explain coefficient of viscosity.
- 4.15 Outline Poiseuille's equation for coefficient of viscosity.
- 4.16 Explain the effect of temperature on viscosity of liquids and gases.
- 4.17 Identify the importance of viscosity in blood flow through arteries, liquid soap, paint, lubricants and braking oil.
- 4.18 Explain Streamline flow and Turbulent flow.
- 4.19 Define Reynold's number and explain its significance.
- 4.20 Outline the Equation of Continuity and explain the terms with diagram.
- 4.21 Explain Bernoulli's theorem.
- 4.22 Apply Bernoulli's theorem to dynamic lift (aero foil lift, swing of a ball, blowing of roofs, atomizer, Bunsen burner).
- 4.23 Solve related numerical problems.

CONSERVATION LAWS AND ENERGY SOURCES

- 5.1 Explain concept of Work, Power and Energy.
- 5.2 Explain Potential energy and Kinetic energy with examples.
- 5.3 Develop expressions for Potential energy and Kinetic energy.
- 5.4 State Work-Energy theorem and prove the relation.
- 5.5 State law of conservation of energy with examples.
- 5.6 Prove law of conservation of energy in the case of a freely falling body.
- 5.7 Illustrate law of conservation of energy in the case of simple pendulum.
- 5.8 Explain Non-renewable and Renewable energy sources and list the examples.
- 5.9 Explain Solar cooker, Wind mill and Biogas plant with neat diagrams.
- 5.10 Explain Green House effect.
- 5.11 List domestic and industrial energy conservation methods.

5.12 Solve related numerical problems.

HEAT

- 6.1 Explain thermal expansion of solids and three coefficients of expansion of solids.
- 6.2 Outline Centigrade and Fahrenheit scales of temperature and relate them.
- 6.3 Explain principle of Bimetallic strip.
- 6.4 Apply principle of bimetallic strip to electric water heater thermostat, circuit breaker and iron box.
- 6.5 Explain Boyle's law in gases and its limitations.
- 6.6 Explain concept of Absolute Zero using the relations $P_t = P_0[1 + \frac{t}{273}]$ and $V_t = V_0[1 + \frac{t}{273}]$.
- 6.7 Explain Absolute scale of temperature.
- 6.8 Explain Charles' laws in gases in terms of absolute temperature.
- 6.9 Develop Ideal gas equation and calculate the value of Universal gas constant.
- 6.10 Translate gas equation in terms of density.
- 6.11 Explain Isothermal and Adiabatic processes and distinguish between them.
- 6.12 Explain the terms internal energy and external work done.
- 6.13 Derive the expression for work done by the gas [$W = P(V_2 - V_1)$].
- 6.14 Explain first law of thermodynamics and list applications of it.
- 6.15 Apply first law of thermodynamics to isothermal and adiabatic processes.
- 6.16 Explain second law of thermodynamics and list applications of it.
- 6.17 Define specific heats and molar specific heats of a gas.
- 6.18 Solve related numerical problems.

References:

1. Principles of Physics by N. Subrahmanyam and Brijlal, S. Chand & Co, New Delhi, edition, 1982
2. Engineering. Physics by R.K. Gaur, S.L. Gupta, Dhanpatrai Publications, New Delhi.
3. ISC Physics, Book I&II, P. Vivekanandan, DK Banerjee, S Chand, New Delhi.
4. Intermediate Physics, Vol. I&II, Telugu Academy, TS, Hyderabad.
5. Fundamentals of Physics by Halliday and Resnick.

E-learning resources:

1. Hyper Physics website: <http://hyperphysics.phy-astr.gsu.edu/>

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
		11(b)			15(b)		
6	VI		7,8	10(b)	14(b)		
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8			8	8	

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD DIPLOMA EXAMINATION (C-21)
MID SEM-I
FIRST SEMESTER EXAMINATION
SC-103 - BASIC PHYSICS

Time: 1 Hour

Total Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark. 4X1 =4

1. Define fundamental physical quantity.
2. Write dimensional formula for work.
3. Define vector quantity.
4. Define unit vector.

PART-B

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks. 2X3 =6

5. (a). Outline three applications of dimensional analysis.
(OR)
(b). Outline any three rules for representing significant figures.
6. (a). Explain Lami's theorem.
(OR)
(b). Explain right hand screw rule of vector product.

PART-C

Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks. 2X5 =10

7. (a). By applying the dimensional analysis convert CGS unit of energy into SI units of energy.
(OR)
(b). Check the correctness of the following equations by applying Principle of homogeneity?
1) $s = ut + \frac{1}{2} at^2$ 2) $v^2 - u^2 = 2as$
8. (a). Derive expression for magnitude and direction of resultant vector by applying parallelogram law of vectors.
(OR)
(b). Two vectors are $\vec{A} = 3\vec{i} - 3\vec{j} + \vec{k}$ and $\vec{B} = 4\vec{i} + 9\vec{j} + 2\vec{k}$. Solve $\vec{A} \times \vec{B}$

BOARD DIPLOMA EXAMINATION (C-21)
MID SEM –II
FIRST SEMESTER EXAMINATION
SC-103 - BASIC PHYSICS

Time: 1 Hour

Total Marks: 20

PART-A

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark.

4X1 =4

1. Define angle of friction.
2. Define central force.
3. Define stress.
4. Define Reynold's number.

PART-B

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

2X3 =6

5. (a). Explain the forces acting on the body moving up on a rough inclined plane.
(OR)
(b). Derive the relation between linear velocity and angular velocity.
6. (a). Explain the effect of temperature on viscosity of liquids and gases.
(OR)
(b). Explain Bernoulli's theorem.

PART-C

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

2X5 =10

7. (a). Develop expressions for maximum height and horizontal range of a projectile in oblique motion.
(OR)
(b). Develop the expression for angle of banking of roads.
8. (a). Develop formula for young's modulus of a wire having circular cross-sectional area.
(OR)
(b). Apply Bernoulli's theorem to dynamic aero foil lift.

BOARD DIPLOMA EXAMINATION, (C-21)
FIRST SEMESTER EXAMINATION
SC-103 - BASIC PHYSICS

Time: 2 Hours]

[Total Marks: 40

PART – A

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark.

08X01=08

1. Define unit.
2. Define capillarity.
3. What is SI unit of power?
4. Define Hooke's law.
5. Name any one example of conservation of energy.
6. Define energy.
7. Define specific heat of a gas.
8. Define internal energy.

PART – B

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

04X03=12

9(a). Explain Lami's theorem.

(OR)

9(b). Explain renewable and non-renewable energy sources with example.

10(a). Explain projectile motion with example.

(OR)

10(b). Explain Boyle's law and its limitations.

11(a). Show that $PE = mgh$

(OR)

11(b). Explain law of conservation of energy in the case of simple pendulum.

12(a). Explain first law of thermodynamics and list applications of it.

(OR)

12(b). Explain Boyle's law and its limitations.

PART – C

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

04X05 = 20

13(a). Develop expressions for magnitude and direction of resultant of two vectors using parallelogram law of vectors.

(OR)

13(b). Develop expression for kinetic energy of a body of mass 'm' moving with a velocity 'v'.

14(a). Develop a relation between linear velocity and angular velocity.

(OR)

14(b). apply first law of thermodynamics to isothermal and adiabatic processes.

15(a). Apply law of conservation of energy in the case of freely falling body.

(OR)

15(b). Explain Work-Energy theorem and develop the relation.

16(a). develop ideal gas equation

(OR)

16(b). Explain principle of bimetallic strip and apply it to electric water heater thermostat

SC-104 - GENERAL ENGINEERING CHEMISTRY

Course Title	General Engineering Chemistry	Course Code	SC-104
Semester	I	Course Group	Foundation
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture +Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Prerequisite: Basic knowledge of chemistry in secondary education.

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Chemistry and environmental studies in different spheres of industries.

Course Outcome: On successful completion of the course, the students will have ability to attain below Course Outcomes (CO):

CO1	Understand and explain the concept of atomic structure, chemical bonding, oxidation, reduction and oxidation number and apply the knowledge to solve engineering problems.
CO2	Understand and explain concept of mole, molarity, normality and colloids and apply the knowledge in various engineering areas.
CO3	Understand and explain the different theories of acids and bases, concept of pH, buffer action and apply the knowledge to solve engineering problems.
CO4	Understand the concept of Ecosystem, Biodiversity, Green Chemistry and Management of e-waste and take measures to support sustainable development.
CO5	Understand the concept of hardness and degree of hardness of water and apply the relevant water treatment methods to solve domestic and industrial problems.
CO6	Understand the concept of electrolysis, applications of electrolysis, Faraday's Laws of Electrolysis and apply the knowledge in extraction and purification of metals used for domestic and industrial purpose.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	-	-	-	-	2
CO2	3	1	-	-	1	-	2
CO3	3	1	-	-	-	-	2
CO4	3	-	-	-	3	-	3
CO5	3	1	-	-	1	-	2
CO6	3	1	-	-	-	-	2

COURSE CONTENTS

UNIT-I: Fundamentals of Chemistry

13 Periods

Atomic Structure: Introduction – Atomic number – Mass number- Isotopes and Isobars - Bohr's Atomic Theory - Orbitals - Shapes of s, p and d orbitals – Aufbau principle - Hund's rule - Pauli's exclusion principle - Electronic configuration of elements

Chemical Bonding: Introduction – Electronic theory of valency - Types of chemical bonds - Ionic, Covalent, Co-ordinate covalent, Metallic and Hydrogen bonds with examples - Properties of Ionic and Covalent compounds - Types of Hydrogen bonds – Effect of hydrogen bonding on physical properties.

Oxidation-Reduction: Electronic concept of Oxidation, Reduction, Oxidation Number - Calculations.

UNIT-II: Solutions and Colloids

12 Periods

Introduction - Solution – Solubility - Classification of solutions based on physical state- Atomic weight - Molecular weight ,Equivalent weight - Mole concept – Molarity – Normality - Numerical problems on mole, molarity and normality – Colloids - Types of colloids- Lyophilic and Lyophobic colloids - Protective Colloids - Gold number - Properties of Colloids - Industrial applications of colloids.

UNIT-III: Acids and Bases

13 Periods

Introduction - Theories of acids and bases and limitations - Arrhenius theory - Bronsted - Lowry theory - Lewis acid base theory - Ionic product of water - pH and related numerical problems - Buffer solutions- buffer action - Applications of buffer solution - Ostwald's theory of indicators.

UNIT-IV: Environmental Science

12Periods

Introduction - Environment -Scope and importance of environmental studies- Important terms -Concept of ecosystem - Producers, consumers and decomposers - Food chain - Food web - Carbon and nitrogen cycles - Biodiversity, definition and threats to Biodiversity- Forest resources- Deforestation – Green Chemistry – e-waste – Management of e-waste.

UNIT-V: Water Technology

13 Periods

Introduction -Soft and hard water - Causes of hardness – Types of hardness - Disadvantages of hard water using in industries - Degree of hardness - Softening methods - Permutit process - Ion exchange process - Drinking water - Municipal treatment of water for drinking purpose – Osmosis - Reverse Osmosis - Advantages of Reverse osmosis – Desalination by Electro dialysis – Defluoridation – Nalgonda Technique.

UNIT-VI: Electrochemistry:

12 Periods

Conductors, insulators, electrolytes – Types of electrolytes - Arrhenius theory of electrolytic dissociation - Electrolysis – Electrolysis of fused NaCl and aqueous NaCl – Applications of electrolysis - Faraday's laws of electrolysis- Numerical problems.

Reference Books:

1. Engineering chemistry – Jain & Jain – Dhanpat Rai Publishing Company.
2. A Text book of Engineering Chemistry – S.S.Dara – S.Chand Publications.
3. Environmental Studies – A.K.De.
4. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press
5. Intermediate Chemistry I and II – Telugu Academy TS
6. Engineering chemistry – Prasanta Rath, B. Ramadevi, Ch. Venkataramana Reddy& Subhendu Chakroborty – CENGAGE

E - learning links:

1. <https://iupac.org/>
2. <https://www.khanacademy.org/>
3. www.nptel.ac.in
4. www.chemguide.co.uk
5. www.visionlearning.com

Specific Learning Outcomes

Upon completion of the course, the student will have ability to

UNIT- I: FUNDAMENTALS OF CHEMISTRY

- 1.1 Explain the concept of atomic number, mass number, isotopes and isobars
- 1.2 State the postulates of Bohr's atomic theory and its limitations
- 1.3 Define Orbital.
- 1.4 Draw and explain the shapes of s, p and d orbitals.

- 1.5 Distinguish between Orbit and Orbital
- 1.6 Make use of 1. Aufbau principle, 2. Hund's rule and 3. Pauli's exclusion principle in writing electronic configuration of elements.
- 1.7 Write the electronic configuration of elements up to atomic number 30
- 1.8 Define chemical bond.
- 1.9 Write the Postulates of Electronic theory of valency.
- 1.10 List the types of chemical bonds viz., Ionic, Covalent, Co-ordinate covalent, Metallic and Hydrogen bond.
- 1.11 Define ionic bond and explain the Ionic bond formation in NaCl, MgO, CaCl₂, Na₂O, K₂O.
- 1.12 List and explain the properties of ionic compounds.
- 1.13 Explain covalent bond formation in Hydrogen, Oxygen, Nitrogen, Ammonia, Methane, Ethylene, and Acetylene molecules using Lewis Dot Method.
- 1.14 List and explain the properties of covalent compounds.
- 1.15 Compare the properties of ionic compounds and covalent compounds.
- 1.16 Define metallic bond and explain with free electron theory/ electron sea model.
- 1.17 Define hydrogen bond
- 1.18 Explain inter molecular hydrogen bonding in HF, H₂O, NH₃
- 1.19 Explain inter and intra molecular hydrogen bonding in Salicylaldehyde and Nitrophenol.
- 1.20 Explain the effect of hydrogen bonding on the boiling point.
- 1.21 Explain the effect of hydrogen bonding on solubility of alcohols
- 1.22 Understand the electronic concept of oxidation, reduction and redox reaction.
- 1.23 Define oxidation number
- 1.24 List the rules for calculation of oxidation number.
- 1.25 Apply the rules to calculate the oxidation number.

UNIT-II: SOLUTIONS AND COLLOIDS

- 2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent.
- 2.2 Define solubility.
- 2.3 Explain the factors effecting solubility.
- 2.4 Define aqueous solution and alcoholic solution.
- 2.5 Compare unsaturated, saturated and super saturated solutions.

- 2.6 Classify the solutions based on the physical state of solute and solvent.
- 2.7 Define atomic weight, molecular weight and equivalent weight.
- 2.8 Calculate the molecular weight and the equivalent weights of acids, bases and salts.
- 2.9 Define mole.
- 2.10 Explain mole concept and solve the numerical problems.
- 2.11 Define and explain molarity and normality.
- 2.12 Derive the relationship between molarity to normality.
- 2.13 Solve numerical problems on molarity and normality of a solution and mixture of solutions.
- 2.14 Define and explain colloids, dispersed phase and dispersion medium with examples.
- 2.15 List the types of colloids with examples.
- 2.16 Distinguish between Lyophilic Colloid and Lyophobic Colloid.
- 2.17 Understand the Protective Colloids and Gold number. (Elementary level)
- 2.18 Explain the properties of colloids: Tyndall effect, Brownian movement and Coagulation.
- 2.19 State and explain the industrial applications of colloids.

UNIT-III: ACIDS AND BASES

- 3.1 Explain Arrhenius theory of acids and bases.
- 3.2 State the limitations of Arrhenius theory of acids and bases
- 3.3 Explain Bronsted - Lowry theory of acids and bases.
- 3.4 State the limitations of Bronsted - Lowry theory of acids and bases.
- 3.5 Explain Lewis theory of acids and bases.
- 3.6 List out the types of Lewis acids and bases.
- 3.7 State the limitations of Lewis theory of acids and bases.
- 3.8 Explain the ionic product of water and solve the problems.
- 3.9 Define pH and explain Sorenson's pH scale.
- 3.10 Solve the numerical problems on pH (Strong acids and bases).
- 3.11 Define buffer solutions and give examples of acidic and basic buffers.
- 3.12 State the applications of buffer solutions.
- 3.13 Explain the buffer action of acidic (acetate buffer) and basic (ammonium buffer) buffers.
- 3.14 Explain the Ostwald's theory of indicators with phenolphthalein and methyl orange indicators as an example.

UNIT-IV: ENVIRONMENTAL SCIENCE

4.1 Define the term environment

4.2 Explain the importance of the following

1) Lithosphere, 2) Hydrosphere, 3) Atmosphere, 4) Biosphere,

4.3 Define and understand the following terms

i) Pollutant, ii) Contaminant iii) Pollution, iv) Receptor, v) Sink,
vi) Particulates, vii) Threshold limit value (TLV), viii) Dissolved oxygen
(DO), ix) BOD and x) COD

4.4 Define Ecosystem. Understand the biotic and the abiotic components of ecosystem.

4.5 Define and explain the following biotic components with examples

1) Producers, 2) Consumers and 3) Decomposers

4.6 Explain the food chain of land, aquatic and forest.

4.7 Explain the Food web.

4.8 Understand the Carbon and Nitrogen cycles.

4.9 Define and explain biodiversity

4.10 Explain the threats to biodiversity.

4.11 Explain conservation of biodiversity.

4.12 Describe the forest and list the uses of forests.

4.13 Define the deforestation and explain the causes, effects and control of deforestation.

4.14 Understand the concept of Green Chemistry – Its principles and benefits.

4.15 Define e-waste

4.16 Explain the effect of e-waste on environment.

4.17 State the effects of chemicals released from e-waste on human beings.

4.18 Explain the management of e-waste.

4.19 Understand and explain the advantage of recycling of e-waste.

UNIT V: WATER TECHNOLOGY

5.1 State the various sources of water.

5.2 Define the terms soft water and hard water with examples

5.3 Define hardness of water.

5.4 Explain temporary and permanent hardness of water.

5.5 List the usual chemical compounds causing hardness (with Formulae)

5.6 Explain the disadvantages of using hard water in industries.

- 5.7 Define Degree of hardness, units of hardness in ppm , mg/L and numerical problems related to hardness.
- 5.8 Explain the methods of softening of hard water:
- a) Removal of temporary hardness by i) Boiling ii) Clark's Method
 - b) Removal of total hardness by i) Permutit process ii) Ion-Exchange process.
- 5.9 List the essential qualities of drinking water.
- 5.10 Explain Municipal treatment of water for drinking purpose.
- 5.11 Define Osmosis and Reverse Osmosis (RO).
- 5.12 List the applications and advantages of RO.
- 5.13 Explain the process of desalination of sea water by Electro dialysis.
- 5.14 Explain the process of defluoridation by using Nalgonda Technique.

UNIT VI: ELECTROCHEMISTRY

- 6.1 Define the terms 1. Conductor, 2. Insulator, 3. Electrolyte and 4. Non-electrolyte
- 6.2 Types of electrolytes - strong and weak electrolytes with examples.
- 6.3 Distinguish between metallic conductors and Electrolytic conductors.
- 6.4 Explain the Arrhenius theory of electrolytic dissociation
- 6.5 Define electrolysis.
- 6.6 Explain the electrolysis of fused NaCl and aqueous NaCl (Nelson Cell).
- 6.7 Explain the applications of Electrolysis - Electrolytic refining of metal (Copper)
- Electroplating.
- 6.8 Explain Faraday's laws of electrolysis
- 6.9 Define chemical equivalent, electrochemical equivalent.
- 6.10 Know the relationship between chemical equivalent and electrochemical equivalent
- 6.11 Solve the numerical problems based on Faraday's laws of electrolysis

Blue Print

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
				11(b)	15(b)		
6	VI			7,8	10(b)	14(b)	
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER, MIDSEM – I
SC-104 - GENERAL ENGINEERING CHEMISTRY

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark.
marks

4 X 1 = 4

1. State Hund's rule.
2. Write the electronic configuration of Cr.
3. Define mole.
4. What are colloids?

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

2 x 3 = 6 Marks

5. a. Draw the shapes of s and d orbitals.
(OR)
b. Explain the covalent bond formation in Nitrogen molecule by Lewis dot method.
6. a. Classify solutions based on their physical state.
(OR)
b. Compare any three properties of lyophilic and lyophobic colloids.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 = 10 Marks

7. a. Explain the effect of hydrogen bonding on boiling point with examples.
(OR)
b. What is oxidation number? Find the oxidation number of 'S' in H_2SO_4 and 'Mn' in KMnO_4 .
8. a. Define molarity. Find the weight of H_2SO_4 required to prepare 400 ml of 0.5M solution.
(OR)
b. Define normality. Calculate the normality of 500 ml solution containing 0.53 grams of Na_2CO_3 .

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER, MIDSEM – II
SC-104 - GENERAL ENGINEERING CHEMISTRY

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: i. Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. What is conjugate acid base pair?
2. Define ionic product of water.
3. Define an ecosystem.
4. What is threshold limit value?

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

2 x 3 = 6 Marks

5. a. What are the limitations of Arrhenius theory of acids and bases?
(OR)
b. Explain the neutralization according to Lewis theory of acids and bases with an example.
6. a. Explain the terms producers, consumers and decomposers with example.
(OR)
b. Explain the aquatic food chain.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 = 10 Marks

7. a. Define pH. Find the pH of 0.5M NaOH solution.
(OR)
b. What are buffer solutions? State the applications of buffer solutions.
8. a. What is Biodiversity and how to conserve the Biodiversity.
(OR)
b. What is deforestation? What are its consequences?

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER END EXAMINATION
SC-104 - GENERAL ENGINEERING CHEMISTRY

Time: 2 Hours

Max. Marks: 40

PART-A

Instructions: Answer **all** questions. Each question carries **one** mark.

8 X 1 = 8 marks

1. Define atomic mass number.
2. What is biodiversity?
3. Define degree of hardness of water.
4. What are buffer solutions?
5. Define soft water and hard water.
6. Name the salts responsible for temporary hardness of water.
7. Define the terms conductor and insulator.
8. What is an electrolyte?

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

4 x 3 = 12 Marks

9. a. State and explain Hund's rule.
or
b. Write any six essential qualities of drinking water.
10. a. Explain the terms producers, consumers and decomposers with example.
or
b. What are strong and weak electrolytes? Give examples.
11. a. Define reverse osmosis and state its advantages.
or
b. Compare temporary and permanent hardness of water.
12. a. Distinguish between metallic and electrolytic conductors.
Or
b. State Faraday's Laws of electrolysis.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks 4 x 5 =20
Marks

13. a. Find the molarity and normality of the two litres of solution containing 10.6 grams of Na_2CO_3 .
or
b. Calculate the temporary and permanent hardness of water containing the following salts per litre
i. $\text{Ca}(\text{HCO}_3)_2 = 32.4 \text{ mg}$, ii. $\text{Mg}(\text{HCO}_3)_2 = 29.2 \text{ mg}$, iii. $\text{CaSO}_4 = 13.6 \text{ mg}$, iv. $\text{MgCl}_2 = 19 \text{ mg}$
14. a. Explain Lewis theory of acids and bases.
or
b. Explain the process of electrolysis of fused NaCl .
15. a. Explain the permutit process of softening of hard water with a neat diagram.
or
b. What are the disadvantages of using hard water in industries?
16. a. Explain the process of electrolytic refining of copper.
Or
b. Calculate the weight of Al deposited on the cathode if 0.5 amperes of electric current is passed through AlCl_3 solution for 1 hour.
- .

EC-105 - Basic Electrical & Electronics Engineering

Course Title :	Basic Electrical & Electronics Engineering	Course Code	EC-105
Semester	I	Course Group	Core
Teaching Scheme in Periods(L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours	75 Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Basic Physics and Mathematics at Secondary school level

Course Outcomes:

Upon completion of the course the student should be able to achieve the following outcomes

CO1 :	Interpret the Basic principles of electricity
CO2 :	Classify Resistors, Inductors and Capacitors, also explain their applications and specifications.
CO3 :	Explain the working of Diodes and special Semiconductor devices.
CO4 :	Analyze the working of Transistor in different regions and configurations.
CO5 :	Explain Transistor biasing and Stabilization techniques.
CO6 :	Analyze the working of FETs and MOSFETs.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	-	1	1	3
CO2	3	3	3	2	3	3	3
CO3	3	2	3	3	2	3	3
CO4	3	1	3	3	1	3	3
CO5	3	1	2	1	2	1	3
CO6	3	1	3	3	3	2	3

Course Content

UNIT 1 – Basic principles of electricity

Duration: 12 Periods

Define (i) electric current (ii) EMF (iii) voltage, concept of resistance to flow of electrons- Deduce the relation $= \frac{\rho l}{A}$, specific resistance, simple problems based on specific resistance- effects of temperature on resistance- expression for resistance at any temperature as $R_t = R_o(1 + \alpha_o t)$ - Temperature co-efficient at zero 0°C and any temperature $t^\circ\text{C}$ -solve problems based on the $R_t = R_o(1 + \alpha_o t)$ & $\alpha_t = \alpha_o / (1 + \alpha_o t)$. expression for equivalent resistance when resistors are connected in series and parallel-problems on series circuits and parallel circuits-work, Power and Energy-Joule's Law -concept of sine wave and define the important terms. Write different forms of emf equation -simple problems to calculate Amplitude, frequency and Time Period -Define the terms Average value, R.M.S. value, Form Factor and Peak Factor for sine wave- terms phase and phase difference- concept of Leading, lagging and in phase components with the help of waveforms.

UNIT 2– Classification of Resistors, Inductors and Capacitors

Duration: 13 Periods

Types of resistors- specifications of a resistor, and state their importance- necessity of preferred- values in resistor- Colour Code (4band and 5 band)-common faults in resistors-wire wound Resistors-applications of Wire wound Resistor- Variable resistors-European and US standard symbols of Potentiometers and Presets-specifications and applications of LDR-principle of operation of VDR-specifications of inductors-applications of A.F. and R.F chokes- common faults in inductors- different types of capacitors-specifications of a capacitor and state their importance- different markings on the a) Electrolytic capacitors b) Ceramic and Plastic capacitors (Value, Polarization, Voltage, Tolerance, temperature rating)- Reading of capacitor value and tolerance by 1. Colour code 2. Value printed-applications of Paper, Mica, Glass, Polyester, Polystyrene, Ceramic, Electrolytic capacitors- losses and common faults in capacitors.

UNIT 3 : Explain the working of Diodes and special Semiconductor devices

Duration: 12 Periods

P-type and N-type semiconductors - PN Junction Diode with no bias - forward bias and reverse bias of PN diode - Volt-Ampere (V-I) characteristics of PN Diode - applications of PN Diode -Working principle of varactor diode- characteristics of Varactor Diode- constructional details of photo diode-characteristics of photo diode-characteristics of photo transistor-principle of photovoltaic cell. Working principle of LCD-types of LCD displays-merits and demerits of LCD Displays-applications of LCD.

UNIT4 –. Understand the working of Transistor

Duration: 13 Periods

Formation of Transistor-working of PNP and NPN Transistors-the input/output characteristics of CB, CE and CC configurations-Interpret the regions of operation of a transistor- relate the alpha, beta and gamma Factors- important specifications and applications of BJT-expression for collector current in CE configuration-performance characteristics of CE, CB and CC Configurations-Transistor as an amplifier- working principle of UJT with its equivalent circuit- UJT characteristics- - applications of UJT-.

UNIT 5 : Understand Transistor biasing and Stabilization techniques

Duration: 12 Periods

Concept of DC and AC load line-selection of operating point on DC load line with waveforms-factors affecting the Q-point- thermal runaway-need for proper biasing in amplifier circuits- types of biasing circuits-stabilization in amplifier circuits-various stability factors (S , S_β , SV_{BE})-expression for stability factor in CE configuration-fixed bias circuit-collector to base resistor method of biasing- self-bias circuit-CE amplifier and explain the function of each component.

UNIT 6 : Understand the working of FETs and MOSFETs.

Duration: 13 Periods

different types of FETs and draw their symbols-construction and principle of operation of n-channel JFET-drain characteristics of JFET-mutual characteristics of JFET-parameters of JFET and obtain the relation among them-specifications and applications of JFET-merits of JFET over BJT-construction and principle of operation of depletion type MOSFET-construction and principle of operation of enhancement type MOSFET-Compare JFET and MOSFET-principle of operation of CMOSFET.

Recommended Books

1. Basic Electrical Engineering	By	V.K.Mehatha
2. Electrical Technology Volume 1	By	BL Theraja
3. Electronic Devices and Circuits	By	David A.BellPrentice hall
4. Hand book of components for Electronics	By	Charles A. Harper
McGrawhills		

Specific Learning Outcomes

1.0 Basic principles of electricity

- 1.1 Define (i) electric current (ii) EMF (iii) voltage
- 1.2 Explain the concept of resistance to flow of electrons.
- 1.3 Deduce the relation $R = (\rho l) / a$
- 1.4 Define specific resistance.
- 1.5 Solve simple problems based on specific resistance.
- 1.6 Explain the effects of temperature on resistance
- 1.7 Develop the expression for resistance at any temperature as $R_t = R_o(1 + \alpha_o t)$
- 1.8 Define Temperature co-efficient at zero 0°C and any temperature $t^\circ\text{C}$
- 1.9 Solve problems based on the $R_t = R_o(1 + \alpha_o t)$ & $\alpha_t = \alpha_o / (1 + \alpha_o t)$.
- 1.10 Derive the expression for equivalent resistance when resistors are connected in series and parallel.
- 1.11 Solve problems on series circuits and parallel circuits.
- 1.12 Define work, Power and Energy.
- 1.13 Define Joule's Law
- 1.14 Explain the concept of sine wave and define the important terms.
- 1.15 Write different forms of emf equation

- 1.16 Solve simple problems to calculate Amplitude, frequency and Time Period
- 1.17 Define the terms Average value, R.M.S. value, Form Factor and Peak Factor for sine wave.
- 1.18 Explain the terms phase and phase difference.
- 1.19 Explain the concept of Leading, lagging and in phase components with the help of waveforms.

2.0 Classification of Resistors, Inductors and Capacitors

- 2.1 Classify types of resistors.
- 2.2 List the specifications of a resistor, and state their importance.
- 2.3 Explain the necessity of preferred values in resistor.
- 2.4 Identify Resistance Value by using Colour Code (4band and 5 band).
- 2.5 List the common faults in resistors.
- 2.6 Classify wire wound Resistors.
- 2.7 List applications of Wire wound Resistor.
- 2.8 List the two types of Variable resistors.
- 2.9 Draw the European and US standard symbols of Potentiometers and Presets.
- 2.10 List important specifications and applications of LDR.
- 2.11 Explain principle of operation of VDR.
- 2.12 List the specifications of inductors.
- 2.13 List the applications of A.F. and R.F chokes.
- 2.14 List the common faults in inductors.
- 2.15 Classify the different types of capacitors.
- 2.16 List the specifications of a capacitor and state their importance.
- 2.17 Explain different markings on the a) Electrolytic capacitors b) Ceramic and Plastic capacitors (Value, Polarization, Voltage, Tolerance, temperature rating).
- 2.18 Explain Reading of capacitor value and tolerance by 1. Colour code 2. Value printed.
- 2.19 Mention the applications of Paper, Mica, Glass, Polyester, Ceramic, Electrolytic capacitors.
- 2.20 Mention the losses and common faults in capacitor

3.0 Explain the working of special Semiconductor devices

- 3.1 Explain extrinsic semiconductors - P-type and N-type semiconductors.
- 3.2 Explain PN Junction Diode with no bias.

- 3.3 Explain forward bias and reverse bias of PN diode
- 3.4 Explain Volt-Ampere (V-I) characteristics of PN Diode.
- 3.5 List the applications of PN Diode.
- 3.6 Explain the working principle of varactor diode.
- 3.7 Draw the characteristics of Varactor Diode.
- 3.8 List the application of varactor diode
- 3.9 Explain constructional details of photo diode.
- 3.10 Draw and explain the characteristics of photo diode.
- 3.11 Draw and explain the characteristics of photo transistor.
- 3.12 Explain the principle of photovoltaic cell.
- 3.13 Explain the working principle of LCD
- 3.14 Mention the types of LCD displays
- 3.15 List the merits and demerits of LCD Displays
- 3.16 List the applications of LCD.

4.0 Understand the working of Transistor.

- 4.1 Explain the formation of Transistor.
- 4.2 Explain the working of PNP and NPN Transistors.
- 4.3 Sketch the input/output characteristics of CB, CE and CC configurations.
- 4.4 Interpret the regions of operation of a transistor.
- 4.5 Derive and relate the alpha, beta and gamma Factors.
- 4.6 List important specifications and applications of BJT.
- 4.7 Derive the expression for collector current in CE configuration.
- 4.8 Compare the performance characteristics of CE, CB and CC Configurations
- 4.9 Explain how Transistor works as an amplifier.
- 4.10 Explain the working principle of UJT with its equivalent circuit
- 4.11 Draw and explain UJT characteristics.
- 4.12 List applications of UJT.

5.0 Understand Transistor biasing and Stabilization techniques

- 5.1 Explain the concept of DC and AC load line.
- 5.2 Explain the selection of operating point on DC load line with waveforms.
- 5.3 List the factors affecting the Q-point.
- 5.4 Explain thermal runaway

- 5.5 State the need for proper biasing in amplifier circuits.
- 5.6 List the types of biasing circuits.
- 5.7 Define stabilization in amplifier circuits.
- 5.8 Define the various stability factors (S , S_{β} , SV_{BE})
- 5.9 Derive an expression for stability factor in CE configuration.
- 5.10 Explain the fixed bias circuit.
- 5.11 Explain the collector to base resistor method of biasing.
- 5.12 Explain the self-bias circuit.
- 5.13 Draw a practical CE amplifier and explain the function of each component.

6.0 Understand the working of FETs and MOSFETs.

- 6.1 Classify the different types of FETs and draw their symbols.
- 6.2 Explain the construction and principle of operation of n-channel JFET.
- 6.3 Draw and explain the drain characteristics of JFET
- 6.4 Draw and explain the mutual characteristics of JFET.
- 6.5 Define the parameters of JFET and obtain the relation among them.
- 6.6 List the important specifications and applications of JFET.
- 6.7 List the merits of JFET over BJT.
- 6.8 Explain the construction and principle of operation of depletion type MOSFET.
- 6.9 Explain the construction and principle of operation of enhancement type MOSFET.
- 6.10 Compare JFET and MOSFET.
- 6.11 Explain the principle of operation of CMOSFET.

Suggested Student Activities

- 1. Student visits Library to refer to Manual of Electronic components to find their specifications
- 2. Student inspects the available equipment in the Lab to identify the components
- 3. Visit nearby Industry to familiarize with fabrication techniques
- 4. Analyze the connections in the UPS available in the Institution facility
- 5. Quiz

6. Group discussion
7. Surprise tests

Suggested E-Learning resources

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	
S.No	Unit Name	MID SEM-II EXAM			
		R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	

SEMESTER END EXAMINATION

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI			7,8	10(b)	14(b)	
					12(a)	16(a)	
					12(b)	16(b)	
Total Questions		8		8	8		

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER, MIDSEM – I
EC-105 BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark.
marks

4 X 1 = 4

1. Define specific resistance.
2. Define work and power.
3. List any 2 important specifications of resistors.
4. Mention the losses in capacitors.

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

2 x 3 = 6 Marks

5a. Calculate the time period and frequency of a sine wave of voltage $v = 20 \sin (500\pi t)$ volts.

(OR)

- b. Derive the expression for equivalent resistance when resistances are connected in series.
- 6a. List the important applications of LDR.

(OR)

- b. List the common faults in inductors.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

1 x 5 = 10 Marks

7a. Derive the expression for resistance at any temperature as $R_t = R_o(1 + \alpha_0 t)$.

(OR)

- b. Explain the concept of phase leading and phase lagging with necessary waveforms.
- 8a. Classify different types of capacitors.

(OR)

- b. List the specifications of inductors.

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER, MIDSEM – II
EC-105 BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: i. Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. What is N-type semiconductor?
2. What is doping?
3. Define alpha of a transistor.
4. Write the relation between alpha and beta of a transistor.

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

3x 3 =6 Marks

5a. Explain the working of PN diode without bias.

(OR)

b. Explain the working principle of LCD.

6a. Derive the expression for collector current in CE configuration.

(OR)

b. . Explain the working of transistor as amplifier.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 =10 Marks

9a. Explain the V-I characteristics of UJT.

(OR)

b. Explain the constructional details of photo diode.

10a. Compare the performance characteristics of CB,CE and CC configuration.

(OR)

b. Explain the working of NPN transistor.

BOARD DIPLOMA EXAMINATIONS (C21)
I SEMESTER END EXAMINATION
EC-105 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
Time: 2 Hours **Max. Marks: 40**

PART-A

Instructions: Answer **all** questions. Each question carries **one** mark.
marks

8 X 1 = 8

1. Define specific resistance.
2. What is an RF choke?
3. Define beta of a transistor.
4. Draw the symbols of Varactor diode and UJT.
5. List the applications of LCD.
6. List the merits of LCD displays.
7. Draw the symbol of JFET and MOSFET.
8. What are the parameters of JFET?

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks 4 x 3 =12
Marks

9 a. Derive the expression for equivalent resistance when resistances are connected in series.

(OR)

b. Explain the selection of operating point on DC load line.

10 a. List the common faults in inductors.

(OR)

b. List the important applications of JFET.

11a. State the need for proper biasing in amplifier circuits.

OR

b. List the factors affecting the Q point.

12a. List the merits of JFET over BJT.

OR

b. Draw and explain the mutual characteristics of JFET.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks 4 x 5 =20
Marks

13a. List the specifications of capacitor and explain their importance.

(OR)

b. Explain the drain characteristics of JFET.

14 a. Explain the working principle of Varactor diode.

(OR)

b. Explain the working principle of enhancement type of MOSFET.

15 a. Explain the concept of DC and AC load line.

(OR)

b. Explain the self- bias circuit.

16 a. Explain the drain characteristics of n-channel JFET

(OR)

b. List any 5 merits of JFET over BJT

ME-106 BASIC ENGINEERING DRAWING

(This Course is Common to all programs of Diploma in Engineering offered by the State Board of Technical Education, Hyderabad, Telangana State)

Course Title :	Basic Engineering Drawing	Course Code	ME-106
Semester	I	Course Group	Core
Teaching Scheme in Pds (L :P)	1:0:2	Credits	1.5
Methodology	Lecture + Practice	Total Contact Pds:	45
CIE	60 Marks	SEE	40 Marks

Prerequisites: No prerequisites are required to learn this course.

Course Objectives

The Course is aimed at developing basic drawing skills so as to enable them to use these skills in the preparation of engineering drawings, their reading and interpretation.

Course Outcomes

Upon completion of the subject the student shall be able to

CO1	Recognize the importance of Engineering Drawing and usage of the drawing instruments.
CO2	Practice free hand lettering & numbering in different styles.
CO3	Recognize the importance of Dimensioning and Acquiring the knowledge of different methods of dimensioning systems.
CO4	Appreciate the usage of engineering curves such as tangent lines, tangent arcs, parabola, hyperbola, ellipse, involute, cycloid and helix in various engineering applications and draw the above said curves
CO5	Realize the concept of projection and attain visualization projection of points, Lines and Planes. The student will also be able to draw the views related to projection of Points, Lines and Planes.
CO6	Analyze the concept of orthographic projections and student will be able to draw orthographic views of an object from its pictorial drawing.

Blueprint for Marks in SEE

Unit No	Name of the Unit	Periods	Questions to be set for SEE		
			R	U	A
			PART-A (2M Questions)		PART-B (6M Questions)
1, 2 & 3	Importance of Engineering Drawing and Instruments, Free hand lettering and Numbering and Dimensioning Practice	09	Q1		Q9(a)
4a.	Geometric constructions up to construction of polygons	06	Q2		Q9(b)
4b.	Geometric constructions contd., Conical curves and Special curves	06	Q3		Q10(a)
5	Projection of points, Lines, and Planes	09	Q4		Q10(b)
6	Orthographic projections	15	Q5, Q6, Q7, Q8		Q11(a), Q11(b), Q12(a), Q12(b)
Total Periods / Total Questions		45	8		4
[R: Remembering; U: Understanding – 2 Marks; A: Application – 6 Marks] <u>Note: Question Paper consists PART – A and PART-B</u> PART – A consists of 8 questions) and student has to answer ALL questions, each question carries 2 marks. (8x2 = 16) PART – B consists of 4 questions and student has to attempt ALL questions, each question carries 6 marks (4x6=24)					

CIE Question Paper Pattern and Syllabus

Unit No	Name of the Unit	Periods	Questions to be set for CIE		
			R	U	A
			PART-A (2M Questions)		PART-B (6M Questions)
Mid Sem – I Exam					
1, 2 & 3	Importance of Engineering Drawing and Instruments, Free hand lettering and Numbering and Dimensioning Practice	09	Q1, Q2	Q5(a), Q5(b)	
4a.	Geometric constructions up to construction of polygons	06	Q3, Q4	Q6(a), Q6(b)	
Total			4	2	
Mid Sem – II Exam					
4b.	Geometric constructions contd., Conical curves and Special curves	06	Q1, Q2	Q5(a), Q5(b)	
5	Projection of points, Lines, and Planes	09	Q3, Q4	Q6(a), Q6(b)	
Total			4	2	
[R: Remembering; U: Understanding – 2 Marks; A: Application – 6 Marks]					
<u>Note: Question Paper consists PART – A and PART-B</u> PART – A consists of 4 questions and student has to answer ALL questions, each question carries 2 marks. (4x2 = 8) PART – B consists of 2 questions and student has to attempt ALL questions, each question carries 6 marks (2x6=12)					

Course Contents

NOTE:

1. B.I.S Specification should invariably be followed in all the topics.
2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0 The importance of Engineering Drawing and Engineering Instruments

Explanation of the scope and objectives of the subject of Engineering Drawing Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education – Link between Engineering drawing and other subjects of study.

Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents, Care and maintenance of Drawing Sheet, Drawing plate:

Lay out of sheet – as per SP-46-1988 to a suitable scale.

2.0 Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering

Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm)

Advantages of single stroke or simple style of lettering - Use of lettering stencils

3.0 Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description - Location of features, surface finish, fully dimensioned Drawing -Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features: Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

4.0 Geometric Construction

Division of a line: to divide a straight line into given number of equal parts internally examples in engineering application. Construction of tangent lines: to draw tangent lines touching circles internally and externally.

Construction of tangent arcs

- a) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles).
- b) Tangent arc of given radius touching a circle or an arc and a given line.
- c) Tangent arcs of radius R, touching two given circles internally and externally.

Construction of polygon: construction of any regular polygon of given side length using general method.

Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. application viz. Projectiles, reflectors, P-V Diagram of a hyperbolic process.

Conical Curves: Construction of any conic section of given eccentricity by general method.

Construction of ellipse by concentric circles method.

Construction of parabola by rectangle method.

Construction of rectangular hyperbola.

Special Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering application, viz, Gear tooth profile, screw threads, springs etc. - their construction

5.0 Projection of points, lines and planes

Projecting a point on two planes of projection -Projecting a point on three planes of projection -Projection of straight line.

- a) Parallel to both the planes.
- b) Perpendicular to one of the planes.
- c) Inclined to one plane and parallel to other planes.

Projection of regular planes.

- a) Plane perpendicular to HP and parallel to VP and vice versa.
- b) Plane perpendicular to HP and inclined to VP and vice versa.

6.0 Orthographic Projections

Meaning of orthographic projection -Using a viewing box and a model – Number of views obtained on the six faces of the box - Legible sketches of 3 views for describing object -Concept of front view, top view, and side view for sketching these views of engineering objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe full object.

Reference Books

1. Engineering Drawing by N.D. Bhatt (Charotar Publishing House Pvt. Ltd.)
2. Engineering Drawing by Kapil dev – (Asian Publisher)

3. Engineering Drawing by Basant Agarwal & C. M. Agarwal - (McGraw-hill)
4. A Textbook on Engineering Drawing by P. Kannaiah, K. L. Narayana, K. Venkata Reddy

Online Resources

1. [1.https://nptel.ac.in/courses](https://nptel.ac.in/courses)
2. [2. www.slideshare.net/shameem.mist/engineering-drawing](http://www.slideshare.net/shameem.mist/engineering-drawing)
3. [3.https://www.powershow.com/viewfl/76303a-](https://www.powershow.com/viewfl/76303a-)
4. OWI5M/Engineering_Drawing_powerpoint_ppt_presentation
5. [4.https://www.powershow.com/view0/91a2bf-](https://www.powershow.com/view0/91a2bf-)
6. N2Q2N/Basic_engineering_drawing_solved_question_powerpoint_ppt_presentation

Suggested Learning Outcomes

Upon completion of the subject, the student shall be able to

1.0 Understand the basic concepts of engineering drawing

- 1.1 State the importance of drawing as an engineering communication medium
- 1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.
- 1.3 Explain the linkages between Engineering drawing and other subjects of study in diploma course.

Use of Engineering Drawing Instruments

- 1.4 select the correct instruments and draw lines of different orientation.
- 1.5 Select the correct instruments and draw small and large Circles.
- 1.6 Select the correct instruments for measuring distances on the drawing.
- 1.7 Use correct grade of pencil for different types of lines, thickness and given function.
- 1.8 Select and use appropriate scales for a given application.
- 1.9 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.
- 1.10 Prepare Title block as per B.I.S. Specifications.

2.0 Write Free Hand Lettering and Numbers

- 2.1 Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height
- 2.2 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height
- 2.3 Select suitable sizes of lettering for different layouts and applications
- 2.4 Practice the use of lettering stencils.

3.0 Understand Dimensioning Practice

- 3.1 Define “Dimensioning.
- 3.2 State the need of dimensioning of drawing according to accepted standard.
- 3.3 Identify notations of Dimensioning used in dimensioned drawing.

- 3.4 Identify the system of placement of dimensions in the given dimensioned drawing.
- 3.5 Dimension a given drawing using standard notations and desired system of dimensioning.
- 3.6 Dimensioning standard features applying necessary rules.
- 3.7 Arrange dimensions in a desired method given in a drawing.
- 3.8 Identify the departures if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly.

4.0 Apply Principles of Geometric Constructions

- 4.1 Divide a given line into desired number of equal parts internally.
- 4.2 Draw tangent lines and arcs.
- 4.3 Use General method to construct any polygon.
- 4.4 Explain the importance of conics.
- 4.5 Construct conics (ellipse, parabola and hyperbola) by general method.
- 4.6 Construct ellipse by concentric circles method.
- 4.7 Construct parabola by rectangle method.
- 4.8 Construct rectangular hyperbola from the given data.
- 4.9 Construct involute from the given data.
- 4.10 Construct cycloid and helix from the given data.
- 4.11 State the applications of the above constructions in engineering practice.

5.0 Apply Principles of Projection of points, lines and planes (06 Hours)

- 5.1 Visualize the objects
- 5.2 Explain the I-angle and III-angle projections
- 5.3 Practice the I-angle projections
- 5.4 Draw the projection of a point with respect to reference planes (HP&VP)
- 5.5 Draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)
- 5.6 Draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)

6.0 Apply principles of orthographic projection

- 6.1 Explain the principles of orthographic projection with simple sketches.
- 6.2 Draw the orthographic view of an object from its pictorial drawing.
- 6.3 Draw the minimum number of views needed to represent complete engineering component.

Course Outcomes (CO)

Upon successful completion of the course, the students will be able to

Course Outcome		Cognizant Level	Linked Program Objectives (PO)
CO1	Acquiring the knowledge about the importance of Engineering drawing and Drawing instruments usage.	R	1, 4, 7
CO2	Practicing free hand Lettering & Numbering in different styles.	R/U	1, 3, 4, 7
CO3	Acquiring the knowledge about different methods of dimensioning systems.	R/U	1,3, 4, 7
CO4	Appreciate the usage of engineering curves for tracing the paths and surface profile of the machine components such as gear profile from involute and cycloid., cooling towers from hyperbola, automobile headlights from ellipse and dish antenna from parabola etc.	R/U/A	1, 2, 3, 4, 7
CO5	Realize the concept of projection and attain visualization projection of points, Lines and Planes. The student will also be able to draw the views related to projection of Points, Lines and Planes.	R/U/A	1, 2, 3, 4,6, 7
CO6	Realize the concept of orthographic projections and student will be able to draw orthographic views of an object from its pictorial drawing.	R/U/A	1, 2, 3, 4, 7

CO-PO MATRIX:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	3	-	-	3
CO2	3	-	1	2	-	-	3
CO3	3	-	1	2	-	-	2
CO4	3	1	2	2	-	-	2
CO5	3	3	2	2	-	1	1
CO6	3	1	3	3	-	-	2

BOARD DIPLOMA EXAMINATION, (C-21)
DME – I SEMESTER
ME-106, MID SEMESTER - I EXAMINATION
BASIC ENGINEERING DRAWING

Time: 1 Hour]

[Total Marks: 20

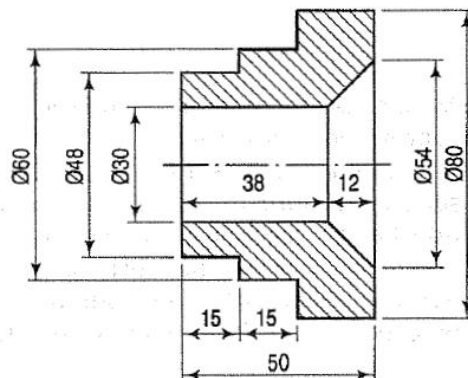
PART-A

04x02=08

Instructions :

1. Answer **ALL** questions.
2. Each question carries **TWO** marks.

1. Write freehand the following, using single stroke vertical capital letters of height 12 mm.
‘NECESSITY IS THE MOTHER OF INVENTION’
2. Redraw the following figure in Uni-Directional system of dimensioning.



3. To divide a straight line of 70mm into 6 equal parts.
4. Bisect a given line AB of length 75mm.

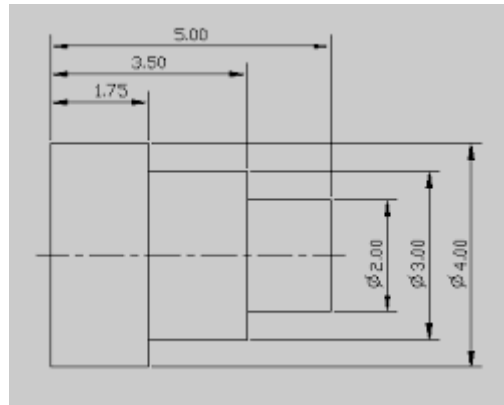
PART-B

02x06=12

Instructions :

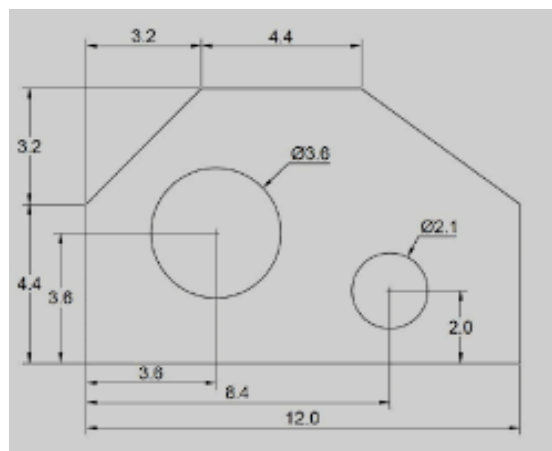
1. Answer ALL questions.
2. Each question carries **SIX** marks.

5. (a) Redraw the following figure with chain dimensioning.



(Or)

5. (b) Redraw the following figure in aligned system of dimensioning.



6. (a) Construct a regular pentagon of base side 30 mm in general method.

(Or)

6. (b) Draw an arc of radius 30 mm touching the given straight line AB of length 70 mm and passing through a point 'P' which is 55 mm above the line AB.

BOARD DIPLOMA EXAMINATION, (C-21)
DME – I SEMESTER
ME-106 MID SEMESTER - II EXAMINATION
BASIC ENGINEERING DRAWING

Time: 1 Hour]

[Total Marks: 20

PART-A

04x02=08

- Instructions :**
1. Answer **ALL** questions.
 2. Each question carries **TWO** marks.
1. Draw an arc of radius 30 mm touching the two given straight lines AB and AC making an angle 45^0 with each other.
 2. Draw an internal common tangent for the two given circles of equal radius of 30 mm if the centre distance is 75 mm.
 3. Draw the projections of a point A lying on both the planes.
 4. A line AB of length 70 mm is parallel to V.P. and inclined an angle of 30^0 to H.P. Draw its projections when its end A is on the H.P. and 20 mm in front of V.P.

PART-B

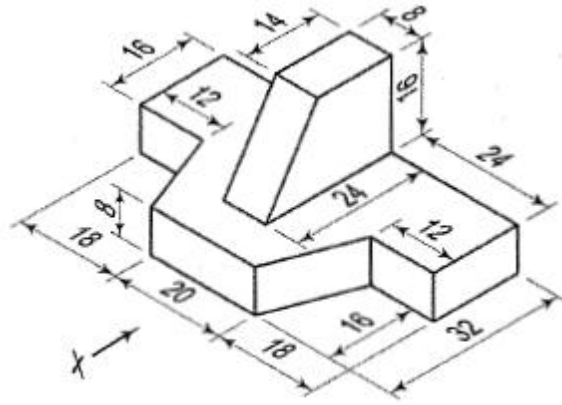
02x06=12

- Instructions :**
1. Answer **ALL** questions.
 2. Each question carries **SIX** marks.
5. (a) Construct an ellipse if the distance between focus and the directrix is 50 mm by eccentricity method. Also draw the normal and tangent at any point on the curve.

(Or)
 5. (b) Construct the locus of a point 'P' which is on the circumference of circle of radius 25 mm when it is rolling on a straight line for one complete revolution without slipping. Also name the curve.
 6. (a) Draw the projections of a line AB of length 75 mm parallel to HP and inclined at an angle of 30^0 to VP. The end A is 30 mm from both the reference planes.

(Or)
 6. (b) A square of base side 40 mm is perpendicular to both the reference planes. Draw its projections.

- 08x02=16



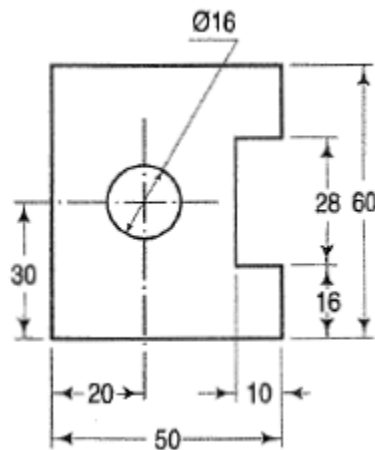
PART-B

04x06=24

Instructions :

1. Answer ALL questions.
2. Each question carries **SIX** marks.
3. All the dimensions are in mm.

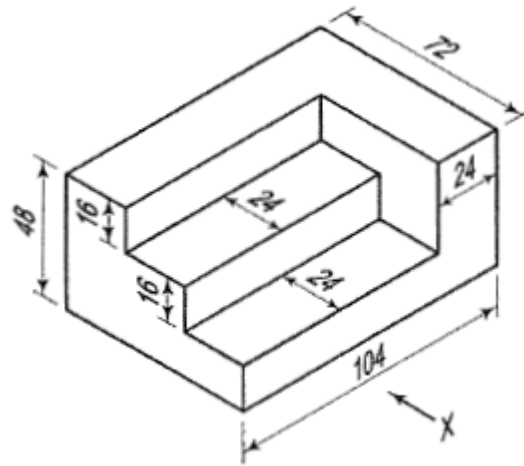
9. (a) Redraw the following figure with aligned system of dimensioning.



(Or)

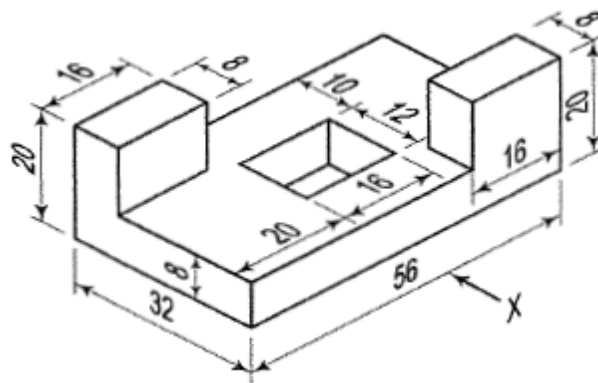
9. (b) Inscribe a hexagon in a given circle of radius 30mm by keeping one of its side horizontal.
10. (a) Draw a parabola with the distance of the focus from the directrix at 50 mm using eccentricity method and draw a normal and tangent through a point 40 mm from the directrix.
- (Or)
10. (b) A line AB 75 mm long is parallel to H.P. and inclined at 30° to V.P. The end A is 25 mm above H.P and 30 mm in front of V.P. Draw its projections.

11. (a) Draw the front view of the component shown in figure

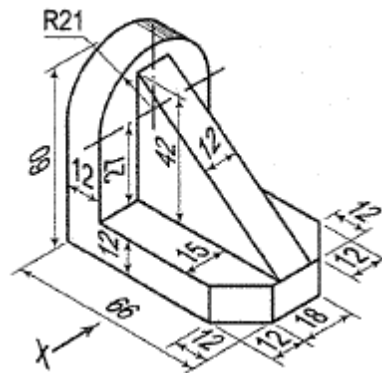


(Or)

11. (b) Draw the top view from the component as shown in figure.

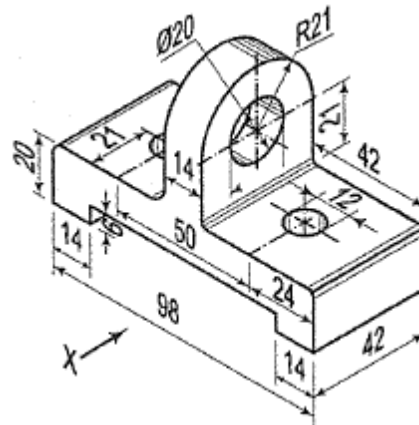


12. (a) Draw the frontview of component shown in figure



(Or)

12 (b) Draw the top view and front view of the component as shown in figure



ME-107 - BASIC AUTOCAD LAB

Course Title :	Basic AutoCAD Lab	Course Code	ME-107
Semester	I	Course Group	Core
Teaching Scheme in periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practice	Total Contact periods	45 Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the Basic Computer Skills and Practice concepts of engineering drawing

Course Outcomes

CO1	Importance and advantages of CAD. Set drawing area and draw geometric shapes and modify as per requirement
CO2	Creating new objects by using draw commands
CO3	Modifying the existing drawing using modify commands
CO4	Add dimensions and text with required font and size.
CO5	Generate isometric model and draw circle on three iso planes
CO6	Create 2D drawings with front, side view with all above features

Course Content

UNIT -1

Duration: 15 periods (T:5 + P:10)

1.1 The Computer Aided Drafting and its software

Definition of Computer Aided Drafting, the Advantages and importance of CAD software LIKE Auto CAD, Intelli Cad, ProG CAD etc., the features of Graphic Work station, CAD Environment: Screen, Various tool bars and menus.

1.2 Selection of commands

Commands using toolbars, menus, command bar. Repeating a command, Nesting a command and modifying a command. Use of prompt history window and scripts, mouse shortcuts. Creating the drawing. Opening existing and, saving of drawing, setting up a drawing. Setting and changing the grid and snapping alignment, and the Entity snaps.

1.3 Use of viewing tools of CAD & Use of coordinate systems of the drawing

Use of mouse, Scroll bar to move around within drawing, changing of magnification of drawing. Displaying of multiple views, the use of controlling visual elements like Line weight and line types.

Two dimensional coordinates such as Absolute, Cartesian, Relative Cartesian and Polar coordinates and direct method of drawing line.

1.4 Creating simple and complex entities

Drawing of lines, circles, arcs, ellipses, elliptical arcs, rays and infinite lines, rectangles, polygons,

1.5 Use the simple Modifying tools to modify the properties of entities

Entity selection and de selection methods, the Deletion of entities. Copying of entities within a drawing, between drawings, parallel copies,

UNIT -2

Duration: 15 periods (T:5 + 10P)

2.1 Use the Modifying tools to modify the properties of entities

Mirroring entities and arraying entities. The Rearranging of entities by Moving, Rotating and Reordering. The Resizing of entities by Stretching, Scaling, Extending, Trimming, and editing the length. The Braking and joining of entities. Chamfering and Filletting of entities

2.2 Creating complex entities

Drawing of shapes like rectangle, Polygon, polylines, Splines, donuts, and adding of hatch pattern

2.3 Use the drawing information retrieving tools Measure, Divide, Calculate and Display

Creating and editing of point entities. Dividing the entities in to segments. Calculation of areas of defined by points, closed entities, and combined entities, calculate the distance and angle between the entities. Displaying the information about the entities and drawing status.

2.4 Use the Text tool to create and formatting the various types of text Fonts and its styles

The creating, naming and modifying the text fonts, the Creation of line text, paragraph text, setting of line text style and its alignment. The Setting of Paragraph text style and its alignment, and modifying the text. Rectangular and polar array

2.5 Use Dimensioning concepts to create, Edit ,Control dimension styles & variables and Adding geometric tolerances

The creating of linear, Angular, Diametral, Radial, Ordinate dimensions. The creating leaders and annotations, making dimensions oblique, Editing the dimension text, controlling of dimension arrows and format. The Controlling of line settings and dimension text, the Controlling of dimension units, and dimension tolerance.

2.6 Isometric Views

Setting of isometric grid – change of iso planes, drawing straight line and circle
Create Isometric views of simple objects

.UNIT -3

Duration: 15 periods (T:3 + P:10)

Practise of 2D Drawings consisting of different line types, line weights, hatch, dimensioning and Text

Using appropriate commands creation of 2D drawings of standard components

Specific Learning Outcomes

UNIT-1

Duration: 15 periods (T:3 + P:10)

Upon completion of the course the student shall be able to Understand about the

1. Computer Aided Drafting and its software

- 1.1 Define Computer Aided Drafting
- 1.2 List the Advantages of CAD and also various CAD software's
- 1.3 Explain the importance of CAD software
- 1.4 Explain the features of Graphic Work station
- 1.5 Explain CAD Screen, Various tool bars and menus
- 1.6 Explain the benefits of Templates
- 1.7 Identify various CAD software's and their features

Use appropriate selection commands

- 1.8 Practice commands using toolbars, menus, command bar
- 1.9 Practice repeating a command, Nesting a command and modifying a command
- 1.10 Use prompt history window and scripts
- 1.11 Know the use of mouse for zooming and pan
- 1.12 Practice the Creating the drawing, saving the drawing with .drawing extension and Opening Existing drawing
- 1.13 Practice the setting up a drawing with drawing limits and drawing units.
- 1.14 Practice the setting and changing the ortho, grid and snapping alignment
- 1.15 Practice the Entity snaps

Use viewing tools of CAD & Use coordinate systems of the drawing

- 1.16 Practice the use of Scroll bar, pan command and rotating view to move around within drawing
- 1.17 Practice the changing of magnification of drawing

- 1.18 Practice how the coordinate system work and it is displayed
- 1.19 Practice the Two dimensional coordinates such as Absolute Cartesian, Relative Cartesian, Polar coordinates and direct method to draw a line.
- 1.20 Explain importance and use of Osnap/ Esnap points.
- 1.21 Practice to draw with other drawing commands like circle, polygon and other.

Create the simple and complex entities

- 1.22 Draw the lines, circles, arcs, ellipses, elliptical arcs, rays and infinite lines.

UNIT -2

Duration: 15 periods (T:3 + P:10)

2. Use the modifying tools to modify the properties of entities

- 2.1 Practice the various methods of entity selection like window, cross window, fence, last and previous methods and deselect ion method
- 2.2 Draw shapes like Rectangles, Polygons, Polylines, Splines, donuts
- 2.3 Practice the adding of hatch with required pattern and adjusting line angle and line space.
- 2.4 Practice the Deletion, breaking and trimming of entities
- 2.5 Practice the Copying of entities within a drawing, between drawings
- 2.6 Practice the Chamfering and Filletting of entities
- 2.7 Practice the making of parallel copies, Mirroring entities and Arraying entities
- 2.8 Practice the Rearranging of entities by Moving, Rotating and Reordering
- 2.9 Practice the Resizing of entities by Stretching, Scaling, and Extending.
- 2.10 Practice the Editing of polylines: Opening, Closing, Curving, Decurving, Joining, Changing width and editing vertices
- 2.11 Practice the Exploding of entities

Use the drawing information retrieving tools Measure, Divide, Calculate, Display, and Track

- 2.12 Divide the entities in to required number of segments
- 2.13 Calculate the areas defined by points, of closed entities, and combined entities
- 2.14 Calculate the distance between the entities
- 2.15 Calculate the angle between the entities
- 2.16 Display the information about the entities and drawing status
- 2.17 Track time spent working on a drawing

Use the Text tool to create and formatting the various types of text fonts and its styles

- 2.18 Practice the creating, naming and modifying the text fonts
- 2.19 Practice the Creation of line text, paragraph text
- 2.20 Practice the Setting of line text style and its alignment
- 2.21 Practice the Setting of Paragraph text style and its alignment

- 2.22 Practice the Changing of line text and Paragraph text
- 2.23 Practice the use of alternate text editor

Use Dimensioning concepts to create dimensions, Edit dimensions, Control dimension styles & variables and Adding geometric tolerances

- 2.24 Practice the creating of linear, Angular, Diametral, Radial, Ordinate dimensions
- 2.25 Practice the creating leaders and annotations
- 2.26 Practice the making dimensions oblique,
- 2.27 Edit the dimension text
- 2.28 Practice the Controlling of dimension properties like arrow types, size, dim line adjustment, dim offset, text size: primary and secondary units and format
- 2.29 Practice the Controlling of dimension units, and dimension tolerance

UNIT-3

Duration: 15 periods (T:3 + P:10)

3. Create 2D Drawings

- 3.1 Create 2D drawings of standard mechanical components with dimensions and text

Recommended Books

1. AutoCAD by George Omura
2. 4MCAD User Guide- IntelliCAD Technology Consortium

Key competence to be achieved by students / Suggested Learning Outcomes

S.No	Experiment Title	Key components
1	Introduction to CAD	• Open / close AutoCAD program • Understands AutoCAD Graphic User • Interface(GUI) and various toolbars
2	Selecting commands & Working withdrawing	• Use prompt history window and scripts • Practice the setting up a drawing • Practice the Entity
3	a) Viewing drawing	• Use Scroll bar, pan command, and rotating view to move around within drawing • Control visual elements like Fill, Text, Blips and • Line weight
	b) Working with coordinates	• Use Two dimensional coordinates and Three dimensional coordinates • Use right-hand rule • Use filters in two and three dimensions • Define user coordinate system
4	Creating simple and complex	• Draw the simple shapes like lines, circles, arcs

	entities	- and complex shapes like polygons, planes etc., - Practice adding of hatch pattern
5	Getting Drawing information	- Measure the intervals and distance between Entities. - Divide the entities in to segments - Calculate the areas defined by points, of closed entities, and Combined entities
6	Use the Text tool to create various types of text fonts and its styles	- Calculate the areas defined by points, of closed entities, and Combined entities - Use filters in two and three dimensions - Draw the simple shapes like lines, circles, arcs and complex shapes like polygons, planes etc., - Practice the adding of hatch pattern
7	Dimensioning drawing	- Practice the Controlling of dimension properties like arrow types, size, dim line adjustment, dim offset, text size , primary and secondary units and format - Practice the Controlling of dimension units, and dimension tolerance
8	Isometric Views	Use Iso snap command to create Isometric views
9	2D Drawings	Use proper 2D commands to create 2D drawings

Course Outcomes		CL	Linked PO	Teaching Hours
CO1	Importance and advantages of CAD. Set drawing area and draw geometric shapes and modify as per requirement	U/A	1,2,3,4,7	3
CO2	Creating new objects by using draw commands	U/A	1,2,3,4	12
CO3	Modifying the existing drawing using modify commands	U/A	1,2,3,7	6
CO4	Add dimensions and text with required font and size.	A	1,2,3,4	6
CO5	Generate isometric model and draw circle on three iso planes	U/A	1,2,3,4,7	3
CO6	Create 2D drawings with front, side view with all above features	A	1,2,3,4,7	15

MID SEM-I EXAM

S.No	Unit Name	R	A	Remarks
1	Unit-I	1, 2,3,4	5,6	
Total Questions		4	2	

MID SEM –II EXAM

S.No	Unit Name	R	A	Remarks
1	Unit-II	1, 2,3,4	5,6	
Total Questions		4	2	

SEMESTER END EXAM

S N	Unit name	Questions to be set for SEE		Remarks
		R, U	A	
1	Unit-1	1,2		
2	Unit-2	3,4		
3	Unit-3		5, 6	

CO-PO MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	3	-	-	3
CO2	3	1	1	2	-	-	3
CO3	3	1	1	2	-	-	2
CO4	3	-	-	2	-	-	2
CO5	3	1	1	2	1	-	1
CO6	3	2	3	3	-	1	2

ME-107 - Basic AutoCAD Lab
MODEL PAPER FOR MID -1 (CIE)

TIME: 1hr

Marks: 20M

PART-A

NOTE: Answer all questions
8marks

4 X 2 =

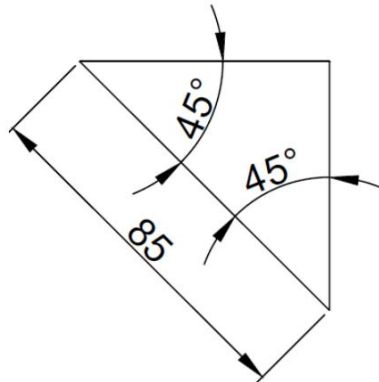
1. Draw a square of 50x50mm by using any CAD software.
2. Draw an equilateral triangle of 50mm side by using any CAD software.
3. Draw an ellipse with major axis 80mm and minor axis 30mm by using any CAD software.
4. Draw a line of 50mm and draw five parallel lines at 10mm distance by using offset command

PART-B

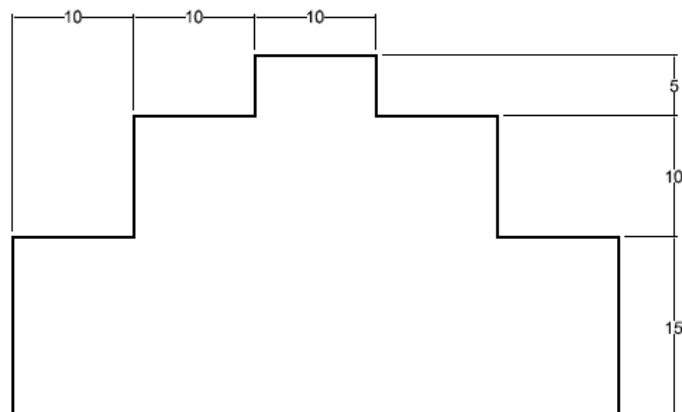
NOTE: Answer any one questions
12marks

1 X 12 =

5. Draw the following using any CAD software without dimensioning.



6. Draw the following using any CAD software without dimensioning.



ME-107 - Basic AutoCAD Lab
MODEL PAPER FOR MID -2 (CIE)

TIME: 1hr

Marks: 20M

PART-A

NOTE: Answer all questions
8marks

4 X 2 =

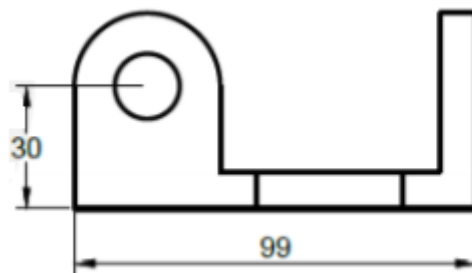
1. Write text "CAD Lab" with Calibri font style and font size 10 by using any CAD software.
2. Draw a line of 10mm and divide it into four equal parts by modifying the point style to x shape.
3. Add continuous dimensions to divided line drawn in Q no. 2.
4. Draw a pentagon of side 60mm and calculate its area by using any CAD software.

PART-B

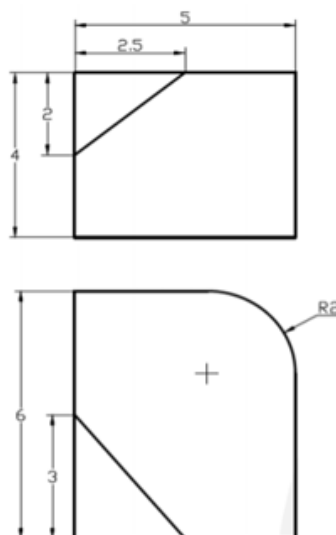
NOTE: Answer any one questions
12marks

1 X 2 =

5. Draw the following using any CAD software and add dimensioning.



6. Draw the following using any CAD software and add dimensioning.



ME-107 - Basic AutoCAD Lab
MODEL PAPER FOR SEE

TIME: 2hr

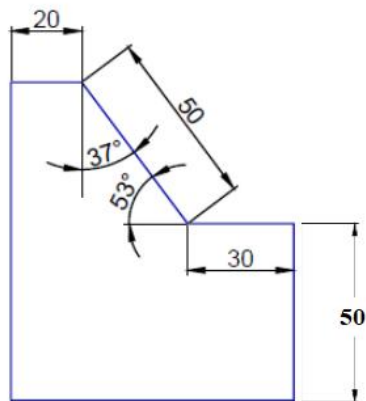
Marks: 40M

PART-A

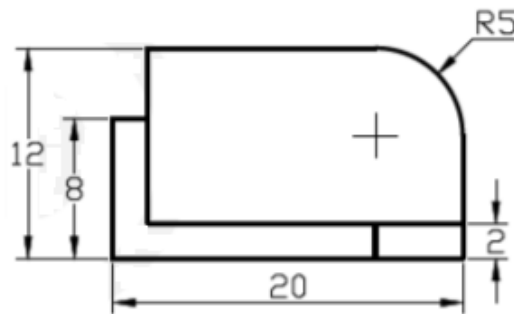
NOTE: Answer all questions
16marks

4 X 4 =

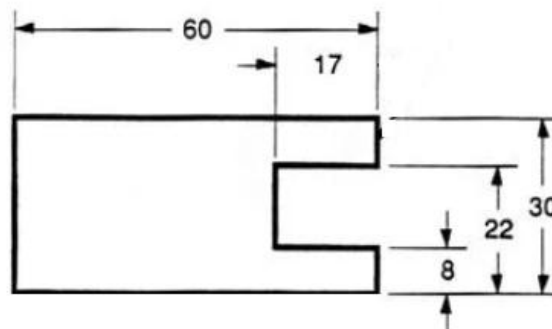
1. Draw the following fig by using any CAD software, change the line type and add dimensions. Also list the commands used in sequence.



2. Draw the following arrow mark by using any CAD software, and add complete dimensions. Also list the commands used in sequence.



3. Redraw the following figure and add dimensions as shown in figure.



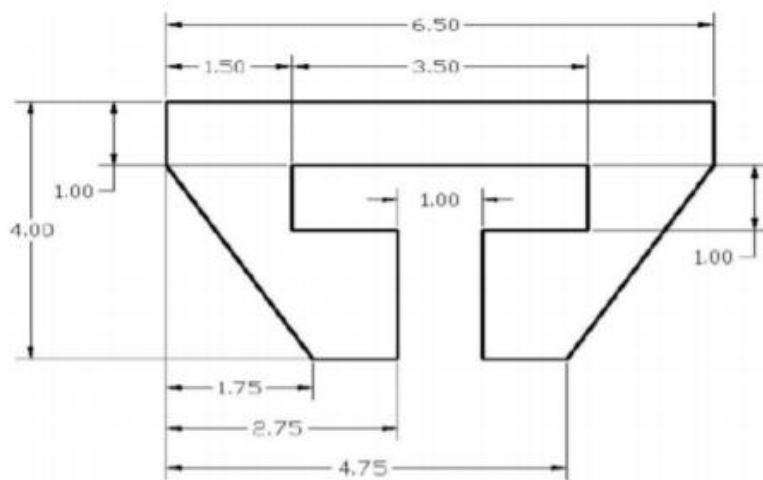
4. Draw isometric view of a cube of 100mm side by using any CAD software.

PART-B

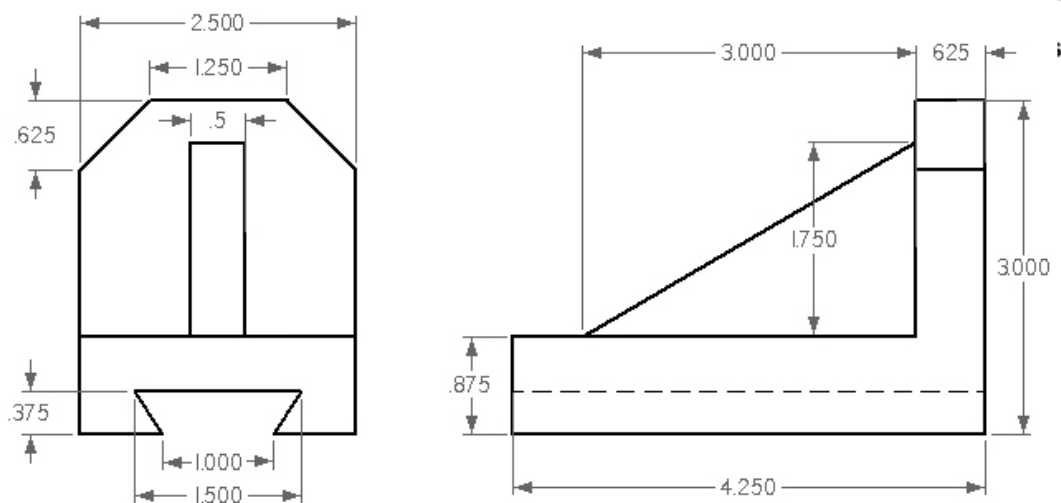
NOTE: Answer any one questions

1 X 24 = 24marks

5. (a) Draw the following using any CAD software and add dimensioning. 15+5+4 marks
(b) List the commands in sequence and also write the procedure
(c) Add title box containing Student PIN, name and college name



6. (a) Draw the following using any CAD software and add dimensioning. 15+5+4 marks
(b) List the commands in sequence and also write the procedure
(c) Add title box containing Student PIN, name and college name



EC-108 - BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

Course Title	Basic Electrical & Electronics Engineering Lab	Course Code	EC-108
Semester	I	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites: This course requires the basic skills of handling basic tools

Course outcomes:

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Identify the significance of Safety Hazards and preventive methods, and apply them for safe and efficient Laboratory practice.	R/U/A	1,2,3,4,5,6,7,8	15
CO2	Identify of different wires, cables and apply them for simple House wiring applications	R/U/A	1,2,3,4	12
CO3	Use basic Electronic measuring Instruments	R/U/A	1,2,3	9
CO4	Design simple circuit using Electronic components	A	1,2,3,10	9
			TOTAL	45

Course Contents

I. Electrical Wiring

1. A) Read Safety precautions and Identify various Symbols related to a) safety b) Electrical Engineering c) Electronic components
B) Identify different a) wires and cables b) Electrical Accessories c) electronic components
2. Identify the terminals of Electrical accessories like a) Two pin socket b) 3 Pin socket c) Power socket d) power plug and make connections.
3. Make simple switch connections using low voltage transformer and 12V lamp
4. Make either of two lamps glow by two-way switch

II. Electronic Instruments & Electronic components

5. Identify and practice the operation the following equipment a) DC Regulated power supply b) Digital Multimeter c) Decade Resistance box d) decade capacitance box

6. Identify Different Electronic Components a) Resistors b) Capacitors and C) Inductors & Transformers, read their value and verify the value of Resistors with Digital multimeter
7. A) Verify the laws of Resistance using a nichrome wire and Multimeter
B) Verify the effect of temperature
8. Measure the current flowing through a two Resistors connected in series and voltage drops across each resistors for different combinations of Resistors (Use Decade Resistance boxes)
9. A.) Verify voltage and current relationship in series and parallel resistive circuits.
B) Connect Resistors in series and parallel combination to get the required value and Verify with DMM

III. Capacitors & Transformers

10. A) Connect Electrolytic Capacitors in Series and Parallel and observe the voltage division
B) Connect a) DC source b) AC generator to a capacitor alternately and verify that Capacitor blocks DC and allows AC.
11. Measure the Resistance of Primary and Secondary windings of Transformer with Digital Multimeter
12. Identify Normal and centre tapped Transformers and measure the voltage across secondary winding terminals
13. Experimentally Verify that same Transformer can be used as Step-down transformer and as Step-up Transformer
14. Experimentally Verify that the transformer does not change the frequency of output voltage/Current.

IV. Soldering Practice

15. Practice soldering of a) Resistors b) Capacitors c) wires (both single strand and Multi strand) on a general purpose PCB taking due precautions.

Reference books:

1. Getting Started in Electronics by Forrest.M.Mims (e-book)

E-Links:

1. www.electronicshub.org/tutorials

SC-109 - BASIC SCIENCE LAB

Course Title	Basic Science Lab	Course Code	SC-109
Semester	I	Course Group	Practical
Teaching Scheme in Pds/Hrs(L:T:P)	1:0:2	Credits	1.5
Type of course	Tutorial & Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Physics Lab

Pre requisites: Knowledge of basic concepts of basic High school science and basic mathematics

Course objectives: To provide practical knowledge about the basics of Physics instrumentation and calculations/measurements.

Course Outcomes	
CO1	Understand Vernier caliper principle and calculate accurate measurement of lengths and volumes of various objects
CO2	Understand Screw Gauge principle and calculate accurate measurement of thickness of various thin objects
CO3	Understand vectors and resultant of vectors and verify Parallelogram law of forces and Triangle law of forces
CO4	Understand the concept of viscosity and calculate Coefficient of viscosity of a liquid by capillary method
CO5	Verify Boyle's law employing Quill tube.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			-	-	1	1
CO2	3			-	-	1	1
CO3	3			-	-	1	1
CO4	3			-	-	1	1
CO5	3			-	-	1	1
	3					1	1

Learning outcomes

On successful completion of the course, the student will have ability to:

1. Determine the volumes of objects like cylinder, sphere and piece of pipe.
2. Determine thickness /diameter of small objects like glass plate and wire.
3. Verify the parallelogram law and triangle law of forces.
4. Determine the viscosity of liquid using capillary method
5. Verify Boyle's law employing Quill tube.

Course Delivery:

The course will be delivered through lectures, class room interaction, group discussions, graded exercises, demonstration and practice.

Tutorial: 1Periodd /Experiment:

1. Introduction to Physics practical and its importance, safety precautions in maintenance of equipment in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in manual and record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strictly following of instructions given from time to time by the lecturer-in-charge.
7. Demonstration of each experiment by the lecturer in charge.

Conduction of experiments: 2 periods/Experiment.

Student must perform experiment individually under the supervision of the lecturer-in charge.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MIDSEM-I	EXPERIMENT NO 1 & 2
2	MIDSEM-II	EXPERIMENT NO 3 & 4
3	SEMESTER END EXAMINATION	EXPERIMENT NO 1,2,3,4 and 5

Scheme of Valuation of SEE		
S.No	Particulars	Marks
1.	Objective/Aim	01
2.	Apparatus/Equipment	02
3.	Observations	02
4.	Principle including formula	02
5.	Experiment (Tabular form, readings, etc)	05
6.	Calculation and Result	05
7.	Viva Voce	03
	Total	20

References:

1. Basic Applied Physics – R.K. Gaur
2. Laboratory manual for class XI and XII – NCERT

Chemistry Lab

Prerequisite:

Knowledge of basic concepts of chemistry of secondary education.

Course Objectives:

To provide practical knowledge about the basics of preparation of chemical solutions and volumetric analysis of chemical compounds.

Course Outcomes:

On successful completion of the course, the student will have ability to attain CO:

Course Outcome	
CO1	Prepare the standard solution.
CO2	Estimate the amount of the HCl in the given sample of solutions
CO3	Estimate the amount of the NaOH in the given sample of solutions.
CO4	Estimate the amount of the H ₂ SO ₄ in the given sample of solutions.
CO5	Determine the hardness of water in the given sample.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	1	-	1	1
CO2	3	-	-	-	-	1	1
CO3	3	-	-	-	-	1	1
CO4	3	-	-	-	-	1	1
CO5	3	-	-	-	2	1	1

Course Delivery:

The course will be delivered through lectures, classroom interaction, group discussion, demonstration and practicals.

Conduction of experiments: Lecture 1 period + Experiment 2 periods.

Student must conduct experiment individually under the supervision of the staff-in-charge.

Lecture and Demonstration: 1 Period

1. Introduction of chemistry practical and its importance, safety precautions in maintenance of cleanliness and orderliness of chemicals in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strict following of instructions given from time to time by the staff-in-charge.
7. Demonstration of each experiment by the staff in charge.

Course Content**Volumetric Analysis: (22.5 Periods)****Volumetric Analysis by Titrimetric Method:-**

Volumetric Analysis - Titration – Standard Solutions - Concentration of solutions - Indicators - Acid base indicators - Selection of indicators - Endpoint of titration- Neutralization.

List of experiments:

1. Preparation of 0.05M sodium carbonate solution.
2. Estimation of hydrochloric acid present in 250 ml of solution by using standard sodium carbonate solution.
3. Estimation of sodium hydroxide present in 250ml of solution by using standard hydrochloric acid solution.
4. Estimation of sulphuric acid present in 250ml of solution by using standard sodium hydroxide solution.
5. Determination of total hardness of water sample by 0.02N EDTA solution.

Specific Learning Outcomes**Upon completion of the course, the student will have ability to**

1. Prepare standard sodium carbonate solution and dilute to desired concentration.
2. Estimate hydrochloric acid present given volume of solution by using standard sodium carbonate solution.
3. Estimate sodium hydroxide present in the given volume of solution by using standard hydrochloric acid solution.
4. Estimate sulphuric acid present in the given volume of solution by using standard sodium hydroxide solution.
5. Determine the total hardness of water sample by using 0.02N EDTA solution.

Reference Books:

1. Vogel's Inorganic Qualitative and Quantitative Analysis.
2. Practical chemistry by O.P.Pande& others.
3. Qualitative and quantitative analysis by Alex.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MIDSEM-I	Experiment No. 1 & 2
2	MIDSEM-II	Experiment No. 3 & 4
3	SEMESTER END EXAMINATION	Experiment No. 1,2,3,4 and 5

Scheme of Valuation for MID I & II and SEE		
Sl. No.	Particulars	Marks
1	Identification of apparatus/equipment/chemical compounds/tools/etc.	2
2	Writing Principle and Procedure	5
3	Experiment and Observations	6
4	Calculation and Results	4
5	Viva-voice	3
Total		20

BOARD DIPLOMA EXAMINATION, (C-21)

MIDSEM – I

FIRST SEMESTER EXAMINATION

SC-109 - BASIC SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.

(2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Find the volume of given sphere using Vernier caliper.
2. Find the volume of given cylinder using Vernier caliper.
3. Find the volume of given piece of pipe using Vernier caliper
4. Determine the thickness of given glass plate using Screw gauge.
5. Find the cross sectional area of given wire using Screw gauge.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Prepare 250 ml of 0.05M sodium carbonate solution.
2. Estimate the amount of hydrochloric acid present in 500 ml of the given solution using 0.02M sodium carbonate solution.
3. Estimate the amount of hydrochloric acid present in 250 ml of the given solution using 0.05M sodium carbonate solution.

BOARD DIPLOMA EXAMINATION, (C-21)

MIDSEM – II

FIRST SEMESTER EXAMINATION

SC-109 - BASIC SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.

(2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Verify parallelogram law of forces.
2. Verify triangle law of forces
3. Determine coefficient of viscosity of water using capillary method.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Estimate the amount of NaOH present in 500 ml solution using 0.02M HCl solution
2. Find the Molarity and estimate the amount of Sulphuric acid present in 250 ml solution using 0.01M NaOH solution.

BOARD DIPLOMA EXAMINATION, (C-21)
SEMESTER END EXAMINATION
FIRST SEMESTER EXAMINATION
SC-109 - BASIC SCIENCE LAB

Time: 2 Hours]

[Total Marks: 40

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.
(2) Each question carries **TWENTY** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Find the volume of given sphere using Vernier caliper.
2. Find the volume of given cylinder using Vernier caliper.
3. Find the volume of given piece of pipe using Vernier caliper
4. Determine the thickness of given glass plate using Screw gauge.
5. Find the cross sectional area of given wire using Screw gauge.
6. Verify parallelogram law of forces
7. Verify triangle law of forces.
8. Determine coefficient of viscosity of water using capillary method.
9. Verify Boyle's law using Quill tube.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

10. Prepare 250 ml of 0.05M sodium carbonate solution.
11. Estimate the amount of hydrochloric acid present in 500 ml of the given solution using 0.02M sodium carbonate solution.
12. Estimate the amount of hydrochloric acid present in 250 ml of the given solution using 0.05M sodium carbonate solution.
13. Find the Molarity and estimate the amount of NaOH present in 100 ml of the given solution using 0.01M HCl solution.
14. Estimate the amount of Sulphuric acid present in a litre of solution using 0.01M NaOH solution.
15. Determine the total hardness of the given water sample using 0.02N EDTA solution

CS-110 - Basic Computer Science Lab

Course Title	Basic Computer Science Lab	Course Code	CS-110
Semester	I	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture +Tutorial	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre-requisite: The students should have basic knowledge of and basic knowledge of using computer

COURSE OUTCOME

CO1	Creating and saving a document, Formatting of text in MS-WORD
CO2	Spell checking, Mail merging and Printing of Documents in MS-WORD
CO3	Creating and Saving a presentation, inserting text and pictures & Formatting the text and pictures, Slide transition and Animation effects in MS-POWER POINT
C04	Building Worksheet & Charts In Ms-Excel and Printing Of Worksheet
C05	Creating Database, Tables, Forms, Queries, Reports In Ms-Access

Course Contents

1. Unit-I: Creating, Saving a document, Formatting of text in MS-WORD

Duration: 5 hrs

- MS_WORD - Creating and saving a document, Formatting of text

2. Unit-II: Spell checking, Mail merging and Printing of Documents in MS-WORD MS Word

Duration: 10 hrs

- MS-WORD - Spell Checking - Mail merging - Printing of Documents

3. Unit-III: Creating and Saving a presentation in MS Powerpoint and Slide transition and Animation effects

Duration: 10 hrs

- MS-POWER POINT - Creating and saving a presentation - Inserting text and pictures
- Formatting the text and pictures- MS-POWER POINT - Effects of slide transition - Animation effects - Slide show & views of slides

4. Unit-IV Building & Charts in MS-Excel and Printing Of Worksheet

Duration: 10 hrs

- Building Worksheets – Building Charts, Printing EXCEL Worksheet

5. Unit-V Creating Database, Tables, Queries, Forms ,Reports & Printing

Duration: 10 hrs

- Creating Table, Viewing(ACCESS) – Creating Forms – Creating Queries and Viewing Database
- Creating of ACCESS Reports – Printing of ACCESS Tables, Forms, Reports

Specific Learning Outcomes:

1.0 Practice Operation of MS-Word.

- 1.1 Demonstrate starting MS word.
- 1.2 Identify the word screen elements.
- 1.3 Identify the tool bars on the screen.
- 1.4 Demonstrate loading different tool bars for their functionality.
- 1.5 Identify the drop down menus of the main menu and their functionality.
- 1.6 Demonstrate creating a sample text.
- 1.7 Demonstrate text formatting.
- 1.8 Demonstrate page formatting.
- 1.9 Demonstrate selecting, deselecting the text from menu and Copying.
- 1.10 Demonstrate importing text from other packages.

2.0 Spell checking, Mail merging and Printing of Documents in MS-WORD

- 2.1 Demonstrate search and replace of text.
- 2.2 Demonstrate spell checking.
- 2.3 Demonstrate creating tables.
- 2.4 Demonstrate mail merging of documents.
- 2.5 Demonstrate printing documents, merge printing of documents.
- 2.6 Demonstrate word procedure for importing figures, charts from other installed software.

3.0 Practice operation of MS-Power Point and Slide transition and Animation effects.

- 3.1 Demonstrate starting MS Power Point.

- 3.2 Identify the opening screen elements.
- 3.3 Identify the tool bars in the opening screen.
- 3.4 Demonstrate the selection of the methods of creating a new presentation.
- 3.5 Identify the different Auto Layouts of a slide.
- 3.6 Demonstrate creating a new slide
- 3.7 Demonstrate inserting a new slide.
- 3.8 Demonstrate slide transition effects.
- 3.9 Demonstrate a slide show.
- 3.10 Demonstrate animation effects.
- 3.11 Demonstrate creating an organization chart.
- 3.12 Identify the different slide views.

4.0 Building Worksheets & Charts in MS-Excel

- 4.1 Start EXCEL from the start
- 4.2 Identify the various parts of the window.
- 4.3 Identify the tabs and groups in ribbon layout
- 4.4 Identify and customizing the quick access toolbar
- 4.5 Identify the office button and commands of the drop down menu.
- 4.6 Practice loading of the existing worksheet or create a new worksheet.
- 4.7 Practice entering into the worksheet.
- 4.8 Practice formatting the cells.
- 4.9 Practice formatting the texts in the cells.
- 4.10 Practice changing the height and width of the cells.
- 4.11 Practice freezing the rows, columns.
- 4.12 Practice splitting the screens.
- 4.13 Enter formulas into the cells.
- 4.14 Enter formulas with built in functions.
- 4.15 Create a range name for the cells for group operations.
- 4.16 Create graph for the data in the worksheet.

5.0 Creating Database, Tables, Queries and Forms

- 5.1 Practice loading Ms Access from the start menu.
- 5.2 Create a database table using Database Wizard.
- 5.3 Enter data into the table.
- 5.4 Edit data in the table.

- 5.5 View data from the database.
- 5.6 Design a query.
- 5.7 View data using the query.
- 5.8 Demonstrate creating Forms.
- 5.9 View the database through Forms.
- 5.10 Practice navigating through the database through Forms.
- 5.11 Practice creating Custom Form using Forms Wizard.
- 5.12 Practice creating Reports using the Report Wizard.
- 5.13 Practice printing the tables, forms and reports.

EXERCISES

- 1. Create and save a document using MS WORD.
- 2. Format the Text document.
- 3. Change the page set-up and Insert Header/Footer.
- 4. Spell checking in the document.
- 5. Print the document.
- 6. Create main document and data file for mail merging.
- 7. Print the document with mail merging.
- 8. Create a table in the document.
- 9. Add row, column to a table.
- 10. Create and save a new presentation using MS Power Point.
- 11. Choose Auto Layout for a new slide.
- 12. Inserting text and pictures into a blank slide.
- 13. Inserting new slides into the presentation.
- 14. Applying slide transition effects.
- 15. Demonstrate a slide show.
- 16. Set animation to text and pictures in a slide.
- 17. Set the sounds, order and timing for animation.
- 18. Create and save a new work book in Excel
- 19. Operating Mouse to selecting tabs, groups, cells, group of cells
- 20. Entering Data into Worksheet
- 21. Editing of Worksheet
- 22. Formatting the text in the cells
- 23. Formatting the numbers in the cells.

24. Changing the height and width of cells.
25. Freezing Titles, splitting screen
26. Enter formulae for calculation in the cells.
27. Copying the formula over a range of cells.
28. Inserting built-in functions in to the cells.
29. Create graphs for the data using Chart Wizard.
30. Practice Data Forms in Excel.
31. Printing of worksheet
32. Creating Tables using wizard in Access
33. Creating Tables using Design View in Access.
34. Entering Data into tables
35. Viewing the data in table.
36. Creating a new query using wizard.
37. Creating a new query using design view.
38. Viewing the data using a Select Query.
39. Updating the data in table using Update Query.
40. Linking two Tables on Relational Aspect.
41. Create forms using Form Wizard.
42. Create reports using Report Wizard.
43. Printing the tables, forms and reports

Suggested Student Activities

1. Student visits Library to refer to Manual for the specifications
2. Student inspects the available equipment in the Lab to identify the components
3. Visit nearby Industry to familiarize with fabrication techniques
4. Analyze the connections in the UPS available in the Institution facility
5. Quiz , Group discussion, Surprise test

RECOMMENDED BOOKS:

1. Teach yourself Office 2007 for Windows – Coray Sandler, Tom Badgett, Jan Weingarten, BPB Publications.
2. The ABC s of MS Office 2007– Guy Hard-Davis, BPB Publications.
3. Working in MS Office - Ran Mansfield, Tata McGraw Hill Publications.

Student E-Learning reference

1. <https://www.tutorialspoint.com/word/index.htm>
2. <https://www.tutorialspoint.com/powerpoint/index.htm>

CO / PO MAPPING MATRIX

	COURSE OUTCOME	CL	Linked PO	Teaching Hrs
CO1	Creating and saving a document, Formatting of text in MS-WORD	R/U/A	1,2,3,4,7	5
CO2	Spell checking, Mail merging and Printing of Documents in MS-WORD	R/U/A	1,2,3,4,7	10
CO3	Creating and Saving a presentation, inserting text and pictures & Formatting the text and pictures and Slide transition and Animation effects in MS-POWER POINT	R/U	1,2,3,4,7	10
C04	Building Worksheet & Charts In Ms-Excel and Printing Of Worksheet	R/U/A	1,2,3,4,7	10
C05	Creating Database, Tables, Forms, Queries, Reports In Ms-Access	R/U/A	1,2,3,4,7	10

MODEL PAPER OF **MID SEM- I** EXAM

TIME: 1 hr

MARKS: 20

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS.

20 x 1 = 20

1. Demonstrate Starting MS word and identify the word screen elements.
2. Draw and explain the groups and commands in Home tab under ribbon in Ms word.
3. Demonstrate text formatting in Ms word.
4. Demonstrate procedure for checking of spelling and grammar using dictionaries.
5. Demonstrate paragraph formatting in Ms word.
6. Draw and explain the groups and commands in page layout tab under ribbon in Ms word.
7. Demonstrate page formatting in Ms word.
8. Demonstrate procedure for creating Mail merging process in Ms word.
9. Demonstrate creating of table and adding rows and columns to the existing table in Ms word.
10. Demonstrate finding and replacing of text & searching for a bookmark.
11. Demonstrate starting of MS Power Point and identify the opening screen elements.
12. Draw and explain the groups and commands in Home tab under ribbon in MS Power Point.
13. Demonstrate different Auto Layouts of a Slide in MS Power Point.
14. Demonstrate Slide Transition effects in Ms Power Point.
15. Demonstrate different Animation effects in Ms Power Point.
16. Draw and explain the groups and commands in Animations tab under ribbon in MS Power Point.
17. Demonstrate different Slide views in MS Power Point.
18. Draw and explain the groups and commands in Review tab under ribbon in MS Power Point.
19. Demonstrate inserting and formatting of text and pictures in MS Power Point.

MODEL PAPER OF **MID SEM- II** EXAM

TIME: 1 hr

MARKS: 20

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS. 20
x 1 = 20

1. Write procedure to open Excel window and Draw and label the parts in Excel window.
2. Draw and Write about groups and commands under Formulas tab under the ribbon in MS-Excel.
3. Write procedure to format the text in the cells.
4. Write procedure to enter formulas with built in functions.
5. Write procedure for creating chart in MS-excel.
6. Write Procedure for formatting numbers in MS-Excel.
7. Write procedure for writing criteria and extract the data.
8. Write procedure for printing of a worksheet.
9. Write procedure for formatting of chart in Ms-excel.
10. Write procedure to jump to different workbooks & import worksheet from different workbook.
11. Write procedure to create a database.
12. Write procedure to create a table using design view.
13. Write procedure to create form using forms wizard.
14. Write procedure for creating reports using report wizard.
15. Write procedure for creating a Custom Form.
16. Write the procedure to create custom reports.
17. Write the procedure to print active sheet.
18. Write the procedure for Printing of reports.
19. Draw and explain the groups and commands in create tab under ribbon in Ms access.
20. Write the procedure for creating Filter by form.

MODEL PAPER OF END SEMESTER EXAM

TIME: 2hr

MARKS : 40

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS.

20 x 1 = 20

1. Write procedure for Creating and saving a document and draw and label the different parts of
opening screen elements in Ms word.
2. Draw and explain the groups and commands in Home tab under ribbon in MS Power Point.
3. Write procedure for applying sounds, order, timing and effects of animation in a presentation.
4. Write procedure for character formatting in Ms word.
5. Draw and explain the groups and commands in Home tab under ribbon in Ms word.
6. Write procedure for creating main document and data file for mail merging.
7. Write procedure for page formatting in Ms word.
8. Write procedure for checking spelling and grammar using dictionary in Ms word.
9. Write procedure for printing of document in Ms word.
10. Draw and explain the groups and commands in Animations tab under ribbon in MS Power Point.
- . 11. Write procedure to open Excel window and Draw and label the parts in Excel window.
12. Draw and Write about groups and commands under Formulas tab under the ribbon in MS-Excel.
13. Write procedure to format the text in the cells.
14. Write procedure to enter formulas with built in functions.
15. Write procedure for creating chart in MS-excel.
16. Write Procedure for formatting numbers in MS-Excel.
17. Write procedure for writing criteria and extract the data.
18. Write procedure for printing of a worksheet.
19. Write procedure for formatting of chart in Ms-excel.

20. Write procedure to jump to different workbooks & import worksheet from different workbook.
21. Write procedure to create a database.
22. Write procedure to create a table using design view.
23. Write procedure to create form using forms wizard.
24. Write procedure for creating reports using report wizard.
25. Write procedure for creating a Custom Form.
26. Write the procedure to create custom reports.
27. Write the procedure to print active sheet.
28. Write the procedure for Printing of reports.
29. Draw and explain the groups and commands in create tab under ribbon in Ms access.
30. Write the procedure for creating Filter by form.

Record book :- 10 marks

Viva-voce:- 10 marks

EE-111-SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	EE-111
Semester	I	Course	Core
Teaching Scheme in periods	0:0:8	Credits	2.5
Methodology	Activities	Total Contact	120
CIE	Rubrics	SEE	NIL

Basic English – Skills Upgradation

TASK:

LEVEL 1: Collection of material for learning skills

LEVEL2: Analysis of the material

LEVEL 3: Practice the activities

LEVEL 4: Assessment of the skills acquired

Activity before the activities:

Collect the material useful for learning Listening, Speaking, Reading, Writing (LSRW skills), Grammar and Vocabulary.

- 1. Collect newspaper clippings, books, puzzles, pictures, audio and video programmes in English.*
- 2. Talk to your classmates, seniors, alumni, teachers, successful people in job interviews and celebrities.*
- 3. Visit libraries to gather information.*
- 4. Visit useful websites for acquiring language learning skills.*

Activities:

1. Collect / Go through the different kinds of dictionaries and find out the differences.
 - a) List out the English words which are originated from Telugu, Hindi, Sanskrit and other Indian languages.
 - b) Prepare a list of technical words related to your branch.
 - c) Prepare the list of Homonyms, Homophones. Heteronyms, Heterophones and Capitonyms.
2. Collect the vocabulary building games and activities. Practice them individually, in pairs and groups.
3. Learn different kinds of reading a text. Practice various kinds of reading material.

4. Find out the differences between reading aloud and silent reading. Identify the advantages and disadvantages of speed reading.
5. Conduct a survey on the need for English. Talk to your classmates or seniors and find out the difficulties while learning English.
6. Practice dialogues on
 - a) Feelings
 - b) Likes & dislikes
 - c) Requests
 - d) Obligations(Dramatize the dialogues)
7. Introduce yourself through a line up activity or inner and outer circle activity.
8. Introduce tenses:
 - a) Write the diary using present tense.
 - b) Write an anecdote in past tense.
 - c) Prepare the weather forecast for the next week in future tense.
9. Observe the picture / photo and describe the persons, places and things using the describing words and prepositions.
10. Role play: Interview a celebrity using 'wh' and 'yes/no' questions.
11. Identify what is there in the bag using 'yes/no' questions.
12. Arrange the jumbled sentences in an order to make a meaningful paragraph.
13. Write a paragraph on your goals.
14. Write a letter to God / a celebrity.
15. Collect the letters written by great leaders, celebrities and officers.

Note: The above activities are indicative. The teacher may assign any other activity relevant to the skills introduced in the semester.

COURSE OUTCOMES

No.	At the end of the course, the students will have the ability to:
101.1	Use a dictionary and acquire vocabulary for social interaction.
101.2	Comprehend, identify main ideas, make inferences, visualize, and answer questions. Analyze and evaluate the written material.
101.3	Speak and write grammatically correct sentences, communicate effectively, express their likes, dislikes, feelings, make requests, express obligations and introduce themselves.
101.4	Use verbs in the different tenses according to the situations. Use Voice to express an action clearly
101.5	Describe people and objects, ask questions, use prepositions and write grammatically correct sentences.
101.6	Convey ideas in the form of paragraphs and letters

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
101.1	-	-	-	-	3		3	5,7
101.2	-	-	-	-	3	2	3	5,6,7
101.3	-	-	-	-	3	3	3	5,6,7
101.4	-	-	-	-	2	2	3	5,6,7
101.5	-	-	-	-	2	2	3	5,6,7
101.6		-	--	--	2		3	5,7

Model Rubric:

Note: Separate rubric may be prepared according to the activity.

[illegible]

I SEMESTER

SKILL UPGRADATION IN - BASIC ENGINEERING MATHEMATICS

ACTIVITY ASSESSMENT Steps

1. Mathematical concepts
2. Procedure
3. Explanation
4. Working with others
5. Mathematical errors

ACTIVITIES

1. Prepare a presentation to explain Logarithms.
2. Prepare a list of articles purchased from a super market and arrange in a matrix form to Compute the total amount using matrix multiplication.
3. Prepare a presentation to resolve a Partial fraction into simpler fractions.
4. Prepare a presentation stating the applications of Trigonometry.
5. List the methods to solve system of equations using Matrices and Determinants. Describe their features.
6. Visit the library, refer books on Mathematics and collect the details related to 2 Mathematicians.
7. Prepare a presentation to solve a triangle ABC in different cases.

CO / PO - MAPPING OF ACTIVITIES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1			1	2	2	3
CO2	3	2	2	1	1		1	2	2	3
CO3	3	2	2	1			1	2	2	3
CO4	3	2	2	1			1	2	2	3
CO5	3	2	2	1			1	2	2	3
CO6	3	2	2	1			1	2	2	3
CO7	3	2	2	1			1	2	2	3

Rubrics for Activity assessment

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Procedures	Typically, uses an efficient and effective procedure to solve the problem(s).	Typically, uses an effective procedure to solve the problem(s).	Sometimes uses an effective procedure to solve problems, but does not do it consistently.	Rarely uses an effective procedure to solve problems.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.

STUDENT ASSESSMENT by RUBRICS

[illegible]

SKILL UPGRADATION – C21 BASIC PHYSICS

TASK

LEVEL 1: Concept, Ethical Data, Materials, Source (Library/internet/others)

LEVEL 2: Methodology/procedure

LEVEL 3: Analysis/experiment

LEVEL 4: Interpretation/inference/evaluation.

Bridge activity: - Visiting your college Library:

(A) Prepare a list of available reference books in Physics with details such as author, publisher, edition etc.

(B) Prepare a list of Physics/Science journals, magazines, monographs with details.

(C) Prepare a log book of your visits to college library with brief description.

Activities:-

1. Discover some physical equations and apply principle of homogeneity.
2. Visit your College Physics laboratory. Collect equal amounts (mass in gm) of water and mercury. Calculate the density of each in CGS units. Express them in SI system of units using dimensional analysis. Infer the result.
3. Identify the bodies which have rolling objects like wheels, ball bearings. Prepare a chart with drawings and explain the importance of rolling friction.
4. Identify the objects where you apply various methods of reducing friction. Make each method as a module to one individual. Integrate all modules and generate a chart with brief explanation by the use of drawings.
5. Take two vectors with varying angles of inclination. Find the resultant using triangle law of vector addition by drawing the vectors in each case on a graph paper. Draw the conclusions. Correlate the result using parallelogram law of vector addition.
6. Three forces F_1 , F_2 and F_3 are acting on a body with angles θ_1 , θ_2 , and θ_3 with the horizontal respectively. Calculate the resultant force acting on that body. Draw the diagram.
7. Survey the places where curved paths are banked. Take photographs and reconstruct on the chart. Prepare a report.
8. Verify Hooke's Law by performing experiment using weights, spring and ruler.
9. Explore the internet. Prepare a power point report on surface tension and wetting, viscosity.
10. Debate on Green house effect and global warming. Justify the advantage of green house effect. Prepare a video clip and power point report with diagrams.
11. Design a mini wind mill/solar cooker/biomass plant as an application of conversion of energy.

12. Construct a model thermometer having centigrade scale, Fahrenheit and absolute scale with the help of available simple objects. Formulate the method of development.

NOTE: The above activities are indicative. The teacher may assign any other activity relevant to the course based on resources available.

Course Outcomes (CO)		Linked Pos	Activity Hours
CO1	Apply principle of homogeneity	PO1, PO2	3
CO2	Convert unit from one system to other system using dimensions	PO1, PO2, PO3	3
CO3	Prepare a chart with drawings explaining the importance of friction	PO1, PO2, PO7	3
CO4	Prepare a chart on reducing friction	PO1, PO2, PO4, PO5, PO7	3
CO5	Triangle law of vector addition - graphical analysis – correlation with parallelogram law of vector addition	PO1, PO4,	3
CO6	Calculate resultant force by component method	PO1, PO2, PO4	3
CO7	Banking of roads – practical observations	PO1, PO2, PO5	3
CO8	Verify Hooke's law with simple materials	PO1, PO2, PO3, PO4	3
CO9	Power point report on surface tension and wetting, viscosity by exploring internet	PO1, PO2, PO7	3
CO10	Debate on Green house effect and global warming. Advantage of green house effect - justification. Prepare a video clip and power point report with diagrams.	PO5, PO6, PO7	3
CO11	Design a mini wind mill/solar cooker/biomass plant as an application of conversion of energy-working models.	PO5, PO6, PO7	3
CO12	Construct a model thermometer having centigrade scale and absolute scale. Formulate the development.	PO1, PO2, PO4	3

Rubrics for Task Assessments

General Scale for scoring student performance in Skill Upgradation

Type of Skill/Score	4	3	2	1
Data/Material Collection	All Data/Material was collected one time independently.	All Data/Material was collected more than one time independently.	All Data/Material was collected several times independently.	All Data/Material was collected several times with assistance.
Methodology/ Procedure	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations.	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Expert help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after expert feedback.	Procedures that were outlined were incomplete or not sequential, even after Expert feedback had been given.
Activity/ Development	Quality of Skill is high.	Skill is mastered to the level of expectation.	Skill is present but with errors and omissions.	Skill needs improvement.
Interpretation/ summary	Student provided a detailed conclusion clearly.	Student provided a somewhat detailed conclusion clearly.	Student provided a conclusion with some reference.	No conclusion was apparent.

NOTE: The above types of skills are indicative. The teacher may change the skills depending on type of activity.

STUDENT ASSESSMENT (RUBRICS)

[illegible]

SC-104 - GENERAL ENGINEERING CHEMISTRY

Suggested Skill Upgradation Activities

Activity Assessment Steps:

Level-1: Concept, Data collection and summarization, Material etc

Level-2: Prepare Chart, explain the process, perform the experiment etc, and prepare a report etc

Level-3: Oral or power point presentation of the activity.

Level-4: Submission of report.

Activity – 1

Prepare a chart or model of different types of orbitals and electronic configuration.

Activity – 2

Prepare the models/ charts on ionic and covalent bonding.

Activity – 3

Prepare and study the physical properties of True Solution, Colloidal Solution, and Suspension.

Activity – 4

Study of the acidic, basic or neutral nature of water sample collected from various sources.

Activity – 5

Compare the renewable and non-renewable energy sources.

Activity – 6

Study and analysis of ecosystem (lake, pond etc) existing in your surroundings.

Activity – 7

Study of bio diversity in your surroundings.

Activity – 8

Study and report the importance of forest resources.

Activity – 9

Study and report the importance of osmosis and reverse osmosis.

Activity – 10

Explain the method of purification of drinking water adopted at your residence.

Activity – 11

Preparation of the models/ charts on the softening of water by different methods and comparison.

Activity – 12

Study of electrolytes and non-electrolytes

Note: Any other skill upgradation activity related to the course may be taken up.

Mapping of POs to Skill Upgradation Activities

S.No	Name of the activity	Linked POs
1	Prepare a chart or model of different types of orbitals and electronic configuration.	1, 6,7
2	Prepare the models/ charts on ionic and covalent bonding.	1, 6,7
3	Prepare and study of physical properties of True Solution, Colloidal Solution, and Suspension.	1,4, 6,7
4	Study of the acidic, basic or neutral nature of water sample collected from various sources.	1,4, 6,7
5	Compare the renewable and non renewable energy sources.	1, 5, 6,7
6	Study and analyze the ecosystem (lake, pond etc) existing in your surroundings	1, 5, 6,7
7	Study of bio diversity in your surroundings	1, 5, 6,7
8	Study and report the importance of forests resources.	1,5, 6,7
9	Study and report the importance of osmosis and reverse osmosis.	1, 6,7
10	Explain the method of purification of drinking water adopted at your residence.	1, 6,7
11	Preparation of the models/ charts on the softening of water by different methods and comparison.	1, 6,7
12	Study of electrolytes and non-electrolytes	1, 6,7

Method of evaluation of the student activities (Rubrics)**Model Rubrics**

S. No	Sub activity	Performance Level (Score)			
		Excellent (4)	Good (3)	Satisfactory (2)	Need improvement (1)
1	Level-1 (Data and Material collection)	All materials and data required for the activity were accurately prepared based on the data collected independently	Almost all materials and data required for the activity were accurately prepared based on the data collected independently	The materials and data required for the activity were accurately prepared based on the data collected with the help of teacher.	The materials and data required for the activity were inaccurately prepared .
2	Level-2 (Chart, Model, Experiment or Study)	Procedures were outlined in a step-by-step fashion that could be followed by anyone & performed the activity effectively.	Procedures were outlined in a step-by-step fashion, require explanation & performed the activity effectively.	Procedures that outlined were complete with 1 or 2 gaps and require explanation & performed the activity normally	Procedures that outlined were not sequential, & performed the activity in a poor way
3	Level-3 (Oral or Power point presentation)	Presented/ explained the information about the activity in logical, interesting sequence with attractive visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with less visuals or diagrams.	Presented/ explained the information about the activity without sequence and visuals or diagrams.
4	Level-4 (Submission of Report)	Provided a detailed conclusion/ summary clearly based on the data and activity	Provided a conclusion / summary clearly based on the data and activity	Provided a conclusion/ summary less effectively	Conclusions /summary was not relevant.

Note: The above rubrics are indicative. Separate rubrics may be prepared according to the activity. Minimum passing score is 2.5.

C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

II SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Cred its	Examination Scheme							
			Instruction periods per week			Total Periods per semest er		Continuous internal evaluation			Semester end examination				
			L	T	P			Mid Sem 1	Mid Sem 2	Internal evaluati on	Max Mark s	Min Mark s	Total Mark s	Min marks for Passing including internal	
1	HU-201	Advanced English	4	1	0	75	3	20	20	20	40	14	100	35	
2	SC-202	Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35	
3	SC-203	Applied Physics	4	1	0	75	3	20	20	20	40	14	100	35	
4	SC-204	Engineering Chemistry & Environmental	4	1	0	75	3	20	20	20	40	14	100	35	
5	CS-205	Programming In C	4	1	0	75	3	20	20	20	40	14	100	35	
6	ME-206	Advanced Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50	
7	ME-207	Advanced AutoCAD Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
8	EE-208	Basic Electrical Workshop Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
9	SC-209	Applied Science Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
10	CS-210	Programming in C Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
11	EE-211	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics			--	-	
	Activities: student performance is to be assessed through Rubrics														

HU-201_Advanced English

Course Title	Advanced English	Course Code	HU-201
Semester	II	Course Group	Foundation
Teaching Scheme in Minutes (L:T)	4:1:0	Credits	3
Methodology	Communicative Language Teaching + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

Prerequisites: Basic knowledge of English Language and Listening, Speaking, Reading and Writing skills.

COURSE CONTENTS

MODULE 1: VOCABULARY

Periods: 12 (L-9 T-3)

1. How to Learn a New Word
 - a) Spelling, pronunciation, syllabification, word class, inflections and the other forms of the word,
 - b) Meanings, usage, derivatives, idiomatic expressions, context for using the word and compound words.
 - c) Phrasal verbs, etymology, word families, collocations.
2. Synonyms, Antonyms and One Word Substitutes
3. Prefixes, Suffixes and Roots

MODULE 2: READING

Periods: 12 (L-8 T-4)

Unit 1:

Innovation, Science and Technology: Process, Cause and Effect, Problem Solution, Evaluation of ideas, reasons and conclusion. (Focus on One-word Substitutes / Scientific terms/ Analyses/ Application/ meanings/ synonyms)

Unit 2:

Descriptive: Biography, Travel Writing, Nature Writing and Journal (Focus on Analysis/ Vocabulary/ Noun / Verbs/ Adjectives / Chronological order).

Unit 3:

Reading for Pleasure: Story / Fable / Drama (Focus on factual, main idea, sequencing, inferring, morals and values).

NOTE: Each reading unit should contain the following word limit.

- a) Paragraph should contain minimum 50 words for answering one mark question.
- b) Paragraph should contain minimum 100 words for answering three one-mark questions.

- c) Paragraph should contain minimum 150 words for answering five one-mark questions.

MODULE 3: SPEAKING

Periods: 12 (L-8 T-4)

1. Fixing, Cancelling and Rescheduling the Appointments.
(Focus on using expressions to fix, cancel and reschedule an appointment)
2. Extending, Accepting and Declining Invitations.
(Focus on using expressions in conversations)
3. Giving Instructions.
4. Asking for and Giving Directions.
5. Describing Objects.
 - a) Use adjectives (Size, shape, colour, weight/ quantity, feel or touch, material, taste, state, purpose/uses)
6. Talking about the Past.
 - a) Events, Incidents and Situations using past tense and passive voice.
7. Offering Help, Opinions and Suggestions.

MODULE 4: WRITING-I

Periods: 13 (L- 8 T-5)

1. Mechanics of Writing
 - a) Spelling, punctuation, capitalization and special symbols.
 - b) Fonts type, font size, bold, italics, underline, superscript, subscript, alignment, margins.
2. Data Interpretation -I
 - a) Understand the information and analyze the flow charts and stating the main idea.
 - b) Describe the process (events or chronological order) interpret flow chart.
 - c) Use connectives and sequence markers, writing a meaningful paragraph.
3. Data Interpretation -II
 - a) Understand the information in a tree diagram and analyze the data.
 - b) State the main idea and describe the process from key word.
 - c) Explain one branch completely and move to the branches down words and write horizontal direction.
 - d) Use linkers and sequence markers.
4. Data Interpretation –III
 - a) Understand the data given in a table and pie charts.
 - b) Analyze and state the main idea of the table and pie charts.
 - c) Identify the similarities, differences and mention figures.
 - d) Use linkers.

MODULE 5: GRAMMAR

Periods: 14 (L-9 T-5)

- a. Reported Speech.
- b. Conversion from Direct to Indirect speech but not vice versa.
- c. Error Analysis on nouns, pronouns and verbs.
- d. Error Analysis on articles, adjectives, adverbs, nouns, Prepositions, Spellings, Concord and Connectives.
- e. Error Analysis on Questions, Vocabulary, Homophones and other kinds of

errors.

MODULE6: WRITING-II

Periods: 12 (L-8 T-4)

1. Writing a Resume
 - a) Different formats of a resume.
 - b) Analyze strengths and weaknesses.
2. Writing a Cover Letter
 - a) Importance of cover letter.
 - b) Format of cover letter.
 - c) Write a Cover letter as per given direction.
3. Note Making
 - a) Understand the Benefits of Note-Making.
 - b) Cue Method.
 - c) Mind – Mapping or Pattern Note-Making.
 - d) Cornell Method.
 - e) Exercises should be given on how to make notes to practice in the classroom.
4. Writing a Report
 - a) Understand the concept of report writing and formats of various reports.
 - b) Report on an incident.
 - c) Technical reports.
 - d) Report on an industrial visit.
 - e) General reports.
 - f) Report on events.
 - g) Revising and editing reports (features of good report writing).
5. Writing an Email
 - a) Structure of personal e-mail.
 - b) Composition and structure of professional e-mail (subject line, greetings, e-mail text, closing).
 - c) Proof reading email.
 - d) Strategies to write Email text.
 - e) Do's and don'ts of e-mail writing.

COURSE OUTCOMES

CO NO	At the end of the course the students will have the ability to
201.1	Learn vocabulary and use them in professional and social interactions.
201.2	Comprehend the main idea and minute details related to engineering courses.
201.3	Communicate effectively in English in terms of basic sciences, mathematics and engineering fundamentals.
201.4	Learn English grammar to speak and write flawlessly so as to interpret the data.
201.5	Learn the mechanics of writing to make the technical writing practical and meaningful.
201.6	Make notes, write resumes, prepare cover letters, write technical emails and draft reports.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
201.1	-	-	-	-	3		3	5,7
201.2	-	-	-	-	3	2	3	5,6,7
201.3	-	-	-	-	3	3	3	5,6,7
201.4	-	-	-	-	2	2	3	5,6,7
201.5	-	-	-	-	2	2	3	5,6,7
201.6		-	--	--	2		3	5,7

Test	Units	Marks	Pattern
Mid Sem- I	1. Vocabulary 2. Reading	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
Mid Sem - II	1. Speaking 2. Writing-1	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
Slip Test 1	1. Vocabulary 2. Reading	5	2 questions out of 3 questions
Slip Test 2	1. Speaking 2. Writing-1	5	2 questions out of 3 questions
Assignment	One assignment per one semester	5	Different group assignments of higher order questions that develop problem solving skills and critical thinking should be given
Seminars	One seminar per one semester	5	Oral presentations using audio –visual equipment, charts, etc.
	Total	60	

MID SEM - I EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	
MID SEM - II EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	

SEMESTER END EXAM								
Sl. NO.	Unit No.	Question to be set for SEE				Remarks		
		R		U	A			
1	I	4	1		9 (a)	13 (a)		
2	II							
3	III		2		10 (a)	14 (a)		
4	IV							
5	V		3	5, 6	9 (b)	13 (b)		
					11 (a)	15 (a)		
					11 (b)	15 (b)		
6	VI				7, 8	10 (b)		14 (b)
						12 (a)		16 (a)
		12 (b)				16 (b)		
Total Questions		8		8		8		

Legend:

Remembering: one mark

Understanding: three marks

Application: five marks

Suggested Learning Outcomes:

On completion of the course the students will be able to:

- Enhance their vocabulary.
- Learn synonyms, antonyms and use one-word substitutes.
- Read and understand main ideas and answer the questions.
- Communicate effectively in various situations.
- Fix, cancel and reschedule appointments.
- Extend, accept and decline invitations.
- Give instructions and directions.
- Describe objects.
- Talk about past incidents/experiences.
- Offer help, opinions and suggestions.
- Write in reported speech.
- Identify and correct common errors.
- Interpret data and write a paragraph.
- Learn to prepare cover letter and resume.
- Make notes, write reports and write emails.
- Confidently take diploma based competitive exams in terms of General English.

Suggested Student Activities:

- Practice conversation / dialogue / speech and answer the questions.
- Group Discussions.
- Seminars.
- Review a movie.
- Review a book.
- Narrating a story.
- Chain stories.
- JAM.
- Speak about incidents /events /memories /dreams /role model.
- Interview with famous personalities.
- Reading for main ideas and specific details.
- Summarizing.
- Picture description.
- Writing a recipe.
- Describing a process.
- Giving directions using maps.
- Surveys.
- Filling forms.
- e-mail etiquette.
- Preparing reports on field visits, experiments, projects.
- General English for competitive exams – Practice the previous year's question papers of SSC, RRB, TS TRANSCO, TSGENCO, etc.

REFERENCES:

1. Practical English Grammar by A.J Thomson and A.V. Martinet
2. A Course in Phonetics and Spoken English by J. Sethi and P.V Dhamija

3. Word Power Made Easy by Norman Lewis.
4. Keep Talking by Friederike Klippel.
5. More Grammar Games by Mario Rinvoluceri and Paul Davis.
6. Essential English Grammar by Raymond Murphy.
7. Spoken English-A Self Learning Guide to Conversation Practice by V Sasi Kumar.

E-learning resources:

1. www.duolingo.com
2. www.bbc.co.uk
3. www.babbel.com
4. www.merriam-webster.com
5. www.ello.org
6. www.lang-8.com
7. youtube.com
8. Hello English (app)
9. mooc.org
10. <https://onlinecourses.nptel.ac.in>
11. <https://www.indeed.com/career-advice/>
12. Dictionary.com
13. Online Dictionaries
14. <https://englishsentences.com>
15. <https://englishcub.com/vocabulary/dictionary-thesaurus.htm>
16. TEDx talks.
17. Toastmasters International on YouTube.

BOARD DIPLOMA EXAMINATION (C-21)
II SEMESTER – MID EXAMINATION - I
HU-201 - ADVANCED ENGLISH

Time: 1 Hour

Total Marks: 20 Marks

PART-A

4 X 1 = 4

Instructions: Answer all questions. Each question carries **one** mark.

1. Write the other forms of the word for the following words.
 - a) Impress
 - b) Create
2. Write two examples of the root word “Tele” which means “far”.
3. Read the following paragraph and answer the question that follows.

Each one of us must realize that the only future for India and her people is one of tolerance and co-operation which has been the basis of our culture from ages past. We have laid down in our constitution that India is secular state. This does not mean we are irreligious. It means equal respect for all faiths and equal opportunities for those profess faith.

- a) What is the basis of our culture?

4. Read the following paragraph and answer the question that follows.

The sun rises and sets at different times in different places. As the earth rotates from west to east, places in the east see the sun earlier than those in the west. If the earth were flat, the whole world would have sunrise and sunset at the same time. But we know this is not so.

- a) Why the places in the east see the sunrise earlier than the places in the west?

PART-B

2 X 3 = 6

Instructions: Answer the following questions. Each question carries **three** marks.

5. i) Use the following idioms in your own sentences.
 - a. once in a blue moon
 - b. beyond wildest dreams
 - c. turn a deaf ear

(OR)

- ii) Form antonyms for the given words using prefixes.

- a) Loyal
- b) Legal
- c) necessary

6. i) Read the following paragraph and answer the questions that follow.

Punctuality helps us to plan our work in advance and also enables us to do a lot of work. On the other hand, if we are unpunctual or the others are not punctual, everything gets upset and we are not able to do much of a work in a day. Our mood is upset. When others are unpunctual, we curse them and vice versa. If we are punctual, we make things smooth for ourselves and others and so we earn the appreciation and respect of others. So, punctuality is a quality that should be cultivated by every Indian. The derisive expression “Indian Punctuality” should go, once and for all, from usage.

- a) How does punctuality help us?
- b) Write the antonym of the word ‘curse’.
- c) When do we earn the appreciation and respect of others?

(Or)

ii) Read the following passage and answer the questions that follow.

Incredible innovations in robotics are taking place in Japan, in attempt to make the lives of the aged more comfortable. One company is developing a bed that transforms into a wheelchair. The bed splits in half, with one half folding into a chair and removing the need to lift someone out of the bed and into a wheelchair. Another company has developed Robear, a high-tech robot which uses 'paws' to help elderly people to get up or lift them out of bed into a wheelchair. These robots are prohibitively expensive at present, but the costs are expected to decrease over the years.

- a) What is the synonym of the word incredible?
- b) How does Robear help elderly people?
- c) What is the antonym of the word expensive?

PART-C

2x5 = 10

Instructions: Answer the following questions. Each question carries **five** marks.

7. i) Write five things you learn from a word with suitable examples.

(OR)

ii) Write one- word substitutes of the following definitions.

- a. A study of some one's life written by another person.
- b. People who work in the same organization or office.
- c. Confinement to one place to prevent the spread of infection.
- d. One who looks at bright side of things.
- e. A person who fits and repairs water pipes.

8. i) Read the following passage and answer the questions that follow.

Stephen Hawking was born in Oxford on 8th Jan 1942. He joined the University College, Oxford where he studied Physics, as a subject of his first choice, Mathematics was unavailable. He pursued his Ph.D., despite being diagnosed with amyotrophic lateral sclerosis (ALS), a rapid progressive disease that cripples all nerves and muscles, in 1985, he became ill with pneumonia and since then he was required 24-hour nursing care. Through his incredible determination and with the help of his family and associates, he continued to pursue research, write books, give lectures, travel widely and inspired millions of persons. His research on black holes, and his books like "A brief History of Time", "Black Holes", "Baby Universe", bear testimony to the fact that he is a unique person with extraordinary mind.

- a. What did Stephen Hawking study in Oxford?
- b. What did Hawking want to study actually?
- c. Name the disease Hawking was diagnosed with when he was just a student.
- d. What happened because of his illness in 1985?
- e. Name two of Hawking's books and the area of his research.

Or

ii) Read the following passage and answer the questions that follow.

Nelson Mandela was born on 18th July 1918 in South Africa. He had thirteen siblings by the same father but different mothers. His father died when he was nine. He was the first member of his family who was sent to school. In 1941 he was expelled from university because he led a group of students on a political strike.

Mandela was sent to prison for life in 1962 for protesting the poverty, in equality and racism against black people in South Africa during apartheid. The apartheid was when people were divided by their race and forced to live separately. Black people could not do the same things as white people, such as going to certain places or voting. Mandela stayed in Prison for 27 years of his life

until 1990, when there was greater political freedom in South Africa, and he was set free. He received the Noble Peace Prize in 1993 and in 1994 he was elected as the first black South African president. He lived a simple life, donated lots of money to charity. He retired from public life in 2004. He passed away on 5th December 2013. He will be remembered as a man who encouraged people to live more loving lives and who took a stand against injustice.

- a. Why was Nelson Mandela expelled from university?
- b. Why was he sent to prison for life?
- c. How many years did he stay in the prison?
- d. How is he remembered by the people?
- e. Select the word from the passage that gives the meaning “a person’s brothers or sisters”.

BOARD DIPLOMA EXAMINATION (C-21)
II SEMESTER – MID EXAMINATION - II
HU-201- ADVANCED ENGLISH

Time: 1 Hour

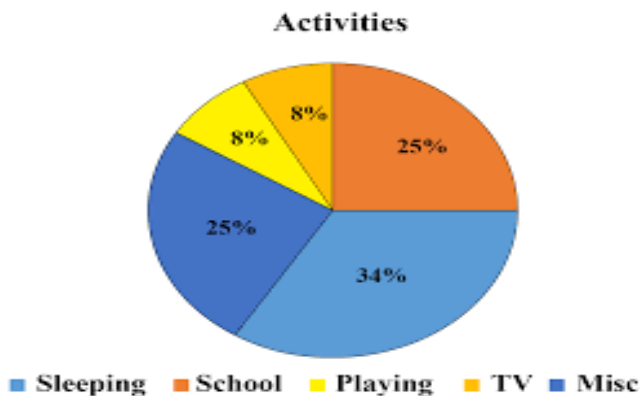
Total Marks: 20 Marks

PART-A

4 X 1=4

Instructions: Answer all questions. Each question carries **one** mark.

1. How do you fix an appointment with a doctor on phone? Write in a sentence.
2. How do you invite your friend to your sister's marriage? Write in a sentence.
3. Write a short paragraph based on the pie chart given below.



4. Rewrite the following sentence using appropriate punctuation marks and capital letters.
(i) he said to rohit did you buy english textbook

PART-B

2X3=6

Instructions: Answer the following questions. Each question carries **three** marks.

5. a) Write a short paragraph on a memorable incident or event of your school days.

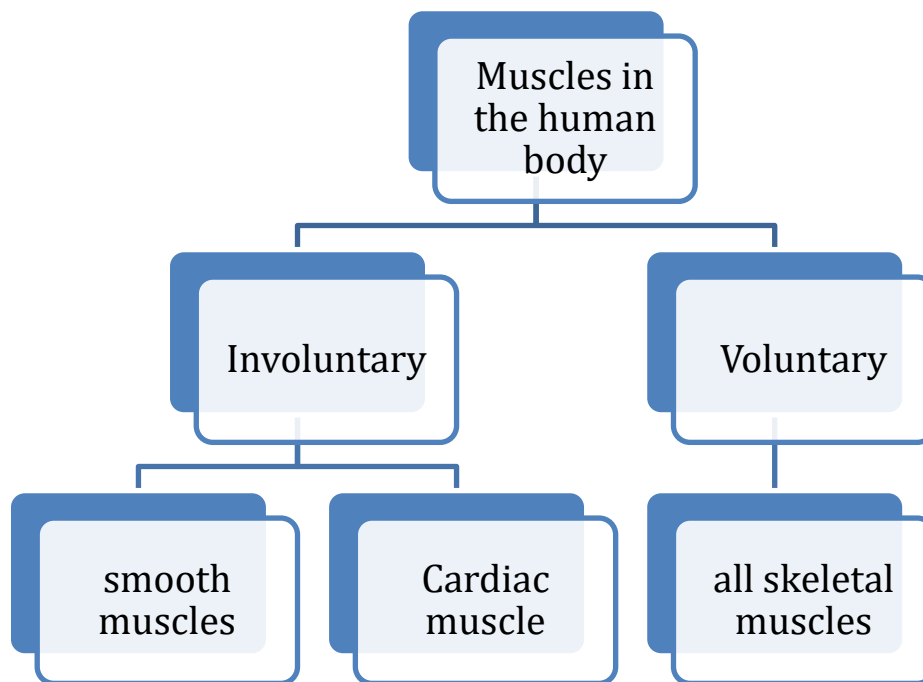
(OR)

b) Describe desk top computer using appropriate words.

6. a) Rewrite the following sentences using appropriate punctuation marks and capital letters.
(ii) this is my cousins phone.
(iii) i have an xmas tree.
(iv) Do you believe in god.

(OR)

b) Write a short paragraph on the following tree diagram.



PART-C

2x5 = 10

Instructions: Answer the following questions. Each question carries **five** marks.

7. a) Write instructions for opening an account in a bank.

(OR)

b) Give suggestions to your brother on how to improve English communication skills.

8. a) Write a paragraph using the information in the following table.

Human Teeth

Incisors	Canine	Premolars	Molars
Cut and bite food	Hold and tear food	Crush and grind food	Grind food

(OR)

b) Draw a flow chart of sending an e-mail and write a paragraph on it.

BOARD DIPLOMA EXAMINATION (C-21)
II SEMESTER - SEMESTER END EXAMINATION
HU-201- ADVANCED ENGLISH

Time: 2 Hours

Total Marks: 40 Marks

PART-A

8 X 1 = 8

Instructions: Answer all questions. Each question carries **one** mark.

1. Write one- word substitutes of the following definition
 - a) Great lover of books.
 - b) Something cannot be read.
2. You saw that your friend was suffering from fever and unable to go to hospital. (Offer help)
3. Subha said, "I can sing songs". (Change it into indirect speech)
4. Write the correct spelling of the following words.
 - a) Enthuciastic
 - b) Challenje
5. Correct the following sentences.
 - a) I bought seven goldfishes.
 - b) Ramana prefers coffee than tea.
6. Correct the following sentences.
 - a) When did she visit her grandmother?
 - b) It is very hot.
7. What will you write under skills/tools section in your resume?
8. What do you write under closing section in a professional email?

PART-B

4x3 = 12

Instructions: Answer the following questions. Each question carries **three** marks.

9. a) Explain the following features of any word and give one example to each feature.
 - (i) Meanings
 - (ii) Inflections
 - (iii) Compound words

(OR)

- b) Correct the following sentences.
 - (i) Pavani is a cleverest girl in our institute.
 - (ii) Latha has bought books three days ago.
 - (iii) He works hardly.

10. a) Describe your smart phone using six describing words.

(OR)

- b) Write your strengths and limitations.

11. a) Change the following sentences into indirect speech.

- (i) Vimala said, "the sun rises in the East".
- (ii) Robert said to Ajay, "When will you pay the examination fee?"
- (iii) Hari said, "I have seen Charminar".

(OR)

- b) Correct the following sentences.

- (i) We discuss about tenses.

- (ii) He is awaiting for the orders.
- (iii) Mount Everest is the most highest peak in the world.

12. a) Read the following paragraph and make notes using Cue Method.

We all knew that “we are what we eat”. So, a healthy diet may improve optimal health. In nutrition, diet is the sum of food consumed by a person or other organism. The word diet often implies the use of specific intake of nutrition for health or weight-management reasons. Complete nutrition requires ingestion and absorption of vitamins, minerals, essential amino acids from protein and essential fatty acids from fat-containing food, also for energy in the form of carbohydrate, protein and fat. Dietary habits and choices play a significant role in the quality of life, health and longevity. Many surveys recommend that people maintain a normal weight by limiting consumption of energy-dense foods and sugary drinks, eating plant-based food, red meat and alcohol intake. A particular diet may be chosen to promote weight loss or weight gain. If a person is overweight or obese, changing to a diet and lifestyle that allows them to burn more calories than they consume may improve their overall health by preventing diseases.

(OR)

- b) Write an e-mail to your friend requesting him or her to help you in completing your project work.

Part-C

5 X 4 = 20M

Instructions: Answer the following questions. Each question carries **five** marks.

13. a) Read the following paragraph and answer the questions that follow.

Florence Nightingale rendered a unique service when the call came to her from the government to help the wounded and the suffering in the hospital at Scutari during the Crimean War. The conditions in the hospital were horrible. There was dust, indifference and inefficiency. There was hospitality to a woman who was assuming such a great public responsibility. It was an insult to the vanity of men. They raised all possible obstacles in the way. But she was an autocrat. She bore down and swept away all opposition.

The hospital became an ideal place and the wounded soldiers worshipped her like an angel. The ‘lady with the lamp’, as the soldiers lovingly called her, became a national heroine. The nation showed its gratitude to her by raising a huge sum for her benefit, but Florence showed herself to be greater by contributing that sum for the setting up of an institution for the training of nurses. Her ambition was not merely to build a profession of nurses but an entire nation of nurses. And she succeeded admirably in her mission.

Questions:

- (i) Why did government call Florence Nightingale?
- (ii) How were the conditions in the hospital?
- (iii) What was her ambition?
- (iv) Write the synonym of the word ‘unique’.
- (v) Write one word substitute for the following definition:
A ruler who has absolute power.

(OR)

b) Correct the following sentences:

- (i) The book is belonging to him.

- (ii) The price of gold is more expensive than silver.
- (iii) When you are coming?
- (iv) Kamala sat besides Vinaya.
- (v) I requested the clerk to refund back my deposit.

14. a) Read the table and write a paragraph based on the details.

Year	Female Literacy	Male Literacy	Literacy rate
1961	15.35%	40.45%	28.30%
1971	21.97%	45.96%	34.45%
1981	29.76%	56.38%	43.57%
1991	39.29%	63.13%	52.21%
2001	54.67%	75.26%	64.84%
2011	65.46%	82.14%	74.04%

(OR)

(b) Write a resume to apply for the post of Sub-Engineer in TSGENCO.

15. a) Change the following into indirect speech.

- (i) Ganesh says, "I am coming".
- (ii) Madhu said to Sahasra, "I prefer Science fiction".
- (iii) Hari said, " I shall learn English language".
- (iv) Ravi said to Srikara, "Why did you go to Hyderabad yesterday?"
- (v) Hanuma said to Bhoomika, "Are you a teacher?"

(OR)

b) Read the following paragraph and make necessary corrections.

Myself is Abhay. My age is 16 years old. Every day I am getting up in the morning at 6.00 a.m. I am eaten breakfast at 7:30 a.m. I go to Polytechnic by walk. Umesh is my cousin brother. Umesh and me play cricket in the evening. We both drinks coffee at 6:30 p. m. He taught physics every day at 7:00p.m. I see television for an hour in the night.

16. a) Write a cover letter to the Managing Director, Nagarjuna Cements, Karimnagar, applying for the post of Assistant Executive Engineer.

(OR)

b) Write a report to your Head of the section on an industry you visited

SC-202 - ENGINEERING MATHEMATICS

Course Title	Engineering Mathematics	Course Code	SC-202
SEMESTER	II	Course Group	Foundation
Teaching Scheme in periods (L : T : P)	4:1: 0	Credits	3 Credits
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the basic knowledge of Algebra, Trigonometry in Mathematics at Secondary school level and Basic Engineering Mathematics at Diploma 1st Semester level

Course Outcomes: COs

At the end of the course, the student will have the ability to:

CO 1	Formulate the equations of Straight Line, Circle and Conic Sections
CO 2	Evaluate the Limits of different Functions
CO 3	Determine the Derivatives of Various Functions
CO 4	Find the Successive Derivatives and Partial Derivatives of Functions
CO 5	Use Differentiation in Geometrical Applications
CO 6	Use Differentiation in real life applications and for finding Maxima and Minima.

Course Contents:

Co-ordinate geometry

Unit – I

Duration: 12Periods (L: 9– T: 3)

- Straight lines:** Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form - Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines - perpendicular distance from a point to a line - Solve simple problems on the above forms
- Circle:** Define locus of a point, circle and its equation. Find equation of the Circle given (i) Centre and radius, (ii) two ends of a diameter (iii) Centre and a point on the circumference (iv) three non collinear points and (v) Centre and tangent equation - general equation of a circle - finding Centre, radius - tangent, normal to circle at a point on it - simple problems.

Unit – II

Duration: 10Periods (L: 8 – T:2)

- Conic Sections:** Define a conic section, focus, directrix, eccentricity, axes and latus rectum – Find equation of a conic when focus, directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola - standard forms with Vertex (Centre) at the Origin and Axis (Axes) along Co – Ordinate Axes only – Simple Problems.

Differential Calculus

Unit-III

Duration: 14Periods (L: 12– T:2)

1. **Functions & Limits :** Concept of Limit- Definition- Properties of Limits and Standard Limits

(without proof) $-\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}, \lim_{x \rightarrow 0} \frac{\sin x}{x}, \lim_{x \rightarrow 0} \frac{\tan x}{x}, \lim_{x \rightarrow 0} \frac{a^x - 1}{x}, \lim_{x \rightarrow 0} \frac{e^x - 1}{x}, \lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}},$
 $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ - Simple Problems. Evaluate the limits of the type $\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$ and
 $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

2. **Differentiation – I: Concept** of derivative - definition from first principle as

$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ - different notations - derivatives of elementary functions like $x^n, a^x, e^x,$

$\log x, \sin x, \cos x, \tan x, \sec x, \operatorname{cosec} x$ and $\cot x$. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Derivative of function of a function (Chain rule) with illustrative examples such as

$$(i) \sqrt{t^2 + \frac{2}{t}} \quad (ii) x^2 \sin 2x \quad (iii) \frac{x}{\sqrt{x^2 + 1}} \quad (iv) \log(\sin(\cos x)).$$

Unit – IV

Duration: 10Periods (L: 8 – T: 2)

1. **Differentiation – II:** Derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables – partial differentiation, Euler's theorem-simple problems.

Applications of Derivatives:

Unit – V

Duration: 14Periods (L: 11– T:3)

1. **Geometrical Applications:** Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point on the curve. Lengths of tangent, normal, sub tangent and subnormal to the curve at any point on it. Angle between two intersecting curves - problems.

Unit – VI

Duration: 15Periods (L:12– T:3)

1. **Physical Applications:** Physical applications of the derivative – Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples. Explain the derivative as a rate measure in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples– Simple Problems.

2. **Maxima & Minima:** Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

References

1. Co - Ordinate Geometry – by S.L. Loney
2. Thomas Calculus, Pearson Addison – Wesley Publications
3. Calculus – I By Shanti Narayan and Manicavachagam Pillai, S.V Publications.
4. NCERT Mathematics Text Books of Class XI, XII.
5. Intermediate Mathematics Text Books (Telugu Academy)

Suggested E-Learning references

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E- books : [www. mathebook.net](http://www.mathebook.net)

Suggested Learning Outcomes

At the end of the course, the student will have the ability to:

Coordinate Geometry

Unit – I

1.0 Solve the problems on Straight lines:

- 1.1 Understand the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form
- 1.2 Solve simple problems on the above forms
- 1.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

Solve the problems on Circles:

- 1.4 Define locus of a point, circle and its equation.
- 1.5 Find the equation of a circle given
 - (i) Centre and radius
 - (ii) Two ends of a diameter
 - (iii) Centre and a point on the circumference
 - (iv) Three non collinear points
 - (v) Centre and tangent
- 1.6 Write the general equation of a circle and find the centre and radius.
- 1.7 Write the equation of tangent and normal at a point on the circle.
- 1.8 Solve the problems to find the equations of tangent and normal.

Unit – II

2.0 Appreciate the properties of Conics in engineering applications:

- 2.1 Understand the concept of a conic section.
- 2.2 Understand the terms focus, directrix, eccentricity, axes and latus rectum of a conic with illustrations.
- 2.3 Find the equation of a conic when focus, directrix and eccentricity are given
- 2.4 Describe the properties of Parabola, Ellipse and Hyperbola
- 2.5 Solve problems in simple cases of Parabola, Ellipse and Hyperbola.

Differential Calculus

UNIT - III

3. Use the concept of Limit for solving the problems

- 3.1 Understand the concept of limit and meaning of $\lim_{x \rightarrow a} f(x) = l$ and state the properties of limits.

- 3.2 Mention the Standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$,

$$\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}, \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$$

- 3.3 Solve the problems using the above standard limits

- 3.4 Evaluate the limits of the type $\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

3.0 Appreciate Differentiation and its meaning in engineering situations

- 3.5 Understand the concept of derivative of a function $y = f(x)$ – definition, first principle as

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad \text{and also provide standard notations to denote the derivative of a function.}$$

- 3.6 Know the significance of derivative in scientific and engineering applications.
- 3.7 Find the derivatives of elementary functions like x^n , e^x , a^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\operatorname{Cosec} x$ and $\cot x$ using the first principles.
- 3.8 Find the derivatives of simple functions from the first principle.
- 3.9 Use the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions to solve simple problems.
- 3.10 Find the derivatives using the method of differentiation of a function of a function (Chain rule)

Unit – IV

4.0 Appreciate Differentiation and its meaning in engineering situations

- 4.1 Find the derivatives of Inverse Trigonometric functions.
- 4.2 Understand the method of differentiation of a function with respect to another function and also differentiation of parametric functions.
- 4.3 Find the derivatives of hyperbolic functions.
- 4.4 Use the above procedures for finding the derivatives of implicit function with examples.
- 4.5 Use logarithms for differentiating some functions with examples like $[f(x)]g(x)$.
- 4.6 Use the concept of the higher order derivatives of second and third order to solve problems in engineering.
- 4.7 Use the concept of functions of several variables, partial derivatives to solve simple examples.
- 4.8 Use Euler's theorem for homogeneous functions to solve simple problems of partial derivatives.

Applications of Differentiation

UNIT - V

5.0 Understand the Geometrical Applications of Derivatives

- 5.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve $y=f(x)$ at any point on the curve.
- 5.2 Use the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve $y = f(x)$ at any point on it.
- 5.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve $y=f(x)$
- 5.4 Use the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

Unit – VI

6. Understand the Physical Applications of Derivatives

- 6.1 Explain the derivative as a rate of change in distance-time relations
- 6.2 To find the velocity and acceleration of a moving particle using the derivative. Use derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time.

6.0 Use Derivatives to find extreme values of functions

6.3 Identify the increasing and decreasing functions.

6.4 Use the conditions to find points where the given function is increasing or decreasing.

6.5 Find the extreme values (maxima or minima) of a function of single variable – Solve simple problems yielding maxima and minima.

6.6 Solve problems on maxima and minima in applications like finding areas, volumes, etc.

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests
5. Seminars
6. Home assignments.
7. Mathematics for preparing competitive exams . Solving old question papers on arithmetical ability.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	1					3	1,2,7
CO2	3	2					3	1,2,7
CO3	3	2	2				3	1,2,7
CO4	3	2	2				3	1,2,7
CO5	3	2	2				3	1,2,7
CO6	3	2	3				3	1,2,7

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I		5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1	9(a)	13(a)		
2	II						
3	III		2	10(a)	14(a)		
4	IV						
5	V		3	5, 6	9(b)	13(b)	
						11(a)	
					11(b)	15(b)	
6	VI		7,8	10(b)	14(b)		
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEMESTER EXAMINATIONS – I
SC-202- ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions 04 X 01 = 04
2 Each question carries **ONE** mark

1. Write the equation of a straight line in intercept form.
2. Write the equation of circle whose centre (h, k) and radius r given.
3. Define conic section.
4. Find the latus rectum of the parabola $y^2 = 6x$

PART-B

Instructions: 1. Answer any **TWO** questions 02 X 03 = 06
2. Each question carries **THREE** marks

5. a) Find the distance between parallel lines $3x + 4y + 5 = 0$ and $3x + 4y + 8 = 0$

OR

- b) Find the centre and radius of the circle $x^2 + y^2 - 6x + 4y - 12 = 0$.
6. a) Find the vertex, focus, equation of directrix and length of latus-rectum of the parabola $y^2 = 20x$

OR

- b) Find the centre, vertices and foci of Ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$

PART C

Instructions: 1. Answer any **TWO** questions 2 X 05 = 10
2. Each question carries **FIVE** marks

7. a) Find the angle between the lines $2x - y + 3 = 0$ and $x + y - 2 = 0$

OR

- b) Find the equation of the Circle passing through the points (0, 0), (1, 0) and (0,2)
8. a) Find the equation of the Parabola with focus at (2, -3) and whose directrix is $3x - 4y + 16 = 0$

Or

- b) Find the Centre, Vertices, Eccentricity, Foci, Lengths of axes, Length of Latus Rectum, and equations of directrices of the Hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$

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BOARD DIPLOMA EXAMINATIONS (C21)
MID SEMESTER EXAMINATIONS - II
SC-202- ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions 04 X 01 = 04
2 Each question carries **ONE** mark

1. Evaluate $\lim_{x \rightarrow 0} \frac{2x^3 - 3x^2 + 1}{9x^2 + 8x + 7}$
2. Differentiate $3 \log x + \sec x$ w. r. t. x
3. Differentiate $\log (\sin x)$ w.r.t x
4. Find $\frac{\partial u}{\partial x}$ if $U = 2x^2 + 3y^2$

PART-B

Instructions: 1. Answer any **TWO** questions 02 X 03 = 06
2. Each question carries **THREE** marks

5. a) Evaluate: $\lim_{\theta \rightarrow 0} \left(\frac{1 - \cos \theta}{\theta \sin \theta} \right)$

OR

- b) If $y = x \sin x$ then find $\frac{dy}{dx}$

6. a) Find $\frac{dy}{dx}$ if $y = \sin^{-1}(3x - 4x^3)$

OR

- b) If $2x^2 + 3y^2 + x y = 5$, then find $\frac{dy}{dx}$

PART C

Instructions: 1. Answer **ALL** questions 02 X 05 = 10
2. Each question carries **FIVE** marks

7. a) Find $\frac{dy}{dx}$, If $x^y = e^{x-y}$

OR

- b) If $x = a(\theta - \sin \theta)$, $y = a(1 - \cos \theta)$, find $\frac{dy}{dx}$
8. a) If $y = \sin(\log x)$, prove that $x^2 y_2 + x y_1 + y = 0$.

OR

- b) If $U = \sin^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$ then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$

@@@

[Total Marks: 40]

(b) Find the minimum value of $x^3 - 6x^2 + 9x + 1$

PART C

Instructions: 1. Answer any **FOUR** questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13. (a) Find the equation of the parabola whose focus is the point (3, -4) and directrix is the line $x - y + 5 = 0$.

OR

- (b) Find the angle between the curves $y^2 = 2x$, $x + y = 8$ at their point of intersection (2, 2)

14. (a) Find $\frac{dy}{dx}$, if $x = a(\cos\theta + \sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$.

OR

- (b) The sum of two numbers is 24. Find them if their product is maximum

15. (a) Find the lengths of the tangent, normal, sub tangent and sub normal to the curve $y = x^3 - 3x + 2$ at (0,2)

OR

- (b) Show that the curves $y^2 = x$ and $y = \frac{k}{x}$ cut at right angles if $8k^2 - 1 = 0$.

16. (a) A circular metal plate expands by heat so that its radius is increasing at the rate of 0.02 cm/sec. At what rate its area is increasing when the radius is 10 cm.

OR

- (b) A wire of length 40 cm is bent so that to has to form a rectangle. Find the maximum area that can be enclosed by the wire.

SC-203 - APPLIED PHYSICS

Course Title	Applied Physics	Course Code	SC-203
Semester	Semester-II	Course Group	Foundation
Teaching Scheme in Pds (L:T:P)	4:1:0	Credits	3
Type of course	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites: High School Science and Mathematics.

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Physics in different areas of engineering and technology.

Course outcomes: On successful completion of the course, the student will have the ability to attain below Course Outcomes (CO):

Course Outcomes	
CO1	Apply the knowledge of Simple Harmonic Motion to solve engineering problems
CO2	Understand the characteristics of waves, sound, Doppler effect, noise pollution and apply to engineering problems
CO3	Apply principles of magnetism and electricity as tools in engineering
CO4	Apply various electromagnetic radiations to engineering problems
CO5	Understand the principles of Laser, Optical fiber and nano technology and apply to engineering problems.
CO6	Apply the knowledge of Semiconductors to diodes and rectifiers.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	-	-	-	-	2
CO2	3	1	-	1	-	-	2
CO3	3	1	-	-	-	-	2
CO4	3	1	-	1	-	-	2
CO5	3	1	-	1	-	-	2
CO6	3	1	-	-	1	-	2
	3	1		1	1		2

SC-203 - APPLIED PHYSICS

Course Contents

1. UNIT – 1 SIMPLE HARMONIC MOTION

Duration: 12 periods

Periodic motion - Simple Harmonic Motion (SHM)– definition – examples, Conditions for SHM, Time period, frequency, amplitude and phase of a particle in SHM, Expressions for Displacement, Velocity, Acceleration, Time period and frequency of a particle executing SHM – derivations, Ideal simple pendulum – time period of simple pendulum –derivation – application of simple pendulum to determine the acceleration due to gravity experimentally, laws of simple pendulum, Second's pendulum- related numerical problems

2. UNIT – 2 SOUND

Duration: 13 periods

Wave motion – definition and characteristics, audible range – infrasonic and ultrasonic, longitudinal and transverse waves – examples, Relation among wavelength, frequency and velocity of a wave – derivation, Stationary waves, beats - applications of beats, echo – definition - applications - relation between time of echo and distance of obstacle, Doppler effect in sound (no derivation, formulae only) – list the applications – ultrasound and radar in medicine and engineering- –derivation- Reverberation and time of reverberation - Sabine's formula - Free and forced vibrations - Resonance - Conditions of good auditorium, noise pollution – causes, effects and methods to minimize noise pollution, related numerical problems.

3. UNIT – 3 MAGNETISM AND ELECTRICITY

Duration: 13 periods

Basics of magnetism, Coulomb's inverse square law in magnetism, moment of couple on a bar magnet placed in a uniform magnetic field – derivation, expression for magnetic induction field strength at a point on the axial line of a bar magnet –derivation, Kirchhoff's laws in electricity, Wheatstone bridge – balancing condition, application of Wheatstone bridge –Meter bridge, Concept of electromagnetic induction - self-induction and mutual induction, Faraday's Laws, Lenz's law, principle and working of transformer-types of transformers, types of magnetic materials – dia, para and ferromagnetic materials, related numerical problems.

4. UNIT – 4 OPTICS

Duration: 12 periods

Electromagnetic spectrum – various types of electromagnetic radiations (gamma rays, x-rays, uv, visible, infrared, microwave and radio waves)-wavelength range-applications (microwave oven, microwave communication, x-rays in medicine, uv lamps, infrared remote controllers), Light theories-dual nature, reflection, refraction, and interference, Photo

electric effect - Einstein's photo electric equation – Work function and threshold frequency - laws of photo electric effect - applications of photo electric effect – photo cell.

5. UNIT – 5 MODERN PHYSICS

Duration: 12 periods

LASER – definition, Spontaneous emission and Stimulated emission –principle and working of LASER, characteristics of LASER- types of LASER, applications of LASER, Total internal reflection, critical angle, conditions for total internal reflection, Principle and working of Optical fiber –types- Applications of optical fiber –Nanotechnology, nano particles and nano materials-applications and devices, Superconductivity-basic concept-applications of Superconductors.

6. UNIT -6 SEMICONDUCTOR PHYSICS

Duration: 13 periods

Energy bands in solids- valence band- conduction band – forbidden gap – Energy band diagram of conductors, insulators and semiconductors – concept of Fermi level - Intrinsic semiconductors - examples - Concept of holes in semiconductors - Doping - Extrinsic semiconductors - P-type and N-type semiconductors, PN Junction diode – Forward Biasing and Reverse Biasing - Volt-Ampere (V-I) characteristics - Applications of PN diode - Diode as rectifier (half wave rectifier), Light Emitting Diode – principle and working, solar cell – principle and working.

LEARNING OUTCOMES:

Upon completion of the course the student shall be able to

SIMPLE HARMONIC MOTION

- 1.1 Define periodic motion and Simple Harmonic Motion (SHM).
- 1.2 List the examples of SHM.
- 1.3 List the conditions of Simple Harmonic Motion.
- 1.4 Define the terms time period, frequency, amplitude and phase of a particle in SHM.
- 1.5 Develop the expressions for Displacement, Velocity, Acceleration, Time period and Frequency of a particle executing in SHM.
- 1.6 Define Ideal simple pendulum and develop the expression for time period of simple pendulum.
- 1.7 Make use of simple pendulum to determine the acceleration due to gravity at a place.
- 1.8 Develop the laws of simple pendulum.
- 1.9 Define second's pendulum.
- 1.10 Solve related numerical problems

SOUND

- 2.1 Define wave and outline the characteristics of wave (frequency, wavelength, amplitude, and time period).
- 2.2 Explain audible range, infrasonic and ultrasonic waves.
- 2.3 Explain longitudinal and transverse wave motion with examples.
- 2.4 Develop the expression relating wave velocity, frequency and wavelength.
- 2.5 Explain stationary waves with neat diagram.
- 2.6 Explain the phenomenon of beats and list the applications of beats.
- 2.7 Explain echo and list the applications of echo.
- 2.8 Apply principle of echo to find the distance of an obstacle from the observer.
- 2.9 Explain Doppler Effect in sound (no derivation, formulae only-source and observer in relative motion-toward and away from each other).
- 2.10 List the applications of Doppler Effect.
- 2.11 Apply Doppler Effect as a tool in medicine (ultrasound) and engineering (radar).
- 2.12 Explain Reverberation, reverberation time and outline Sabine's formula.
- 2.13 Define free and forced vibrations and resonance with examples.
- 2.14 List the conditions of a good auditorium.
- 2.15 Explain noise pollution and list the causes, effects and methods to minimize noise pollution.
- 2.16 Solve related numerical problems.

MAGNETISM AND ELECTRICITY

- 3.1 Summarize magnetic field, magnetic lines of force and magnetic induction field strength.
- 3.2 Explain Coulomb's inverse square law of magnetism.
- 3.3 Develop an expression for moment of couple on a bar magnet placed in a uniform magnetic field.

- 3.4 Develop an expression for magnetic induction field strength at a point on the axial line of a bar magnet.
- 3.5 Explain Kirchhoff's laws in electricity.
- 3.6 Explain Wheatstone's bridge with legible sketch.
- 3.7 Apply Kirchhoff's laws to develop formula for balancing of Wheatstone's bridge.
- 3.8 Apply principle of Wheatstone's bridge to Meter Bridge.
- 3.9 Explain Faraday's laws of electromagnetic induction.
- 3.10 Explain self-induction and mutual induction.
- 3.11 Explain Lenz's law.
- 3.12 Explain the principle and working of Transformer.
- 3.13 Explain types of transformers (Step up and Step down).
- 3.14 Explain types of magnetic materials (dia, para and ferro magnetic materials).
- 3.15 Solve related numerical problems.

OPTICS

- 4.1 Explain various frequency/wavelength windows of electromagnetic spectrum (gamma rays, x-rays, uv, visible, infrared, microwave and radio waves).
- 4.2 Summarize the emission process of electromagnetic radiation.
- 4.3 Apply electromagnetic radiations to microwave oven, microwave communication, x-rays in medicine, uv lamps and infrared remote controllers.
- 4.4 Outline light theories (Newton's Corpuscular theory, Huygen's Wave theory, Maxwell's Electromagnetic wave theory and Planck's Quantum theory).
- 4.5 Explain reflection, refraction and interference.
- 4.6 Explain dual nature of light.
- 4.7 Explain Photo electric effect.
- 4.8 Explain Einstein's photo electric equation, work function and threshold frequency.
- 4.9 Summarize laws of photo electric effect.
- 4.10 List the applications of photo electric effect.
- 4.11 Explain the working of photocell.

MODERN PHYSICS

- 5.1 Define LASER.
- 5.2 Explain concept of energy levels (Ground state, excited state and Meta stable state).
- 5.3 Explain Spontaneous emission and Stimulated emission.
- 5.4 Explain principle and working of LASER.
- 5.5 List the characteristics of LASER.
- 5.6 List the types of LASER.
- 5.7 Utilize LASER in Engineering and Medicine (Bar code reading, Laser welding and cutting, Laser eye surgery).
- 5.8 Explain Total internal reflection.
- 5.9 Define Critical angle.
- 5.10 List the conditions of total internal reflection.
- 5.11 Explain the principle and working of Optical fiber.

- 5.12 Explain types of optical fiber (Step index and Graded index).
- 5.13 List the applications of optical fiber.
- 5.14 Define Nano scale and properties at nano scale.
- 5.15 Explain Nano particles and Nano materials (zero, one, two and three dimensional).
- 5.16 Outline Nano technology-based devices and application (Nano tubes, Ultra-high-definition displays, drug delivery, energy applications for clean environment)
- 5.17 Explain basic concept of Superconductivity.
- 5.18 List the applications of Superconductors.

SEMICONDUCTOR PHYSICS

- 6.1 Explain Valence band, Conduction band and Forbidden energy gap in solids.
- 6.2 Explain Conductors, Insulators and Semiconductors on the basis of energy band diagram.
- 6.3 Explain the concept of Fermi level.
- 6.4 Explain Intrinsic semiconductors.
- 6.5 List the examples of intrinsic semiconductors.
- 6.6 Explain the concept of hole and doping in semiconductors.
- 6.7 Explain Extrinsic semiconductors - P-type and N-type semiconductors.
- 6.8 Explain PN Junction Diode.
- 6.9 Explain Forward bias and Reverse bias of PN diode (biasing and flow of majority and minority carriers with diagram).
- 6.10 Summarize Volt-Ampere (V-I) characteristics of PN Diode.
- 6.11 List the applications of PN Diode.
- 6.12 Explain the principle of diode as a Rectifier – half wave rectifier.
- 6.13 Explain working principle of Light Emitting Diode (LED).
- 6.14 Explain the working principle of Solar cell.

References:

1. Principles of Physics by N. Subrahmanyam and Brijlal, S. Chand & Co, New Delhi, edition, 1982
2. Engineering. Physics by R.K. Gaur, S.L. Gupta, Dhanpatrai Publications, New Delhi.
3. ISC Physics, Book I&II, P. Vivekanandan, DK Banerjee, S Chand, New Delhi.
4. Intermediate Physics, Vol. I&II, Telugu Academy, TS, Hyderabad.
5. Fundamentals of Physics by Halliday and Resnick.

E-learning resources:

1. Hyper Physics website: <http://hyperphysics.phy-astr.gsu.edu/>

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
		11(b)		15(b)			
6	VI		7,8	10(b)	14(b)		
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8			8	8	

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD DIPLOMA EXAMINATION, (C-21)
MID SEM-I
SECOND SEMESTER EXAMINATION
SC- 203 - APPLIED PHYSICS

Time: 1 Hour

Total Marks: 20

PART-A

4 X 1 = 4

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark.

1. Define Simple harmonic motion.
2. Define Ideal simple pendulum.
3. Define wave.
4. Define resonance.

PART-B

2 X 3 = 6

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

- 5 (a) Explain the conditions for SHM.

(OR)

- 5 (b) Explain the laws of simple pendulum

- 6 (a) Explain longitudinal and transverse wave motion with examples.

(OR)

- 6 (b) List three applications of beats

PART-C

2 X 5 = 10

Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

- 7 (a) Develop the expressions for velocity and acceleration of a particle executing SHM

(OR)

- 7 (b) Develop the expression for time period of a simple pendulum

- 8 (a) Explain echo and apply principle of echo to find the distance of an obstacle from the observer.

(OR)

- 8 (b) List five causes of noise pollution.

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BOARD DIPLOMA EXAMINATION, (C-21)
MID SEM-II
SECOND SEMESTER EXAMINATION
SC-203 - APPLIED PHYSICS

Time: 1 Hour

Total marks: 20

PART-A

4 X 1 = 4

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark.

1. Define magnetic field
2. Define magnetic lines of force.
3. What is refraction?
4. Define work function in photoelectric effect.

PART-B

2 X 3 = 6

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

5(a) Explain Faradays laws of electromagnetic induction.

(OR)

5(b) Explain Lenz's law.

6(a) Summarize the laws of photo electric effect

(OR)

6(b) Summarize the emission process of electromagnetic radiation.

PART-C

2 X 5 = 10

Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

7(a) Develop an expression for balancing condition of Wheatstone bridge with legible sketch.

(OR)

7(b) Explain the principle of working of transformer.

8(a) Outline light theories.

(OR)

8(b) Explain the working of photocell.

** ** *

BOARD DIPLOMA EXAMINATION, (C-21)
FIRST SEMESTER EXAMINATION
SC-203 - APPLIED PHYSICS

Time: 2 Hours

Total marks :40

PART-A

8 X 1 = 8

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark

1. Define ultrasonic sound.
2. Define magnetic field.
3. Define critical angle.
4. Define Simple Harmonic Motion.
5. Define Nano scale.
6. Define superconductivity.
7. What is forbidden gap?
8. What is doping in semiconductors?

PART-B

4 X 3 = 12

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

- 9(a) Develop the laws of simple pendulum.
(OR)
9(b) Explain concept of meta stable state.
- 10(a) Explain Coulomb's inverse square law of magnetism.
(OR)
10(b) Explain the concept of Fermi level.
- 11(a) List the characteristics of LASER.
(OR)
11(b) List the applications of superconductors.
- 12(a) Explain P-type and N-type semiconductors.
(OR)
12(b) List the applications of PN Diode.

PART-C

4 X 5 = 20

- Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

13(a) Explain echo and apply principle of echo to find the distance of an obstacle from the observer.

(OR)

13(b) Explain working principle of LASER.

14(a) Derive the expression for magnetic induction field strength at a point on the axial line of a bar magnet.

(OR)

14(b) Explain forward and reverse bias of PN diode

15(a) Explain the principle and working of optical fiber.

(OR)

15(b) Explain Nano particles and zero, one, two- and three-dimensional Nano materials.

16(a) Explain the principle of diode as a rectifier.

(OR)

16(b) Explain working principle of Light Emitting Diode (LED).

SC-204 - Engineering Chemistry and Environmental Studies

Course Title	Engineering Chemistry and Environmental Studies	Course Code	SC-204
Semester	II	Course Group	Foundation
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture +Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Prerequisite:

Basic knowledge of Chemistry in Secondary Education.

Course Objectives: After studying this course the student will be able to understand and appreciate the role of chemistry and environmental studies in different spheres of industries.

Course Outcome:

On successful completion of the course, the students will have ability to attain below Course Outcomes (CO):

CO1	Understand and explain the different metallurgical processes and apply the knowledge to solve engineering problems.
CO2	Understand and explain the various corrosion processes, protection methods and apply the knowledge to reduce the corrosion in new equipment and constructions.
CO3	Understand and explain the different methods of preparation, moulding and industrial uses of organic polymers and apply the knowledge to select suitable polymer for domestic and industrial use.
CO4	Understand the concept of calorific value, gaseous fuels, explosives and lubricants and apply the knowledge to use the relevant fuel and lubricant for domestic and industrial applications.
CO5	Understand and explain construction and applications of Galvanic Cell, Batteries and Cells and apply the knowledge to identify and compare the materials best suited for construction of Battery and Fuel Cells.
CO6	Explain the causes, effects and controlling methods of air pollution, water pollution and soil pollution and apply relevant methods to solve domestic and industrial problems.

CO -PO Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	-	2
CO2	3	-	-	-	1	-	2
CO3	3	-	-	-	-	-	2
CO4	3	1	-	-	1	-	2
CO5	3	1	-	-	1	-	2
CO6	3	-	-	-	3	-	3

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES
COURSE CONTENTS

UNIT - I: MTALLURGY:**12 Periods**

Characteristics of metals - Distinguish between metals and non metals - Mineral, Ore, Gangue, Flux, Slag - Concentration of ore - Construction and operation of Reverboratory furnace and Blast furnace - Methods of extraction of crude metal - Roasting, Calcination, Smelting – Alloys-Purpose of making alloys – Composition and uses of Brass, German Silver, Nichrome, Stainless Steel and Duralumin.

UNIT – II: CORROSION:**12 Periods**

Corrosion - Factors influencing the rate of corrosion – Dry and wet theories of corrosion – Composition cell, Stress cell and Concentration cell - Rusting of iron and its mechanism - Prevention of corrosion – Protective coatings, - Cathodic protection - Paints – Constituents of paint – Functions of constituents of paint.

UNIT – III: POLYMERS:**13 Periods**

Polymers - Polymerization - Types of polymerization – Addition polymerization, Condensation polymerization - Plastics - Types of plastics - Advantages of plastics over traditional materials - Disadvantages of using plastics - Preparation and uses of the following plastics: 1. Polythene 2. PVC 3.Teflon 4. Polystyrene 5.Urea formaldehyde 6. Bakelite - Compounding and moulding of plastics – Natural rubber – Vulcanization of natural rubber - Elastomers – Preparation and uses of Butyl rubber, Buna-s, Neoprene rubber - Fibre -Preparation and uses of Nylon 6,6, and Polyester (Polyethylene terephthalate) - Biodegradable polymers and their general applications.

UNIT – IV: FUELS AND LUBRICANTS:

12 Periods

Definition and classification of fuels- Characteristics of good fuel - Calorific value - HCV and LCV - Calculation of oxygen required for combustion of methane and ethane – Preparation method, composition, calorific value, and uses of gaseous fuels- a) CNG b) LPG c) Water gas, d) Producer gas, e) Coal gas, and f) Bio gas – Explosives – Classification of explosives – Applications of explosives – Lubricants – Classification and functions of lubricants.

UNIT – V: ELECTROCHEMICAL CELL – BATTERIES:

13 Periods

Galvanic cell – Standard electrode potential – Reference electrodes – Types of reference electrodes - Electro chemical series - EMF of cell – Batteries -Types of batteries - Fuel cells.

UNIT – VI: ENVIRONMENTAL STUDIES:

13 Periods

Introduction- Classification of air pollutants based on origin and states of matter-Air pollution – Causes, effects, and controlling methods of air pollution - Water pollution – Causes, effects, and controlling methods of water pollution – Soil pollution – Causes of soil pollution – General effects of soil pollution - Controlling methods of soil pollution – Carbon Trading.

Reference Books:

1. Engineering chemistry – Jain & Jain – DhanpatRai Publishing Company.
2. A Text book of Engineering Chemistry – S.S.Dara – S.Chand Publications.
3. Environmental Studies – A.K.De.
4. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press
5. Intermediate Chemistry I and II – Telugu Academy TS
6. Engineering chemistry – Prasanta Rath, B. Ramadevi, Ch. Venkataramana Reddy& Subhendu Chakroborty – CENGAGE

E learning links:

<https://iupac.org/>

<https://www.khanacademy.org/>

www.nptel.ac.in

Specific Learning Outcomes

Upon completion of the course, the student will have ability to

UNIT – I: METALLURGY

- 1.1 List the characteristics of metals.
- 1.2 Distinguish between metals and non metals
- 1.3 Define and explain the terms 1. Mineral, 2. Ore, 3. Gangue, 4. Flux and 5. Slag
- 1.4 List the minerals and ores of iron, aluminium and copper.
- 1.5 Apply the Hand picking, Levigation, Froth floatation and Electromagnetic methods for the concentration of ore.
- 1.6 Explain the construction and operation of Reverboratory furnace and Blast furnace
- 1.7 Explain the following methods involved in extraction of crude metal- Roasting, Calcination, Smelting.
- 1.8 Define an alloy
- 1.9 Explain the purpose of making of alloys
- 1.10 Write the composition of the following alloys: i) Brass, ii) German silver, iii) Nichrome iv) Stainless Steel, v) Duralumin
- 1.11 List the uses of following alloys: i) Brass, ii) German Silver, iii) Nichrome, iv) Stainless Steel, v) Duralumin.

UNIT – II: CORROSION

- 2.1 Define the term corrosion
- 2.2 Explain the factors influencing the rate of corrosion based on i) Nature of metal ii) Nature of environment of metal.
- 2.3 Explain the dry and wet theories of corrosion.
- 2.4 Describe the formation of a) Composition cell, b) Stress cell c) Concentration cell
- 2.5 Define rust and explain the mechanism of rusting of iron with chemical reactions.
- 2.6 Explain the following methods of prevention of corrosion:
 - a) Proper designing
 - b) Modification of environment.
 - c) Protective coatings i) Metallic coatings (Anodic coating and Cathodic coating)
ii) Inorganic coatings iii) Organic coatings
 - d) Cathodic protection -Sacrificial anode method and Impressed voltage method.

- 2.7 Define the term paint.
- 2.8 Write the characteristics of good paint.
- 2.9 List the constituents of paint (pigment, vehicle or drying oil, thinner, drier, filler and plasticizers) and state the functions of constituents of paint.

UNIT – III: POLYMERS

- 3.1 Define polymerization
- 3.2 State and explain the types of polymerization (Addition polymerization and Condensation polymerization) with examples.
- 3.3 Define the term plastic
- 3.4 List the characteristics of plastics.
- 3.5 State and explain the advantages of plastics over traditional materials
- 3.6 State the disadvantages of using plastics.
- 3.7 Explain the types of plastics with examples.
- 3.8 Distinguish between thermoplastics and thermosetting plastics
- 3.9 Explain the methods of preparation and uses of the following plastics:
1. Polythene, 2. Polyvinyl chloride, 3. Teflon, 4. Polystyrene 5. Urea formaldehyde
 6. Bakelite (Only flow chart for Bakelite i.e. without chemical equations).
- 3.10 Explain the concept of compounding of plastic.
- 3.11 List the types of additives (Fillers, Binders, Plasticizers, Stabilizers and Colouring materials with examples) used in compounding of plastic and their impact on properties of plastic.(Elementary level only)
- 3.12 Explain the types of moulding of plastics (Compression moulding, Injection moulding and Extrusion moulding)
- 3.13 Define the term natural rubber
- 3.14 Explain processing of natural rubber from latex.
- 3.15 Write the structural formula of natural rubber
- 3.16 List the characteristics of natural rubber
- 3.17 Explain the process of vulcanization
- 3.18 List the characteristics of vulcanized rubber
- 3.19 Define the term elastomer
- 3.20 Describe the preparation and uses of the following synthetic rubbers a) Butyl rubber, b) Buna-s and c) Neoprene rubber.
- 3.21 Define fibre.

- 3.22 Explain the preparation and uses of fibres–Nylon 6,6 and Polyethylene terephthalate (PET)
- 3.23 Define biodegradable polymers and state their general applications

UNIT – IV: FUELS AND LUBRICANTS

- 4.1 Define the term fuel.
- 4.2 Classify the fuels based on physical state - solid, liquid and gaseous fuels with examples.
- 4.3 Classify the fuels based on occurrence- primary and secondary fuels with examples.
- 4.4 List the characteristics of a good fuel
- 4.5 Explain the advantages of gaseous fuels
- 4.6 Define Calorific value - HCV and LCV.
- 4.7 Explain the terms i) Knocking ii) Octane number and iii) Cetane number
- 4.8 Calculate the oxygen required for the combustion of methane and ethane.
- 4.9 State the method of preparation (Without description), composition, calorific value and uses of the following gaseous fuels:
- a) CNG b) LPG c) Water gas, d) Producer gas,
e) Coal gas, and f) Bio gas
- 4.10 Define and understand the term explosive.
- 4.11 Classify the explosives (Primary explosives (Detonators), Low explosives (Propellants) and High explosives with examples).
- 4.12 State the constructive and destructive applications of explosives.
- 4.13 Define the term lubricant.
- 4.14 Classify the lubricants.
- 4.15 Explain the functions of lubricants.

UNIT – V: Electrochemical cell – Batteries

- 5.1 Define galvanic cell
- 5.2 Explain the construction and working of galvanic cell
- 5.3 Distinguish between electrolytic cell and galvanic cell
- 5.4 Explain standard electrode potential
- 5.5 Understand the need of reference electrode and types of reference electrodes.
- 5.6 Explain primary reference electrode (standard hydrogen electrode) and Secondary reference electrode (Calomel electrode).
- 5.7 Define electrochemical series and explain its significance.
- 5.8 Define and explain EMF of a cell.
- 5.9 Solve the numerical problems on EMF of cell

- 5.10 Define battery and explain the types of batteries with examples
- 5.11 Explain the construction, working and applications of Dry cell (Leclanche cell), Lead storage battery, Ni-Cd cell
- 5.12 Explain the construction, working and advantages of Hydrogen - Oxygen fuel cell

UNIT – VI: ENVIRONMENTAL STUDIES

- 6.1 Define air pollution
- 6.2 Classify the air pollutants- based on origin and states of matter
- 6.3 Explain the causes of air pollution
- 6.4 Explain the effects of air pollution on human beings, plants and animals
- 6.5 Explain the Green house effect - Ozone layer depletion and Acid rain
- 6.6 Explain the controlling methods of air pollution
- 6.7 Define water pollution
- 6.8 Explain the causes of water pollution
- 6.9 Explain the effects of water pollution on living and non living things
- 6.10 Explain the methods of control of water pollution.
- 6.11 Explain the process of sewage treatment.
 - i) Primary treatment (Coagulation)
 - ii) Secondary treatment (Trickling filters and Activated sludge process)
 - iii) Tertiary treatment (Brief note on tertiary treatment)
- 6.12 Define soil pollution.
- 6.13 State and explain the causes of soil pollution.
- 6.14 List the general effects of soil pollution.
- 6.15 Explain the controlling methods of soil pollution.
- 6.16 Understand the concept of Carbon Credits and Carbon Trading (Elementary level only)
- 6.17 Understand the advantages and disadvantages of Carbon Trading

Blue Print**MID SEM-I EXAM**

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
6	VI	7,8		11(b)	15(b)		
			10(b)	14(b)			
			12(a)	16(a)			
			12(b)	16(b)			
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

BOARD OF DIPLOMA EXAMINATIONS (C21)
MID SEM EXAMINATION – I
SC-204 - ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark 4 X 1 = 4 marks

1. Define the terms mineral and ore.
2. Define an alloy.
3. Define corrosion.
4. What is paint?

PART – B

Instructions: Answer the **following** questions. Each question carries **three** marks 2 x 3 = 6

Marks

5. a. List any six characteristics of metals.
(OR)
b. Explain the process of roasting of ore with an example.
6. a. List any six factors influencing the rate of corrosion.
(OR)
b. Explain the formation of stress cell with an example.

PART – C

Instructions: Answer the **following** questions. Each question carries **five** marks 2 x 5 = 10

Marks

7. a. Explain the froth floatation process of concentration of ore .
(OR)
b. Explain the construction and operation of Reverboratory furnace
8. a. Explain the mechanism of rusting of iron with chemical equations.
(OR)
b. Explain sacrificial anode method of prevention of corrosion with a neat diagram.

BOARD OF DIPLOMA EXAMINATIONS (C21)
MID SEM EXAMINATION – II
SC-204 - ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. What is the chemical name of natural rubber?
2. Define polymerization.
3. What are fuels?
4. Mention any two characteristics of good fuel.

PART – B

Instructions: Answer the **following** questions. Each question carries **three** marks

2 x 3 =6 Marks

5. a. Write any three advantages of plastics over traditional materials.
(OR)
b. Write any three differences between thermoplastic and thermosetting plastic.
6. a. Define calorific value and differentiate lower and higher calorific values.
(OR)
b. Classify the fuels based on their physical state.

PART – C

Instructions: Answer the **following** questions. Each question carries **five** marks

2 x 5 =10 Marks

7. a. What is vulcanization of rubber and explain with chemical equations.
(OR)
b. Explain Compression Moulding, and Injection Moulding of plastics
8. a. Write the composition and uses of water gas and producer gas.
(OR)
b. Calculate the mass and volume of the oxygen required for the complete combustion of 8 grams of CH₄.

BOARD OF DIPLOMA EXAMINATIONS (C21)
END SEMESTER EXAMINATION
SC-204 - ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Time: 2 Hours

Max. Marks: 40

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark.

8 X 1 = 8 marks

1. Define gangue.
2. What are the different types of plastics?
3. Define Galvanic cell.
4. What is the chemical formula of rust?
5. What is electrochemical series?
6. What are the different types of batteries?
7. Define air pollution.
8. Define water pollution.

PART – B

Instructions: Answer the **following** questions. Each question carries **three** marks

4 x 3 =12 Marks

9. a. Write any three differences between metals and non-metals.
(OR)
b. Write any three significances of electrochemical series.
10. a. Write a method of preparation and two uses of polystyrene.
(OR)
b. Classify the pollutants based on origin and give examples.
11. a. Write any three differences between electrolytic cell and galvanic cell.
(OR)
b. Write the electrode reaction of lead storage battery during discharging.
12. a. Write a short note on Green house effect.
(OR)
b. Write a note on Ozone layer depletion.

PART – C

Instructions: Answer the **following** questions. Each question carries **five** marks

4 x 5 =20 Marks

13. a. Explain the formation of composition cell and stress cell.

(OR)

b. Describe the construction and working principle of Leclanche cell.

14. a. Calculate the mass and volume of oxygen required for the complete combustion of 15 gm of ethane(C_2H_6).

(OR)

b. Explain the controlling methods of water pollution.

15. a. Explain the construction and functioning of Galvanic cell.

(OR)

b. Explain working principle of H_2 - O_2 fuel cell.

16. a. Explain the control methods of air pollution.

(OR)

b. What is Carbon Trading? Explain the advantages of Carbon Trading

CS – 205 - PROGRAMMING IN C

Course Title	Programming in C	Course Code	CS-205
Semester	II	Course Group	Core
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture +Tutorial	Total Periods Contact	75
CIE	60 Marks	SEE	40 Marks

Prerequisites

Knowledge of basic mathematics and IT skills.

Course Outcome

Upon completion of the course the students shall be able to:

Course Outcome	
CO1	Write Algorithms and draw flow charts for given problems
CO2	Use data types and classify operators
CO3	Develop programs using Decision making and looping statements
CO4	Create arrays and know usage of strings
CO5	Develop programs using different types of functions
CO6	Develop programs using Structures and Files

COURSE CONTENTS:

1. Programming Methodology and Introduction to C Language

Duration: 10 Periods

Steps involved in problem solving - Define Algorithm - Characteristics of algorithm - Steps involved in algorithm development - Algorithms for simple problems - Define flowchart - Symbols used in flowchart - Flowcharts for simple problems - Differentiate algorithm and flowchart - Define Program - Differentiate between algorithm and program - Define High level language and low level language- Define Compiler, Assembler, Linker and Loader - Define source code, assembly code, object code, machine code - importance of C language -- structure of C program – different stages in converting the C program source code into an executable code - steps in executing the C program.

2. Understand Constants, Variables and Data Types in C and Understand Operators and Expressions in C

Duration: 10 Periods

Character set - C Tokens - Keywords and Identifiers- Constants and Variables - data types and classification - declaration of a variable - Assigning values to variables - Define operator -Classify operators - List and explain various arithmetic operators with examples -Illustrate the concept of relational operators - List logical operators - various assignment operators - Increment and decrement operators - List bitwise operators - Conditional operator - List various special operators - precedence and associativity of operators - Define expression - Evaluation of Arithmetic expressions - Evaluation of Logical expressions - Evaluation of Relational expressions - type conversion techniques – Know Preprocessor directives – Know Header Files - Reading and writing characters - formatted input and output.

3. Decision making and Looping statements

Duration: 14 Periods

Decision making in C programming - simple if statement – *if-else* statement – nested if statement - *else-if* ladder – break and continue statements - Switch statement - Classification of various loop statements- while loop – *do-while* loop - for loop - nesting of loops- Comparisons of different loop statements - Infinite loop and steps to avoid it.

4. Arrays and Strings

Duration: 14 Periods

Arrays – definition, declaration and initialization of One Dimensional -Array -Accessing the elements in the Array - ‘accessing array out of bounds’ problem - Reordering an array in ascending order – average of elements in an array – largest element in an array - Declaration and initialization of two Dimensional Arrays - sample programs on matrix addition and matrix multiplication, transpose- Strings – Definition, Declaration and initialization of String variables - Reading of strings from terminal - writing strings to screen - String handling functions with sample programs

5. User defined functions

Duration: 13 Periods

Function – Definition - Need for user defined functions - Advantages of functions - elements of function - Return values and their types - function prototype - function call - function definition – Scope, visibility and lifetime of variables in functions- Local and External variables -Global variable-Functions with no arguments and no return values - functions with arguments with no return values - functions with arguments with return values - functions with no arguments with return values - Recursion - sample programs on recursion - passing arrays to functions .

6. Structures and Unions and File Management

Duration: 14 Periods

Structures and Unions Structure- Definition - Creating a structure - Declaring structure variables - Accessing the structure members - Concept of structure assignment - Find size of a structure - Nested structure - Structure as function arguments - Array of structures - Structure containing arrays - array of structures containing arrays - Union and illustrate usage of a union – difference between Structures and Union.

Files management File – Definition - Declare file pointer to a file - file opening modes - Concept of closing of a file - Input / Output operations on a file - Random access to files.

REFERENCE BOOKS

1. Let Us C	--	Yeshwanth Kanetkar	BPB Publications
2. Programming in ANSI C	--	E. Balaguruswamy	Tata McGrawHill
3. Programming with C	--	Gottfried Schaum's	outline
4. C The complete Reference	--	Schildt	Tata McGraw Hill

Specific Learning Outcomes:

Upon completion of the course the student shall be able to

1.0 Programming Methodology and Introduction to C Language

- 1.1. State different steps involved in problem solving
- 1.2. Define algorithm and know its characteristics
- 1.3. State the steps involved in algorithm development
- 1.4. Develop algorithms for simple problems.
- 1.5. Define flowchart and know symbols used in drawing flowcharts
- 1.6. Draw flowchart for simple problems.
- 1.7. Differentiate algorithm and flowchart
- 1.8. Define program and differentiate between program and algorithm
- 1.9. Define High level language and low level language
- 1.10. Define Compiler, Assembler, Linker and Loader
- 1.11. Define source code, assembly code, object code, machine code.
- 1.12. state the importance of C language
- 1.13. Explain the structure of C program
- 1.14. List and Explain different stages in converting the C program source code to executable code.
- 1.15. Explain the steps involved in executing the C program

2.0 Constants, Variables , Data Types in C and Operators and Expressions and Input , Output functions in C

- 2.1 Describe character set, C Tokens-Keywords, Variables, Identifiers, Constants and Variables.
- 2.2 Define Data type. Classify data types and explain with examples
- 2.3 Explain declaration of a variable and assigning values to variables
- 2.4 Define operator.
- 2.5 Classify and Explain operators with examples
- 2.6 Describe precedence and associativity of operators
- 2.7 Define expression
- 2.8 Describe evaluation of Arithmetic, Relational and logical expressions
- 2.9 Illustrate type conversion techniques.
- 2.10 Define and List Pre-processor directives
- 2.11 Discuss #include and #define Pre-processor directives.
- 2.12 Define Header file and discuss stdio.h, conio.h, math.h, string.h Header files.
- 2.13 Illustrate getchar(), putchar(), scanf(), printf() with programs.

3.0 Decision making , Looping statements

- 3.1 Discuss decision making in programming and
- 3.2 Explain decision making statements- if , if-else, nested if, else-if ladder - with syntax and programs
- 3.3 Discuss break and continue statements.
- 3.4 Explain decision making statement- switch statement - with syntax and programs
- 3.5 Define looping and list loop statements
- 3.6 Explain the loop statements – while, do- while, for statement- with syntax and programs
- 3.7 Define nesting of loops and implement it
- 3.8 Compare different loop statements
- 3.9 Know about Infinite loop and steps to avoid it

4.0 Arrays and Strings

- 4.1 Define Array. Describe declaration and initialization of One Dimensional Array with syntax and program
- 4.2 Explain about ‘accessing array out of bounds’ problem
- 4.3 Explain reading elements of an array, accessing the elements and display them with program
- 4.4 Explain sorting elements in an array in ascending order
- 4.5 Explain finding the average of elements in an array and finding the largest element in an array
- 4.6 Explain declaration and initialization of two Dimensional Arrays
- 4.7 Illustrate the concept of two dimensional arrays with sample programs on matrix addition, subtraction, matrix multiplication and transpose of a matrix
- 4.8 Define String and know about declaration and initialization of a String variable.
- 4.9 Know about reading & writing of strings with programs

4.10 Explain about various String handling functions with sample programs.

5.0 User defined functions and Applications

5.1 Define function, state the need for user defined functions, advantages of functions

5.2 Know the elements of function and return values.

5.3 Define and discuss function prototype, function call, and function definition with syntax and program.

5.4 Discuss the scope, visibility and lifetime of variables in functions

5.5 Differentiate Local and Global variables

5.6 Illustrate functions with no arguments and no return values with programs

5.7 Illustrate functions with no arguments and with return values with programs

5.8 Illustrate functions with arguments and with no return values with programs

5.9 Illustrate functions with arguments and with return values with programs

5.10 Illustrate passing arrays to functions with programs

5.11 Define recursion and Illustrate recursion with programs

6.0 Structures and Unions and File Management

Structures and Unions

6.1 Define structure

6.2 Illustrate creating a structure tag and declaring structure variables,

6.3 Explain accessing structure members and structure assignment

6.4 Know size of a structure.

6.5 Discuss nested structure concept.

6.6 Illustrate array of structures, structures containing arrays, arrays of structures containing arrays.

6.7 Illustrate structure as function arguments and returning of structure variables as function values.

6.8 Define Union and illustrate usage of a union.

6.9 Know the differences between Structure and Union

Files management

6.10 Define file

6.11 Know how to declare file pointer to a file

6.12 Illustrate the concept of file opening in various modes

6.13 Illustrate the concept of closing of a file

6.14 Illustrate the concept of Input / Output operations on a file

6.15 Illustrate the concept of random access to files

Suggested Student Activities:

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 5-10 students.

1. Each group should do any one of the following type of activity or any other similar activity related to the course with prior approval from the course coordinator and programme coordinator concerned.
2. Each group should conduct different activity and no repetition should occur.
3. Explore and analyse topics to improve the level of creativity and analytical skill by taking Quiz/ tests/ assignments. Documents have to be maintained as a record.
4. Create a power point presentation on the topic relevant to course or advanced topic as an extension to the course to improve the communication skills. Documents have to be maintained as a record.
5. Visit different sites relevant to topics. Listen to the lectures and submit a handwritten report
6. Coding competitions

Suggested E-learning links:

1. <http://www.tutorialspoint.com/cprogramming/>
2. <http://www.indiabix.com/online-test/c-programming-test/>
3. <https://www.w3schools.in/c-tutorial/>
4. <https://nptel.ac.in/courses/106/104/106104128/>
5. https://onlinecourses.nptel.ac.in/noc19_cs42/preview

CO-PO Mapping Matrix:

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Write Algorithms and draw flow charts for given problems	R, U, A	1,2,3,4,7	10
CO2	Use data types and classify operators	R, U, A	1,2,3,4,7	10
CO3	Develop programs using Decision making and looping statements	U, A	1,2,3,4,7	14
CO4	Create arrays and know usage of strings	U, A	1,2,3,4,7	14
CO5	Develop programs using different types of functions	U, A	1,2,3,4,7	13
CO6	Develop programs using Structures and Files	R, U, A	1,2,3,4,7	14
		Total Sessions		75

MID SEM – I Exam

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM – II Exam

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

S.No	Unit Name	R		U	A	Remarks	
1	Unit-I	4	1	9(a)	13(a)		
2	Unit-II						
3	Unit-III		2	10(a)	14(a)		
4	Unit-IV						
5	Unit-V		3	5,6	9(b) 11(a) 11(b)	13(b) 15(a) 15(b)	
6	Unit-VI			7,8	10(b) 11(a) 11(b)	14(b) 16(a) 16(b)	
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEM-1 EXAMINATION (C-21)
CS-205– PROGRAMMING IN C

TIME: 1 HOUR

MAXIMUM MARKS:

20

PART-A

MARKS: 4 X 1=4

NOTE: 1. Answer all questions.

2. Each question carries one mark.

1. List any two differences between algorithm and flowchart.
2. Define Low level language
3. List various types of constants.
4. Define an expression.

PART-B

MARKS: 2 X 3=6

NOTE: 1. Answer any one question from 5 and 6.

2. Each question carries three marks.

- 5.a) Write any three differences between algorithm and flowchart
(OR)
- b) Write any three differences between high level language and low level language
- 6.a) How to declare variable in C ? Give examples.
(OR)
- b) Evaluate an expression $(2+5)*(10-4)\%10$.

PART-C

MARKS: 2 X 5=10

NOTE: 1. Answer any one question from 7 and 8.

2. Each question carries five marks.

7. a) Draw a flowchart to find factorial of given number N.
(OR)
- b) Draw a flowchart to find biggest of three numbers.
8. a) Explain different data types in C with examples.
(OR)
- b) Explain operators in C with examples.

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEM-2 EXAMINATION (C-21)
CS-205– PROGRAMMING IN C

TIME: 1 HOUR

MAXIMUM MARKS: 20

PART-A

MARKS: 4

X1=4

NOTE: 1. Answer all questions.

2. Each question carries one mark.

1. Give the syntax of if statement in C.
2. Give the syntax of while statement in C.
3. Define an array.
4. Give the syntax for declaring and initializing of one dimensional array.

PART-B

MARKS: 2 X3=6

NOTE: 1. Answer any one question from 5 and 6.

2. Each question carries three marks.

5. a) Write any three differences between break and continue statements.
(OR)
5. b) Write any three differences between while and do-while statements.
6. a) Write a C program to find largest number in array.
(OR)
6. b) Explain any three String handling functions .

PART-C

MARKS: 2 X

5=10

NOTE: 1. Answer any one question from 7 and 8.

2. Each question carries five marks.

7. a) Explain do-while statement with syntax and sample program
(OR)
7. b) Explain switch statement with syntax and sample program .
8. a) Write a C program to find the multiplication of two matrices.
(OR)
8. b) Write a C program to find the addition of two matrices.

MODEL QUESTION PAPER
BOARD DIPLOMA END SEMESTER EXAMINATION (C-21)
CS-205– PROGRAMMING IN C

TIME: 2 HOURS

MAXIMUM MARKS: 40

PART-A

MARKS: 8 X 1=8

NOTE: 1. Answer all questions.

2. Each question carries one mark.

1. List any two differences between algorithm and flowchart..
2. Give the syntax of if statement in C.
3. List any two advantages of functions.
4. Give the syntax for declaring and initializing of one dimensional array.
5. Define function.
6. Define recursion.
7. What is a structure?

8. What is a file?

PART-B

NOTE: 1. Answer any one question from 9, 10, 11 and 12.

MARKS: 4 X 3=12

2. Each question carries three marks.

9. a) Write any three differences between algorithm and flowchart.

(OR)

9. b) Write a C program to find factorial of a number using recursion.

10. a) Write any three differences between break and continue statements.

(OR)

10. b) Write any three differences between structure and union statements.

11. a) Explain elements of function in C.

(OR)

11. b) Write any three differences between local variable and global variable statements.

12. a) Explain various modes to open a file.

(OR)

12. b) Explain how to access structure members.

PART-C

NOTE: 1. Answer any one question from 13, 14, 15 and 16

MARKS: 4 X 5=20

2. Each question carries five marks.

13. a) Draw a flowchart to find biggest of three numbers.

(OR)

13. b) Write a C program to illustrate functions without arguments and without return values.

14. a) Write a C program to find the multiplication of two matrices.

(OR)

14. b) Explain random handling functions.

15. a) Write a C program to illustrate functions with arguments and without return values.

(OR)

15. b) Write a C program to illustrate functions with arguments and with return values.

16. a) Write a C program to implement nested structures.

(OR)

16. b) Write a C program to implement array of structures.

ME-206 ADVANCED ENGINEERING DRAWING

(This Course is Common to all programs of Diploma in Level offered by the State Board of Technical Education, Hyderabad, Telangana State)

Course Title	Advanced Engineering Drawing	Course Code	ME-206
Semester	II	Course Group	Core
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Teaching + Practice	Total Contact Periods:	45
CIE	60 Marks	SEE	40 Marks

Pre-requisites: Knowledge of Basic Engineering Drawing pictorial intelligence to learn this course.

COURSE OUTCOMES (CO)

Upon successful completion of the course, the students will be able to

Course Outcome		CL	Linked Program Objectives (PO)
CO1	Apply the principles of Projection of solids also draw the projections of solids.	R / U / A	1, 2, 3, 4, 7
CO2	Appreciate the need of Sectional views also draw the sectional views and true sections of the engineering components.	R / U / A	1, 2, 3, 4, 7
CO3	Escalate the need of auxiliary views and draw the auxiliary views of the given engineering components.	R / U / A	1, 2, 3, 4, 7
CO4	Gain the knowledge of Isometric views of engineering components also draw the isometric views of given components.	R / U / A	1, 2, 3, 4, 7
CO5	Grasp the knowledge and draw the development of surfaces of different engineering components	R / U / A	1, 2, 3, 4, 6,7
CO6	Appraise the drawing principles and appreciate its applications in engineering field.	R / U / A	1, 2, 3, 4, 7

BLUEPRINT OF MARKS FOR SEE

Unit No	Name of the Unit	Periods	Questions to be set for SEE		
			R	U	A
			PART-A (2M Questions)		PART-B (6 M Questions)
1	Projection of Solids	08	Q1		Q9(a)
2	Sectional Views	08	Q2		Q9(b)
3	Auxiliary views	06	Q3		Q10(a)
4	Pictorial drawing	09	Q4		Q10(b)
5	Development of surfaces	14	Q5, Q6, Q7, Q8		Q11(a), Q11(b), Q12(a), Q12(b)
Total Periods / Total Questions		45	8		4
[R: Remembering, U: Understanding – 2 Marks] [A: Application – 6 Marks]					
Note: Question Paper consists PART – A and PART-B, Total Marks: 40, Time: 2 Hours					
PART – A consists of 8 and student have to answer ALL questions, each question carries 2 marks (8x2 = 16)					
PART – B consists of 4 questions and student have to answer ALL questions, each question carries 6 marks (4x6=24)					

CIE Question Paper Pattern and Syllabus

Unit No	Unit Name	Questions to be set for CIE		
		R	U	A
		2M Questions		6M Questions
Mid Semester - I				
1	Projection Solids	Q1, Q2		Q5(a), Q5(b),
2	Sectional Views	Q3, Q4		Q6(a), Q6(b)
	Total	4		2
Mid Semester - II				
3	Auxiliary views	Q1, Q2		Q5(a), Q5(b),
4	Pictorial drawing	Q3, Q4		Q6(a), Q6(b)
	Total	4		2
[R: Remembering, U: Understanding – 2 Marks] [A: Applying – 6 Marks]				
<u>CIE Question Paper Pattern: Total Marks : 20, Time: 1 Hour</u> Maximum Marks: 20, Time: 1 Hour <u>Part A:</u> Consists of 4 Short questions, students have to attempt ALL questions and each question carries 2 Marks.(4 x 2 = 8 Marks) <u>Part B:</u> Consists of 2 Essay type questions, students have to attempt ALL questions and each question carries 6 Marks.(2 x 6 = 12 Marks)				

COURSE CONTENT

1.0 Projection of solids

(08 periods)

Projection of regular solids

- a) Axis perpendicular to one of the planes
- b) Axis parallel to VP and inclined to HP and vice versa.

2.0 Sectional views

(08 periods)

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane

3.0 Auxiliary views periods)

(06

Need for drawing auxiliary views -Explanation of the basic principles of drawing an

auxiliary views - explanation of reference plane and auxiliary plane -Partial auxiliary view.

4.0 Pictorial Drawings

(09 periods)

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale and ordinary scale difference between Isometric view and Isometric projection - Isometric and non-Isometric lines -Isometric drawing of common features like rectangles, circular shapes, non-isometric lines - Use of box and offset methods.

5.0 Development of Surfaces

(14 periods)

Need for preparing development of surface with reference to sheet metal work - Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramid (sketches only) -Types of development: Parallel line and radial line development -Procedure of drawing development, drawings of trays, funnels, elbow pipes and rectangular ducts.

REFERENCE BOOKS

1. Engineering Drawing by Kapil dev – (Asian Publisher)
2. Engineering Drawing by Basant Agarwal&C.M Agarwal - (McGraw-hill)
3. Engineering Drawing by N.D.Bhatt. (Charotar Publishing House Pvt. Ltd.)
4. A Textbook on Engineering Drawing by P. Kannaiah, K. L. Narayana, K. Venkata Reddy

ONLINE RESOURCES

1. <https://nptel.ac.in/courses>
2. www.slideshare.net/shameem.mist/engineering-drawing
3. <https://www.powershow.com/viewfl/76303a>
OWI5M/Engineering_Drawing_powerpoint_ppt_presentation
4. <https://www.powershow.com/view0/91a2bf>
N2Q2N/Basic_engineering_drawing_solved_question_powerpoint_ppt_presentation

SPECIFIC LEARNING OUTCOMES

1.0 Apply Principles of Projection of solids

- 1.1. Draw the projections of solids to axis of solids parallel to one plane.
- 1.2. Draw the projections of solids to axis of solid inclined to other plane.

2.0 Appreciate the need of Sectional Views

- 2.1 Explain the need to draw sectional views.
- 2.2 Select the section plane for a given component to reveal maximum information.
- 2.3 Explain the positions of section plane with reference planes
- 2.4 Differentiate between true shape and apparent shape of section
- 2.5 Draw sectional views and true sections of regular solids discussed in 6.0
- 2.6 Apply principles of hatching.

3.0 Understand the need of auxiliary views

- 3.1 State the need of Auxiliary views for a given engineering drawing.
- 3.2 Draw the auxiliary views of a given engineering component
- 3.3 Differentiate between auxiliary view and apparent view

4.0 Prepare pictorial drawings

- 4.1 State the need of pictorial drawings.
- 4.2 Differentiate between isometric scale and true scale.
- 4.3 Prepare Isometric views for the given orthographic drawings.

5.0 Interpret Development of surfaces of different solids

- 5.1 State the need for preparing development drawing.
- 5.2 Prepare development of simple engineering objects (cubes, prisms, cylinders, cones, pyramid) using parallel line and radial line method.
- 5.3 Prepare development of surface of engineering components like trays, funnel, 90° elbow & rectangular duct.

COURSE-PO ATTAINMENT MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	3	-	-	3
CO2	3	2	1	2	-	-	3
CO3	3	1	1	2	-	-	2
CO4	3	1	2	3	-	-	2
CO5	3	2	2	3	-	1	1
CO6	3	1	3	3	-	-	3

BOARD DIPLOMA EXAMINATION, (C-21)
DME – II SEMESTER
MID SEM - I EXAMINATION
ADVANCED ENGINEERING DRAWING

Time: 1 Hours]

[Total Marks: 20

PART-A

4x2=8

- Instructions :**
1. Answer **ALL** questions.
 2. Each question carries **TWO** marks.

1. Draw the projections of a triangular prism of base side 35 mm, resting on H.P. on its base such that one of its base side is perpendicular to V.P.
2. Draw the projections of a cone of base diameter 40 mm and height 60 mm resting on H.P. on its base.
3. A cube of base side 30 mm resting on its base on H.P. such that one of its base side is making an angle of 30° to V.P. A sectional plane parallel to H.P passes through the axis at a distance of 20 mm from the base. Draw the sectional top view of the truncated cube.
4. Draw the sectional top view of the square pyramid of base side 30 mm and height 60 mm is resting on HP on its base with one of its base side is parallel to V.P. when it is cut by a horizontal section plane at a distance of 30 mm from the apex.

PART-B 2x6=12

- Instructions :**
1. Answer any **ALL** questions.
 2. Each question carries **SIX** marks.

5. (a) .Draw the projections of a pentagonal pyramid, base 30 mm edge and axis 50 mm long, having its base on the H.P. and an edge of the base parallel to the V.P. Also draw its side view.

(Or)

5. (b). A tetrahedron of 50 mm long edges is resting on the H.P. on one of its faces, with an edge of that face parallel to the V.P. Draw its projections.

6. (a) A cube of 35 mm long edges is resting on the H.P. on one of its faces with a vertical face inclined at 30° to the V.P. It is cut by a section plane parallel to the V.P. and 9 mm away from the axis and further away from the V.P. Draw its sectional front view and the top view.

(Or)

6. b) A cylinder of 40 mm diameter, 60 mm height and having its axis vertical, is cut by a section plane, perpendicular to the V.P., inclined at 45° to the H.P. and intersecting the axis 32 mm above the base. Draw its front view, sectional top view and true shape.

BOARD DIPLOMA EXAMINATION, (C-21)
DME – II SEMESTER
MID SEM- II EXAMINATION
ADVANCED ENGINEERING DRAWING

Time: 1 Hours]

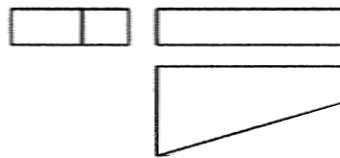
[Total Marks: 20

PART-A

4x2=8

- Instructions :**
1. Answer **ALL** questions.
 2. Each question carries **TWO** marks.

1. What is the need for an auxiliary view?
2. A cube of side 30 mm placed on HP and sectioned diagonally, draw the auxiliary view of the inclined surface.
3. Draw the isometric view of a block whose orthographic projections are given below assume proper dimensions.



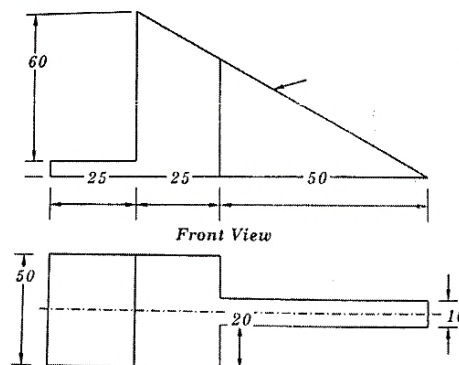
4. Draw the isometric view of a hexagonal plane of base side 30 mm when one of its side is parallel to H.P, when it is horizontal.

PART-B

2x6=12

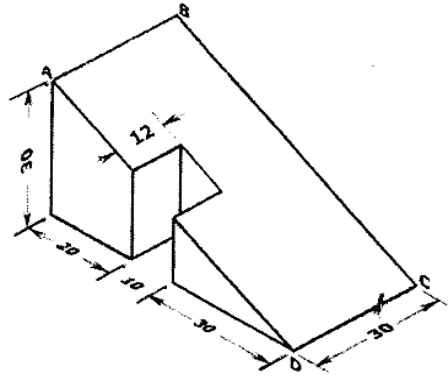
- Instructions :**
1. Answer any **ALL** questions.
 2. Each question carries **SIX** marks.

5. (a) Draw the auxiliary view of a component given below.

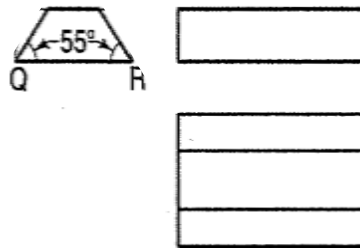


(Or)

5. (b) Draw the auxiliary view of the slopping surface of the cast iron block as shown in the figure.

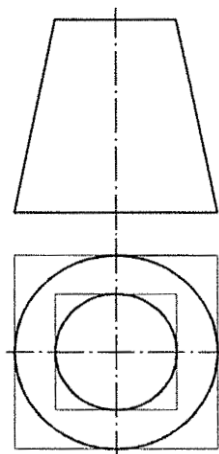


6. (a) Draw the isometric view of the block whose orthographic projections are given below by assuming proper dimensions.



(Or)

6. (b) Draw the isometric drawing of the frustum of a cone shown in figure with proper dimensions.



PART-B

4x6=24

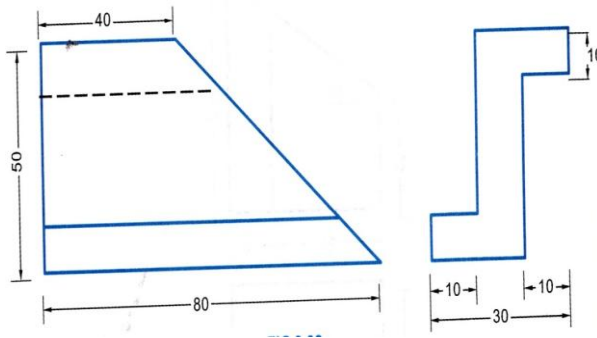
- Instructions :**
1. Answer any **ALL** questions.
 2. Each question carries **SIX** marks.
 3. All the dimensions are in mm.

9. a) Draw the projection of a cone of base diameter 50 mm and height 80 mm when its axis is making an angle of 45° to H.P and parallel to the V.P.

(Or)

9. b) A triangular prism, base 30 mm side and axis 50 mm long, is lying on the H.P. on one of its rectangular faces with its axis inclined at 30° to the V.P. It is cut by a horizontal section plane, at a distance of 12 mm above the ground. Draw its front view and sectional top view.

10. a) Draw the auxiliary view of sloping surface of an object shown in figure.

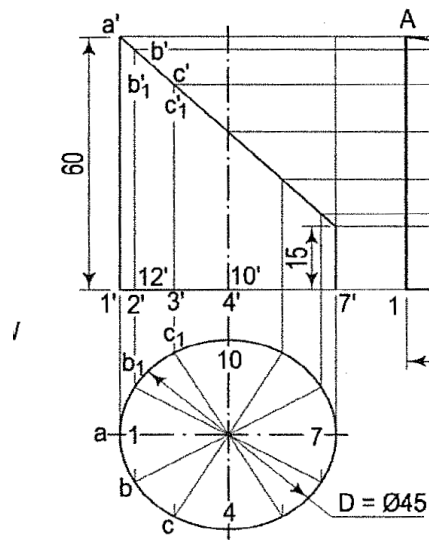


(Or)

10. b) Draw the isometric view of the block, whose orthographic views are shown in figure.

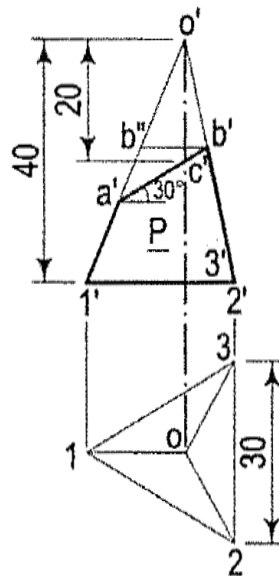
-

12. a) Develop of bottom portion of the truncated cylinder.



(Or)

12. b) Develop the portion 'P' in the below figure.



ME-207 ADVANCED AUTOCAD LAB

Course Title :	Advanced AutoCAD Lab	Course Code	ME-207
Semester	II	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lectures+ Practice	Total Contact Periods :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites This course requires the Basic CAD Skills and concepts of engineering drawing

COURSE OUTCOMES

CO1	Significance of Layers. Create and assign properties to layers and modify layers
CO2	Importance and advantages of blocks. Use of standard blocks and user defined blocks
CO3	Need of solid modeling and various methods of solid modeling with different surfaces
CO4	Create 3D drawings
CO5	Practice 3D object modifying skills
CO6	Practice rendering and selection of material

COURSE CONTENTS

UNIT -1

Duration: 15 periods (T:5 + P:10pds)

1.0 Layers

1.1 Organize the information on layers

Setting a current layer, layers color, line type, line weight, print style locking and unlocking of layers, the layer visibility and layer printing. Setting of current line type. The loading of additional line types, creating and naming of line type, editing of line type.

1.2 Use the Blocks, Attributes and External references to manage the drawing blocks

The purpose of a block, creating a block, inserting a block, redefining a block, exploding a block

1.3 Attribute

Editing attribute definitions, attaching attribute to blocks. Editing attributes attached to blocks, Extracting attributes information.

UNIT -2

Duration: 15 periods (T:5 + P:10)

2.0 Viewing entities in three dimensions

2.1 Creation of three-dimensional entities using different methods

Drawing of two dimensional entities in three dimensional space.

Converting two dimensional planar entities into three dimensional entities by applying elevation and thickness.

Converting two dimensional planar entities into three dimensional entities by revolving or extruding.

Creation of three-dimensional faces, rectangular meshes, ruled surface meshes, extruded surface meshes, revolved surface meshes, three dimensional entities such as boxes, Cylinders, Cones, Spheres, wedges, torus, Regions, extruded solids, revolved solids, composite solids, intersect solids

Boolean operations like union, subtract and interfere.

2.2 Editing in three dimensions

Rotating in three dimensions, Array in three dimensions (Rectangular and polar).

Mirroring in three dimensions, aligning in three dimensions.

2.3 Editing of three dimensional solids

Sectioning and Slicing of solids, hiding, shading and rendering.

2.4 Selection of material from library

Enable the material library, editing materials and material library.

UNIT- 3

3.0 Application of above units 10P)

Duration: 15 periods (T:5 +

RECOMMENDED BOOKS

1. Auto cad by George Omura
2. 4MCAD User Guide- IntelliCAD Technology Consortium

SPECIFIC LEARNING OUTCOMES:

UNIT -1

1.0 Organize the information on layers

- 1.1 Explain the need and importance of Layers.
- 1.2 Practice creating new layer, naming the layer and assigning properties like Layer colour, Line type and line weight and setting the current layer
- 1.3 Practice the locking and unlocking of layers
- 1.4 Practice the Freezing and thawing of layers
- 1.5 Practice the layer visibility and layer printing
- 1.6 Practice the loading of additional line types

Use the Blocks, Attributes and External references to manage the Drawing

- 1.7 Define a block
- 1.8 Explain the purpose of a block
- 1.9 Practice the creating a block
- 1.10 Practice the inserting a block
- 1.11 Practice the redefining a block
- 1.12 Practice the exploding a block
- 1.13 Define an Attribute
- 1.14 Practice the editing attribute definitions
- 1.15 Practice the attaching attribute to blocks
- 1.16 Edit attributes attached to blocks
- 1.17 Extract attributes information
- 1.18 Define external reference
- 1.19 Practice the Attaching, Removing, and Reloading of external references
- 1.20 Practice the Binding, Clipping and changing the path of external references

UNIT -2

2.0 Understand the concepts of 3D

- 2.1 View entities in three dimensions
- 2.2 To set a new viewing direction
- 2.3 To dynamically set a view direction

Create three-dimensional entities using different methods

- 2.4 Draw two dimensional entities in three dimensional space.
- 2.5 Convert two dimensional planar entities into three dimensional entities by applying elevation and thickness.
- 2.6 Convert two dimensional planar entities into three dimensional entities by revolving or extruding.
- 2.7 Create three-dimensional faces.
- 2.8 Create rectangular meshes.
- 2.9 Create ruled surface meshes.
- 2.10 Create extruded surface meshes.
- 2.11 Create revolved surface meshes.
- 2.12 Create three dimensional entities such as boxes, Cylinders, Cones, Spheres, wedges, torus, Regions.
- 2.13 Create extruded solids.
- 2.14 Create revolved solids.
- 2.15 Create composite solids.
- 2.16 Create intersect solids.

Editing in three dimensions

- 2.17 Rotate in three dimensions
- 2.18 Array in three dimensions (Rectangular and polar)
- 2.19 Mirror in three dimensions
- 2.20 Align in three dimensions

Edit three dimensional solids

- 2.21 Practice Sectioning and Slicing solids

2.22 Practice hiding, shading and rendering

UNIT -3

3.0 Practice applications on above unit

Exercise	Key components
Layers	• Importance of layers • Creation of new layers and controlling properties of layers
Working with blocks	• Create, insert and explode a block • Attach attribute to blocks • Edit and extract attributes attached to blocks
View entities in three dimensions	• Set a new viewing direction • Set dynamically view direction
Create three-dimensional entities	• Create three-dimensional faces • Create rectangular meshes, ruled surface meshes, extruded surface meshes, revolved surface meshes • Create three dimensional entities such as boxes, Cylinders.
Edit in three dimensions	• Rotate in three dimensions • Array in three dimensions (Rectangular and polar) • Mirror in three dimensions • Align in three dimensions
Edit three dimensional solids	• Practice Sectioning and Slicing solids • Practice hiding, shading and rendering
Practice the selection of material from library	• Enable material library • Edit materials and material library

Course Outcome		Cognizant Level	Linked PO	Teaching Hours
CO1	Significance of Layers. Create and assign properties to layers and modify layers	U/A	1,2,3,4,7	6
CO2	Importance and advantages of blocks. Use of standard blocks and user defined blocks	U/A	1,2,3,4,6,7	9
CO3	Need of solid modeling and various methods of solid modeling with different surfaces	U/A	1,2,3,4,7	3
CO4	Create 3D drawings	U/A	1,3,4,6,7	6
CO5	Practice 3D object modifying skills	U/A	1,3,4,6,7	6
CO6	Practice rendering and selection of material	A	1,2,3,4,6,7	15

CO-PO MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	-	-	3
CO2	3	1	2	2	-	1	3
CO3	3	2	2	3	-	-	2
CO4	3	-	2	3	-	1	2
CO5	3	-	2	3	-	1	2
CO6	3	2	3	3	-	2	2

MID SEM-I EXAM

S N	Unit name	R,U (Q No's)	A (Q No's)	Remarks
1	Unit-1	1,2,3,4	5,6	

MID SEM-2 EXAM

S N	Unit name	R,U (Q No's)	A (Q No's)	Remarks
1	Unit-2	1,2,3,4	5,6	

SEE

S N	Unit name	Questions to be set for SEE		Remarks
		R,U (Q No's)	A (Q No's)	
1	Unit-1	1,2		
2	Unit-2	3,4		
3	Unit-3		5,6	

ME-207- Advanced AutoCAD Lab
MODEL PAPER FOR MID -I (CIE)

TIME: 2hr

Marks: 20M

PART-A

NOTE: Answer all questions

4 X 2 =

8marks

1. Create four layers, name the layers and assign different properties like line color, line type, line weight to different layers.
2. Write the procedure to create a block.
3. What is meant by attribute.
4. What do you mean by layer and what are the advantages of it.

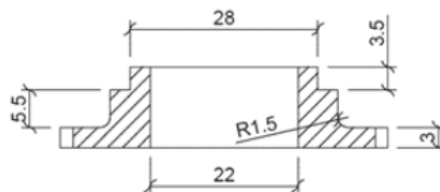
PART-B

NOTE: Answer any one questions

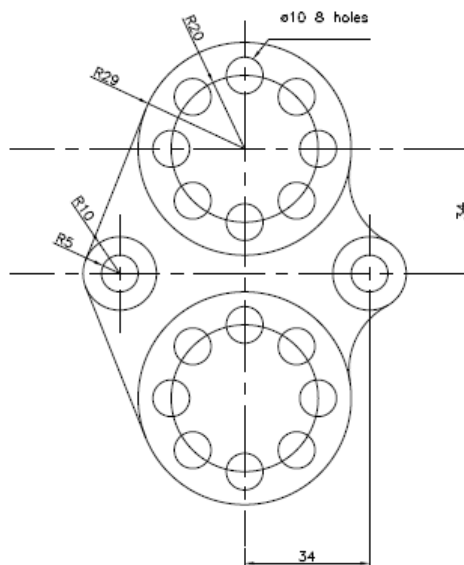
1 X 2 =

12marks

5. Draw the following using Layers. Use different layers to different line types, text, dimension and main figure.



6. Draw the following using Layers. Use different layers to different line types, text, dimension and main figure.



ME-207- Advanced AutoCAD Lab
MODEL PAPER FOR MID -II (CIE)

TIME: 2hr

Marks: 20M

PART-A

NOTE: Answer all questions

4 X 2 =

8marks

1. Draw rectangle of 100x60 and extrude to a depth of 25mm.
2. Draw a cylinder of dia 50mm and height 100mm.
3. List various Boolean operations
4. Draw a cube of 100mm side and make a hole of 25mm.

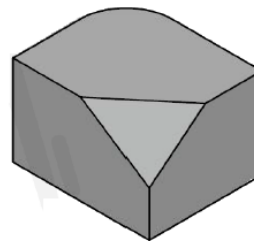
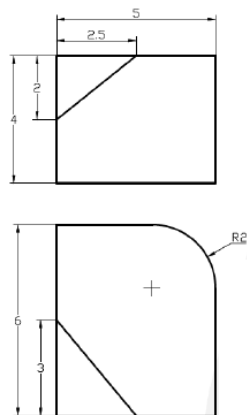
PART-B

NOTE: Answer any one questions

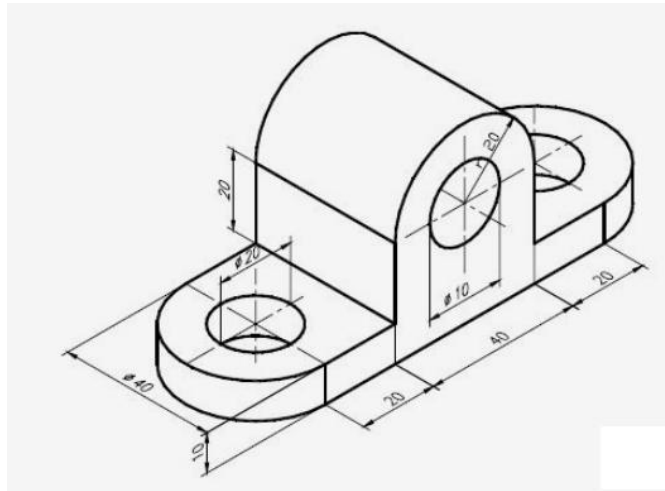
1 X 2 =

12marks

5. Draw the following 3D figure using any CAD software as per the given dimension.



6. Draw the following using any CAD software and add dimensioning.



ME-207- Advanced AutoCAD Lab
MODEL PAPER FOR SEE

TIME: 3hr

Marks: 40M

PART-A

NOTE: Answer all questions
16marks.

4 X 4 =

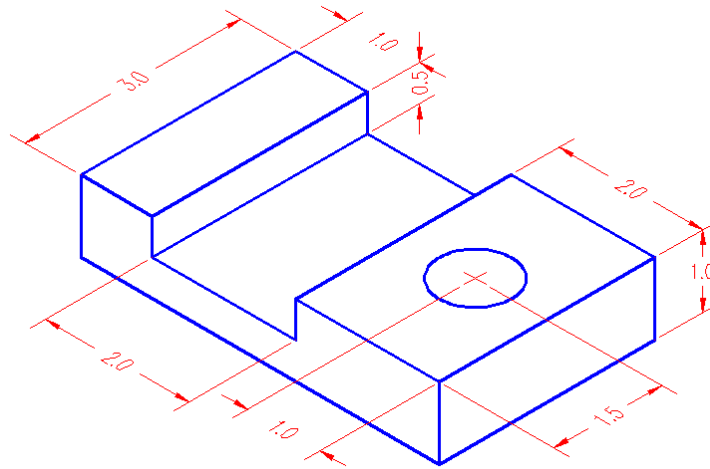
1. Write the procedure to create and insert a block.
2. Create four layers, name the layers and assign different properties like line color, line type, line weight to different layers.
3. Draw a 3D cone of base 30mm and height 50mm
4. Draw to 2 boxes of 50x30x20 and 30x50x20 mm and union them

PART-B

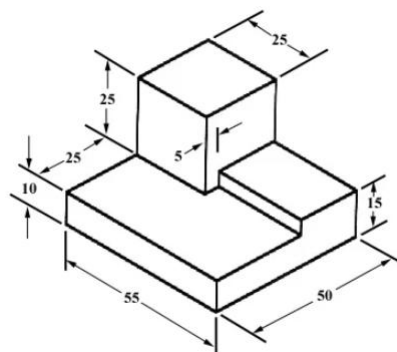
NOTE: Answer any one questions

1 X 24 = 24marks

5. (a) Draw the following 3D object CAD software. 20+4 marks
(b) List the commands in sequence and also write the procedure



6. (a) Draw the following 3D object CAD software. 20+4 marks
(b) List the commands in sequence and also write the procedure



EE-208-BASIC ELECTRICAL WORKSHOP LAB

Course Title :	Basic Electrical Workshop Lab	Course Code	EE-208
Semester	II	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lectures+ Practice	Total Contact Periods :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic electricity

Course Outcomes

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Comply with Electrical Safety and First aid Procedures	R/U/A	1,2,5,7	5
CO2	Familiarize with wires, cables, protective devices & handle various wiring tools, accessories.	R/U/A	1,3,4,7	5
CO3	Perform various electrical wiring joints	U/A	2,3,4,5,7	6
CO4	Perform electrical wiring of lighting loads and Power Loads	U/A	2,3,4,5,7	20
CO5	Measurement of Electrical parameters and Populate the PCB	U/A	1,2,3,4,7	9

Course Contents

1.0 Electrical Safety and First Aid

- 1.1 Identify various Electrical Symbols and Electrical Safety Signs and understand what they mean.
- 1.2 Demonstrate how to free a person from electrocution and administer proper first-aid.
- 1.3 Understand Electrical fire safety and steps to precautionary steps to avoid Electrical hazard.
- 1.4 Identify different type of fire extinguishers and use appropriate fire extinguisher on different types of fire.

2.0 Handle the Wiring Tools and Accessories

- 2.1 Identify the following electrical wiring tools with respect to i) Size ii) Shape iii) Purpose iv) Use
 - a) Screw drivers
 - b) Pliers
 - c) Drilling machines & Drilling Bits.
 - d) Rawl plug jumper, and poker
 - e) Voltage/line tester
 - f) Splicers (insulation remover)
 - g) Standard Wire gauge
- 2.2 Identify the following electrical wiring accessories with respect to i) Size ii) Shape iii) Purpose iv) Use
 - a) Switches
 - b) Ceiling roses
 - c) Lamp holders and adopters
 - d) Sockets
 - e) Plug socket
 - f) Plug top
- 2.3 Identify the following types of main switches with respect to i) Rating ii) Purpose iii) Use.
SP, DP mains, TP,ICDP, ICTP, SPDT, DPDT, TPDT, Change over Knife type/globular, Rotary, micro, modular switches.
- 2.4 Identify fuse, 1-pole, 2-pole and 3-pole MCB's, ELCBs and RCCBs with respect to rating, purpose, and use etc.

2.5 Identify various types of wires and cables with respect to sizes, rating, purpose and use etc.

3.0 Make Electrical Wiring Joints

3.1 Make straight joint/ married joint

3.2 Make T joint

3.3 Make Western union joint

3.4 Make pigtail joint

4.0 Lamp Circuits

4.1 Make a circuit for one lamp controlled by one switch with PVC surface conduit system.

4.2 Make a circuit for two lamps controlled by two switches with PVC surface conduit system.

4.3 Make a circuit for one lamp controlled by one switch and provision of 2/3pin socket.

4.4 Make a circuit for stair case wiring.

4.5 Make a circuit for godown wiring.

4.6 Make a circuit for electrical bell connection.

4.7 Make a circuit for ceiling fan with regulator

4.8 Make a circuit for series connection of two lamps using a single switch.

4.9 Make a circuit for parallel connection of two lamps using a single switch.

4.10 Control and practice the wiring for Fluorescent Lamp/ T9 LED Lamp

4.11 Control and practice the wiring for Mercury Vapour Lamp or Sodium Vapour or Halogen Lamp.

5.0 Resistance measurement, Capacitor measurement& Battery Voltage Measurement.

5.1 Identify different types of resistors used in power circuits.

5.2 Measure the resistance using multimeter and ohm meter

5.3 Connect resistors in series and parallel and measuring the resistance using multimeter.

5.4 Connect a rheostat in a given circuit and vary its resistance from minimum to maximum resistance position

5.5 Identify different types of capacitors used in power systems.

5.6 Find the value/specifications of capacitor from value printed and color code.

5.7 Measure of battery voltage using multimeter.

5.8 Connect batteries in series and parallel and observing the output voltage using DMM.

5.9 measure the voltage and current in live wires using Tangtester.

Note :

1. All experiments to be done on PVC surface conduit.
2. PVC casing capping may be demonstrated for any one of the exercises.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7
CO5	3	2	3	3	2	2	3	1,2,3,4,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

BOARD DIPLOMA EXAMINATION (C-21)

DEEE II- SEMESTER EE-208

BASIC ELECTRICAL WORKSHOP LAB

MID SEM - I

Duration: 1 Hour

Max. Marks: 20

Note: Answer allotted Question.

1. Demonstrate how to free a person from electrocution and administer proper first aid.
2. Make married jointing of given wires.
3. Make T joint of given wires
4. Make Western union jointing of given wires
5. Make pigtail joint of given wires
6. Perform installation of a wiring circuit for one lamp controlled by one switch and provision of 2/3pin socket.
7. Perform installation of a wiring circuit for two lamps controlled by two switches with PVC surface conduit system.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

BOARD DIPLOMA EXAMINATION (C-21)

DEEE II- SEMESTER EE-208

BASIC ELECTRICAL WORKSHOP LAB

MID SEM - II

Duration: 1 Hour

Max. Marks: 20

Note: *Answer allotted Question.*

1. Make a circuit for parallel connection of two lamps using a single switch.
2. Perform installation of a circuit for staircase wiring.
3. Connect a circuit for godown wiring.
4. Control and practice the wiring for Mercury Vapour Lamp or Sodium Vapour or Halogen Lamp.
5. Perform installation a circuit for ceiling fan with regulator.
6. Connect resistors in series and parallel and measure the resistance using multimeter.
7. Connect batteries in series and parallel and observe the output voltage using DMM.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
BOARD DIPLOMA EXAMINATION (C-21)
DEEE II- SEMESTER EE-208
BASIC ELECTRICAL WORKSHOP LAB
SEMESTER END EXAM

Duration: 2 Hour

Max. Marks: 40

Note: Answer allotted Question.

1. Make married jointing of given wires.
2. Make T joint of given wires
3. Perform Western union jointing of given wires
4. Connect resistors in series and parallel and measure the resistance using multimeter.
5. Control and practice the wiring for Mercury Vapour Lamp or Sodium Vapour or Halogen Lamp.
6. Perform installation of a wiring circuit a circuit for two lamps controlled by two switches with PVC surface conduit system.
7. Connect a circuit for one lamp controlled by one switch and provision of 2/3pin socket.
8. Perform installation of a circuit for stair case wiring.
9. Connect a circuit for Godown wiring.
10. Connect a circuit for electrical bell connection.
11. Perform installation a circuit for ceiling fan with regulator.
12. Perform installation a circuit for series connection of lamps.
13. Perform installation a circuit for parallel connection of lamps.
14. Connect batteries in series and parallel and observe the output voltage using DMM.
Perform soldering on PCB

SC-209 - Applied Science Lab

Course Title	Applied Science Lab	Course Code	SC-209
Semester	II	Course Group	Practical
Teaching Scheme in Pds/Hrs(L:T:P)	1:0:2	Credits	1.5
Type of course	Tutorial & Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Physics Lab

Pre requisites: Knowledge of basic concepts of basic High school science and basic mathematics

Course objectives: To provide practical knowledge about the basics of Physics instrumentation and calculations/measurements.

Course outcomes:

Course Outcomes	
CO 1	Understand the properties of convex lens and find the focal length and focal power of convex lens (Separate & Combination)
CO 2	Determine the value of acceleration due to gravity using simple pendulum and verify with $L-T^2$ graph.
CO 3	Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0°C .
CO 4	Determine the refractive index of a solid using travelling microscope.
CO 5	Practice the mapping of magnetic lines of force-locating neutral points and calculate magnetic moment.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3			-	-	1	1
CO 2	3			-	-	1	1
CO 3	3			-	-	1	1
CO 4	3			-	-	1	1
CO 5	3			-	-	1	1
	3					1	1

Learning outcomes

On successful completion of the course, the student will have ability to:

1. Find the focal length and focal power of convex lens (Separate & Combination)
2. Determine the value of acceleration due to gravity and verify with $L-T^2$ graph.
3. Determine the velocity of sound in air at room temperature and calculate velocity of sound in air at 0°C .
4. Determine refractive index of a solid.
5. Practice the mapping of magnetic lines of force-location of neutral points and calculate magnetic moment.

Course Delivery:

The course will be delivered through lectures, class room interaction, group discussions, graded exercises, demonstration and practice.

Tutorial: 1 Period/Experiment:

1. Introduction to Physics practical and its importance, safety precautions in maintenance of equipment in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in manual and record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strictly following of instructions given from time to time by the lecturer-in-charge.
7. Demonstration of each experiment by the lecturer in charge.

Conduction of experiments: 2 periods/Experiment.

Student must perform experiment individually under the supervision of the lecturer-in charge.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MIDSEM-I	EXPERIMENT NO 1 & 2
2	MIDSEM-II	EXPERIMENT NO 3 & 4
3	SEMESTER END EXAMINATION	EXPERIMENT NO 1,2,3,4 and 5

Scheme of Valuation of SEE		
S.No	Particulars	Marks
1.	Objective/Aim	01
2.	Apparatus/Equipment	02
3.	Observations	02
4.	Principle including formula	02
5.	Experiment (Tabular form, readings, etc)	05
6.	Calculation and Result	05
7.	Viva Voce	03
	Total	20

References:

1. Basic Applied Physics – R.K. Gaur
2. Laboratory manual for class XI and XII - NCERT

Chemistry Lab

Prerequisite:

Knowledge of basic concepts of Chemistry of Secondary Education.

Course Objectives:

To provide practical knowledge about the basics of volumetric analysis of chemical compounds.

Course Outcomes:

On successful completion of the course, the student will have ability to attain the following COs

Course Outcome	
CO1	Estimate the amount of the molar salt in the given solution
CO2	Determination of acidity of given water samples/solutions.
CO3	Determination of alkalinity of given water samples/solutions.
CO4	Determination of pH of given water samples/solutions.
CO5	Estimate the amount of the chlorides in the given solution.

CO-PO Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	1	1	1
CO2	3	-	-	-	2	1	1
CO3	3	-	-	-	2	1	1
CO4	3	-	-	2	2	1	1
CO5	3	-	-	-	2	1	1

Course Delivery:

The course will be delivered through lectures, classroom interaction, group discussion, demonstration and practicals.

Conduction of experiments: Lecture 1 period + Experiment 2 periods.

Student must conduct experiment individually under the supervision of the staff-in-charge.

Lecture and Demonstration: 1 Period

1. Introduction of chemistry practical and its importance, safety precautions in maintenance of cleanliness and orderliness of chemicals in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strict following of instructions given from time to time by the staff-in-charge.
7. Demonstration of each experiment by the staff in charge.

Course content

Volumetric Analysis: (22.5 Periods)

Volumetric Analysis by Titrimetric Method:-

Volumetric Analysis - Titration – Standard solutions - Concentration of solutions - Indicators – Self indicator - Acid base indicators - Selection of indicators - Endpoint of titration - Neutralization.

List of experiments:

1. Estimation of Mohr's salt by using 0.02M potassium permanganate solution.
2. Determination of acidity of water sample by using 0.02N NaOH solution.
3. Determination of alkalinity of water sample by using 0.02N H₂SO₄ solution.
4. Find out the pH of the given solution by using pH meter.
5. Estimate the chloride content present in water sample by using 0.0141N AgNO₃ solution.

Specific Learning Outcomes

Upon completion of the course, the student will have ability to

1. Estimate Mohr's salt by using standard potassium permanganate solution.
2. Determine the partial and total acidity of water sample by using 0.02N NaOH solution.
3. Determine the partial and total alkalinity of water sample by using 0.02N H₂SO₄ solution.
4. Find out the pH of the given solution by using pH meter.
5. Estimate the chloride content present in water sample by using 0.0141N AgNO₃ solution.

Reference Books:

1. Vogel's Inorganic Qualitative and Quantitative Analysis.
2. Practical chemistry by O.P. Pande & others.
3. Qualitative and quantitative analysis by Alex.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MIDSEM-I	Experiment No 1 & 2
2	MIDSEM-II	Experiment No 3 & 4
3	SEMESTER END EXAMINATION	Experiment No 1,2,3,4 and 5

Scheme of Valuation for SEE		
Sl. No.	Particulars	Marks
1	Identification of apparatus/equipment/chemical compounds/tools/etc.	2
2	Writing Principle and Procedure	5
3	Experiment and Observations	6
4	Calculation and Results	4
5	Viva-voce	3
Total		20

BOARD DIPLOMA EXAMINATION, (C-21)
MIDSEM – I
SECOND SEMESTER EXAMINATION
SC-209APPLIED SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

- Instructions:** (1) Answer both PART-A AND PART-B on separate answer sheets.
- (2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the Focal length and focal power of given convex lens using U-V method.
2. Determine the value of acceleration due to gravity at your place sing Simple Pendulum.
3. Determine the value of acceleration due to gravity at your place sing Simple Pendulum by L-T² graph.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Estimate the amount of Mohr's salt present in the given 500 ml of solution by using 0.02M potassium permanganate solution.
2. Determine the partial acidity of water sample by using 0.02N NaOH solution.
3. Determine the total acidity of water sample by using 0.02N NaOH solution

BOARD DIPLOMA EXAMINATION, (C-21)
MIDSEM – II
SECOND SEMESTER EXAMINATION
SC-209 - APPLIED SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

Instructions: (1) Answer both PART-A AND PART-B on **separate** answer sheets.

(2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the velocity of sound in air at room temperature by resonance method.
2. Determine the refractive index of a solid using travelling microscope.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the partial alkalinity of water sample by using 0.02N H₂SO₄ solution.
2. Determine the total alkalinity of water sample by using 0.02N H₂SO₄ solution
3. Find out the pH of the given solution by using pH meter.

BOARD DIPLOMA EXAMINATION, (C-21)
SEMESTER END EXAMINATION
SECOND SEMESTER EXAMINATION
SC-209 - APPLIED SCIENCE LAB

Time: 2 Hours]

[Total Marks: 40

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.

(2) Each question carries **TWENTY** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Determine the Focal length and focal power of given convex lense using U-V method.
2. Determine the Focal length and focal power of given convex lense by U-V graph method
3. Determine the value of acceleration due to gravity at your place sing Simple Pendulum.
4. Determine the value of acceleration due to gravity at your place sing Simple Pendulum by L- T^2 graph.
5. Determine the velocity of sound in air at room temperature by resonance method.
6. Determine the refractive index of a solid using travelling microscope.
7. Draw magnetic lines of force around a bar magnet placed in NN position of earth's magnetic field and locate neutral points.
8. Draw magnetic lines of force around a bar magnet placed in NS position of earth's magnetic field and locate neutral points.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Estimate the amount of Mohr's salt present in the given one litre of solution by using 0.02M KMnO_4 solution.
2. Determine the partial acidity of water sample by using 0.02 N NaOH solution.
3. Determine the total acidity of water sample by using 0.02 N NaOH solution
4. Determine the partial alkalinity of water sample by using 0.02 N H_2SO_4 solution.
5. Determine the total alkalinity of water sample by using 0.02 N H_2SO_4 solution
6. Estimate the chloride content present in water sample by using 0.0141 N AgNO_3 solution
7. Find out the pH of the given solution by using pH meter.

PROGRAMMING IN C LAB

Course Title	Programming in C Lab	Course Code	CS-210
Semester	II	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of Computer Operation.

Course Content

Unit Number	Unit Name	Periods
1	Concepts of Algorithm, Flowchart and Program	2
2	Using Variables, Operators, Data-types	4
3	Decision making and Looping statements	10
4	Arrays and String programming	8
5	Concept of Functions.	10
6	Structure, union and Files	11
	Total	45

Course Objectives

1. Use the concepts of algorithm and flowchart for developing programs in C language.
2. Use variables, constants, data types, operators and Input / Output functions in programs.
3. Apply decision making and looping concepts for developing programs in C language
4. Implement the concepts of arrays and structures for a given problem.
5. Illustrate the use of functions in developing modular programming.
6. Creating and managing Files.

Course Outcomes

On successful completion of the course, the students will be able to attain below Course Outcome(CO):

Course Outcome		Experiment Linked	CL	Linked PO	Lab Sessions
CO1	Use the concepts of algorithm and flowchart for developing programs in C language.	1,2,3	U, A	1,2,3,4,7	3
CO2	Use variables, constants, data types, operators and Input / Output functions in programs	4,5,6,7	U, A	1,2,3,4,7	3
CO3	Apply decision making and looping concepts for developing programs in C language	8,9,10,11,12,13, 14,15	U, A	1,2,3,4,7	10
CO4	Implement the concepts of arrays and structures for a given problem	16,17,18,21	U, A	1,2,3,4,7	14
CO5	Illustrate the use of functions in developing modular programming	19,20	U,A	1,2,3,4,7	10
CO6	Creating and managing Files	22	U,A	1,2,3,4,7	5
					45

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Program Outcomes						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
PROGRAMMING IN C LAB	3	3	3	3	-	-	3

References

1. Let Us C -- Yeshwanth Kanetkar BPB Publications
2. Programming in ANSI C -- E. Balaguruswamy Tata McGrawHill
3. Programming with C -- Gottfried Schaum's outline
4. C The complete Reference -- Schildt Tata McGraw Hill

Course Delivery

The course will be delivered through Demonstration and Practices.

List of Exercises:-

1. Exercise on developing algorithms
2. Exercise on drawing flowcharts
3. Exercise on structure of C program
4. Exercise on Keywords, identifiers, constants, variables
5. Exercise on data types and operators in a simple C program
6. Exercise on input and output of characters
7. Exercise on formatted input and output.
8. Exercise on simple if statement
9. Exercise on if else statement
10. Exercise on else if ladder statement
11. Exercise on switch statement
12. Exercise on conditional operator
13. Exercise on while statement
14. Exercise on for statement
15. Exercise on do...while statement
16. Exercise on one dimensional arrays
17. Exercise on two dimensional arrays
18. Exercise on string handling functions.
19. Exercise on Functions
20. Exercise on Recursion
21. Exercise on structures
22. Exercise on Files.

EE-211 - SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	EE-211
Semester	II	Course	Core
Teaching Scheme in periods	0:0:8	Credits	2.5
Methodology	Activities	Total Contact	120
CIE	Rubrics	SEE	Nil

Advanced English – Skills Upgradation

TASK:

LEVEL 1: Collection of material for learning skills

LEVEL2: Analysis of the material

LEVEL 3: Practice the activities

LEVEL 4: Assessment of the skills acquired

Activity before the activities:

Collect the material useful for learning Listening, Speaking, Reading, Writing (LSRW skills), Grammar and Vocabulary

- 1. Collect newspaper clippings, books, puzzles, pictures, audio and video programmes in English*
- 2. Talk to your classmates, seniors, alumni, teachers, successful people in job interviews and celebrities*
- 3. Visit libraries to gather information on language learning skills*
- 4. Visit useful websites for learning vocabulary and grammar.*

Activities:

1. Collect the prefixes, suffixes and roots and build vocabulary
2. Collect the vocabulary building games and activities. Practice them individually, in pairs and groups.
3. Learn different kinds of reading a text. Practice reading various kinds of reading material.
4. Collect the following reading material:
 - a) Short stories (Read them aloud in the class.)
 - b) Collect interesting / funny articles on science and technology, biographies and travelogues. (Display them on the board.)
5. Practice jigsaw reading

6. Practice dialogues on
 - a) Fixing, rescheduling and cancelling appointments.
 - b) Extending, accepting and declining invitations.
 - c) Offering help, opinion and suggestions.
 (Dramatize the dialogues)
7. Identify the treasure hidden in the institute by giving directions and instructions to your team members. (Treasure Hunt game)
8. Collect different kinds of tables, pie charts, graphs, tree diagrams, etc. and interpret them using primary and secondary analysis.
9. Prepare a tree diagram on your family for three to four generations.
10. Identify and correct the errors in the given reading material.
11. Collect the resumes of celebrities or successful people in the job interviews and analyze them.
12. Listen to the audio clip and make notes.
13. Edit the rough copy of a project report.
14. Visit the vegetable market / a hospital / a sports complex / bus station and write a report.
15. Create an email id and write e-mails to your local leaders describing the problems in your village.

Note: The above activities are indicative. The teacher may assign any other activity relevant to the skills introduced in the semester.

COURSE OUTCOMES

CO NO	At the end of the course the students will have the ability to
201.1	Learn vocabulary and use them in professional and social interactions.
201.2	Comprehend the main idea and minute details related to engineering courses.
201.3	Communicate effectively in English in terms of basic sciences, mathematics and engineering fundamentals.
201.4	Learn English grammar to speak and write flawlessly so as to interpret the data.
201.5	Learn the mechanics of writing to make the technical writing practical and meaningful.
201.6	Make notes, write resumes, prepare cover letters, write technical emails and draft reports.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
201.1	-	-	-	-	3		3	5,7
201.2	-	-	-	-	3	2	3	5,6,7
201.3	-	-	-	-	3	3	3	5,6,7
201.4	-	-	-	-	2	2	3	5,6,7
201.5	-	-	-	-	2	2	3	5,6,7
201.6		-	--	--	2		3	5,7

Model Rubric:

Note: Separate rubric may be prepared according to the activity.

[illegible]

SKILL UPGRADATION IN - ENGINEERING MATHEMATICS

ACTIVITY ASSESSMENT Steps

1. Mathematical concepts
2. Procedure
3. Explanation
4. Working with others
5. Mathematical errors

ACTIVITIES

- 1 Prepare a presentation to describe various types of Straight lines.
- 2 Identify the geometrical shapes in and around your locality and give the details about them.
3. Prepare a comparative study of conic sections and their uses in engineering applications.
3. Prepare a detailed study report on differentiation using different methods.
4. List out and explain the applications of Differentiation.
5. Apply the differentiation in geometrical problems.
6. Apply the differentiation in rate measure problems.
7. Apply the differentiation to problem solving in finding maxima minima.

CO / PO - MAPPING OF ACTIVITIES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1			1	2	2	3
CO2	3	2	2	1			1	2	2	3
CO3	3	2	2	1			1	2	2	3
CO4	3	2	2	1			1	2	2	3
CO5	3	2	2	1			1	2	2	3
CO6	3	2	2	1			1	2	2	3
CO7	3	2	2	1			1	2	2	3

Rubrics for Activity assessment

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Procedures	Typically, uses an efficient and effective procedure to solve the problem(s).	Typically, uses an effective procedure to solve the problem(s).	Sometimes uses an effective procedure to solve problems, but does not do it consistently.	Rarely uses an effective procedure to solve problems.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.

STUDENT ASSESSMENT by RUBRICS

[illegible]

SKILL UPGRADATION – APPLIED PHYSICS

TASK

LEVEL 1: Concept, Ethical Data, Materials, Source (Library/internet/others)

LEVEL 2: Methodology/procedure

LEVEL 3: Analysis/experiment

LEVEL 4: Interpretation/inference/evaluation.

Activities:-

1. Construct a blowing pipe to detect dangerous gases in mines.
2. Construct model stethoscope with known materials.
3. Conduct awareness program on noise pollution in your college, colony. Prepare a video report.
4. Construct a second's pendulum with simple objects.
5. Prepare a power point presentation on photosensitive materials with detailed specifications.
6. Prepare a report on Lasers where they are practically used.
7. Prepare a power point presentation on application of optical fibers in medical and engineering field.
8. How can you produce electricity with a magnet? – (a) Develop a working model/ prepare a power point presentation with animation/ prepare drawings on a chart.
9. Construct an electric calling bell.
10. Setup a circuit on breadboard to verify Kirchhoff's voltage law.
11. Prepare a power point presentation on Superconductors and their practical applications with motion pictures embedded.
12. Collect various resistors, diodes and LEDs with specifications and compile on a card board.

NOTE: The above activities are indicative. The teacher may assign any other activity relevant to the course based on resources available.

Course Outcomes (CO)		Linked Pos	Activity Hours
CO1	Construction of a blowing pipe to detect dangerous gases in mines	PO1, PO2, PO3, PO4, PO5, PO6	3
CO2	Construction of model stethoscope with known materials	PO1, PO2, PO5, PO7	3
CO3	Conduct of awareness program on noise pollution in the college, colony and preparation of a video report.	PO1, PO2, PO5, PO6, PO7	3
CO4	Construct a second's pendulum with simple objects.	PO1, PO2, PO3, PO4	3
CO5	Preparation of PPT on photosensitive materials with detailed specifications	PO1, PO2	3
CO6	Preparation of report on lasers practically used	PO1, PO2, PO4, PO5, PO7	3
CO7	Preparation of PPT on application of optical fibers in medical and engineering field	PO1, PO2, PO4, PO5, PO6, PO7	3
CO8	Production of electricity with a magnet – working model, PPT with animation and drawings on a chart.	PO1, PO2, PO3, PO4	3
CO9	Construction of an electric calling bell	PO1, PO2, PO3, PO4	3
CO10	Construction of a circuit on breadboard to verify Kirchhoff's voltage law	PO1, PO2, PO3, PO4	3
CO11	Preparation of PPT on Superconductors and their practical applications with motion pictures.	PO1, PO2, PO3, PO4, PO7	3
CO12	Collection of various resistors, diodes and LEDs with specifications and installation on a card board	PO1, PO2	3

Rubrics for Task Assessments

General Scale for scoring student performance in Skill Upgradation

Type of Skill/Score	4	3	2	1
Data/Material Collection	All Data/Material was collected one time independently.	All Data/Material was collected more than one time independently.	All Data/Material was collected several times independently.	All Data/Material was collected several times with assistance.
Methodology/ Procedure	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations.	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Expert help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after expert feedback.	Procedures that were outlined were incomplete or not sequential, even after Expert feedback had been given.
Activity/ Development	Quality of Skill is high.	Skill is mastered to the level of expectation.	Skill is present but with errors and omissions.	Skill needs improvement.
Interpretation/ summary	Student provided a detailed conclusion clearly.	Student provided a somewhat detailed conclusion clearly.	Student provided a conclusion with some reference.	No conclusion was apparent.

NOTE: The above types of skills are indicative. The teacher may change the skills depending on type of activity.

STUDENT ASSESSMENT (RUBRICS)

[illegible]

SC-204 - ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Suggested Skill Upgradation Activities

Activity Assessment Steps:

Level-1: Concept, Data collection and summarization, Material etc

Level-2: Prepare Chart, explain the process, perform the experiment etc, and prepare a report etc

Level-3: Oral or power point presentation of the activity.

Level-4: Submission of report.

Activity – 1

Collect the data of the different methods of concentration of ore and present with PPT :

Activity – 2

Study the process of Corrosion of a metal under different conditions:

Activity – 3

Compare the Corrosion of different metals /alloys exposed to the same environmental conditions:

Activity – 4

Compare the Corrosion of metal with different shapes and surfaces under same environmental conditions:

Activity – 5

Study the Prevention of Corrosion of a metal by using different coating materials

Activity – 6

Study of plastics, recycling of plastics and their advantages and disadvantages

Activity – 7

Study of natural rubber and its uses

Activity – 8

Power point presentation on fossil fuels

Activity – 9

Study and suggest the measures to improve your environment related to air pollution

Activity – 10

Study and suggest the measures to improve your environment related to water pollution

Activity – 11

Study and suggest the measures to improve the college environment

Activity – 12

Construct a working model of Galvanic cell and explain its working.

Note: Any other skill upgradation activity related to the course may be taken up.

Mapping of POs to Student activities

S.No	Name of the activity	Linked POs
1	Collect the data of the different methods of concentration of ore and present with PPT	1, 6,7
2	Study the process of Corrosion of a metal under different conditions	1, 6,7
3	Compare the Corrosion of different metals /alloys exposed to the same environmental conditions	1, 6,7
4	Compare the Corrosion of metal with different shapes and surfaces under same environmental conditions	1, 5, 6,7
5	Study the Prevention of Corrosion of a metal by using different coating materials	1, 5, 6,7
6	Study of plastics, recycling of plastics and their advantages and disadvantages	1,5, 6,7
7	Study of natural rubber and its uses	1,5, 6,7
8	Power point presentation on fossil fuels	1,5, 6,7
9	Study and suggest the measures to improve your environment related air pollution	1,5, 6,7
10	Study and suggest the measures to improve your environment related water pollution	1,5, 6,7
11	Study and suggest the measures to improve the college environment	1,5, 6,7
12	Construct a working model of Galvanic cell and explain its working.	1, 6,7

Method of evaluation of the student activities (Rubrics)

Model Rubrics

S. No	Sub activity	Performance (Score)			
		Excellent (4)	Good (3)	Satisfactory (2)	Need improvement (1)
1	Level-1 (Data and Material collection)	All materials and data required for the activity were accurately prepared based on the data collected independently	Almost all materials and data required for the activity were accurately prepared based on the data collected independently	The materials and data required for the activity were accurately prepared based on the data collected with the help of teacher.	The materials and data required for the activity were inaccurately prepared .
2	Level-2 (Chart, Model, Experiment or Study)	Procedures were outlined in a step-by-step fashion that could be followed by anyone & performed the activity effectively.	Procedures were outlined in a step-by-step fashion, require explanation & performed the activity effectively.	Procedures that outlined were complete with 1 or 2 gaps and require explanation & performed the activity normally	Procedures that outlined were not sequential, & performed the activity in a poor way
3	Level-3 (Oral or Power point presentation)	Presented/ explained the information about the activity in logical, interesting sequence with attractive visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with less visuals or diagrams.	Presented/ explained the information about the activity without sequence and visuals or diagrams.
4	Level-4 (Submission of Report)	Provided a detailed conclusion/ summary clearly based on the data and activity	Provided a conclusion / summary clearly based on the data and activity	Provided conclusion/ summary less effectively	Conclusion /summary was not relevant.

Note: The above rubrics are indicative. Separate rubrics may be prepared according to the activity. Minimum passing score is 2.5.

C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

III SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Cred its	Examination Scheme						
			Instruction periods per week			Total Periods per semest er		Continuous internal evaluation			Semester end examination			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal evaluati on	Max Mark s	Min Mark s	Total Mark s	Min marks for Passing including internal
1	SC-301	Applied Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35
2	EC-302	Digital Electronics	4	1	0	75	3	20	20	20	40	14	100	35
3	EC-303	Electronic Devices and Circuits	4	1	0	75	3	20	20	20	40	14	100	35
4	EE-304	Electrical and Electronic Measuring Instruments	4	1	0	75	3	20	20	20	40	14	100	35
5	EE-305	Electrical Circuits	4	1	0	75	3	20	20	20	40	14	100	35
6	EC-306	Electronic Devices Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
7	EE-307	Circuits Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	EC-308	Digital Electronics Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	EE-309	Electrical Measurements Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	HU-310	Communication and Life Skills Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
11	EE-311	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics			--	-
Activities: student performance is to be assessed through Rubrics														

SC-301 - APPLIED ENGINEERING MATHEMATICS

Course Title	Applied Engineering Mathematics	Course Code	SC-301
SEMESTER	III	Course Group	Foundation
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Basic Engineering Mathematics and Engineering Mathematics at Diploma 1st and 2nd Semester level.

Course Outcomes: COs

At the end of the course, the student will have the ability to:

CO 1	Integrate different kinds of continuous functions
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Find the values of definite integrals using fundamental theorem of integral calculus.
CO 4	Apply definite integrals to determine Areas, Volumes of irregular shapes.
CO 5	Find the Mean and RMS values of various functions and Approximate values of Definite integrals using Trapezoidal and Simpson's 1/3 rd rule
CO 6	Find order and degree of a Differential equation, form the Differential Equation from given primitive by eliminating the arbitrary constants and Solve Simple DEs of 1 st order and 1 st degree.

Course Content:

Unit-I

Duration: 14 Periods (L: 11 – T:3)

Indefinite Integration-I

Integration regarded as anti-derivative – Indefinite integral of standard functions. Properties of indefinite integral. Integration by substitution or change of variable. Integrals of the form $\sin^m \theta \cdot \cos^n \theta$. Where m and n are positive integers. Integrals of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$ and powers of $\tan x$, $\sec x$ by substitution. Evaluation of integrals which are reducible to the following forms: (Nine standard integrals)

$$\begin{aligned} \text{i)} & \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2} \\ \text{ii)} & \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}} \\ \text{iii)} & \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}, \sqrt{x^2 - a^2} \end{aligned}$$

Unit – II

Duration: 10 Periods (L: 8 – T:2)

Indefinite Integration-II

Integration by decomposition of the integrand into simple rational algebraic functions.
Integration by parts - Bernoulli's rule.

Unit-III

Duration: 10 Periods (L: 8 – T: 2)

Definite Integral and its Properties:

Definite integral fundamental theorem of integral calculus properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum.

Unit – IV

Duration: 12 Periods (L: 10 – T: 2)

Applications of Definite Integrals:

Areas under plane curves – Sign of the Area – Area enclosed between two curves. Solid of revolution – Volumes of solids of revolution.

Unit – V

Duration: 10 Periods (L: 8 – T: 2)

Mean , RMS values and Numerical Integration:

Mean values and Root Mean Square values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

Unit – VI

Duration: 19 Periods (L: 15 – T: 4)

Differential Equations of First Order:

Definition of a differential equation – order and degree of a differential equation – formation of differential equations – solution of differential equation of first order, first degree : Variables -separable, Homogeneous, Exact, Linear differential equation, Bernoulli's equation.

Reference Books:

1. Integral Calculus Vol. I, by M. Pillai and Shanti Narayan
2. Thomas' Calculus, Pearson Addison –Wesley Publishers
3. Higher Engineering. Mathematics, by B.S. Grewal— Khanna publishers—New Delhi

Suggested E-Learning references

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E-books: www.mathebook.net

Suggested Learning Outcomes

At the end of the course, the student will have the ability to:

Unit-I

1.0 Use Indefinite Integration to solve engineering problems

- 1.1 Use the concept of Indefinite integral as an anti-derivative.
- 1.2 Use the indefinite integrals of standard functions and properties of Integrals
 $\int (u + v) dx$ And $\int k u dx$ where k is constant and u, v are functions of x in solving simple problems.
- 1.3 Solve integration problems involving standard functions using the above rules.
- 1.4 Evaluate integrals involving simple functions of the following type by the method of Substitution.
 - (i) $\int f(ax + b) dx$ where $\int f(x) dx$ is in standard form.
 - (ii) $\int [f(x)]^n f'(x) dx$
 - (iii) $\int f'(x)/[f(x)] dx$
 - (iv) $\int f\{g(x)\} g'(x) dx$
- 1.5 Find the Integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.
- 1.6 Evaluate the integrals of the form $\int \sin^m \theta \cos^n \theta. d\theta$ where m and n are positive integers.
- 1.7 Evaluate integrals of powers of $\tan x$ and $\sec x$.
- 1.8 Evaluate the Standard Integrals of the functions of the type : (Nine standard integrals)

$$\begin{aligned} \text{i)} & \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2} \\ \text{ii)} & \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}} \\ \text{iii)} & \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}, \sqrt{x^2 - a^2} \end{aligned}$$

1.9 Evaluate the integrals of the type :

$$\int \frac{1}{a \pm b \sin \theta} d\theta, \int \frac{1}{a \pm b \cos \theta} d\theta \text{ and } \int \frac{1}{a \cos \theta \pm b \sin \theta \pm c} d\theta.$$

Unit-II

2.0 Use Indefinite Integration to solve engineering problems

- 2.1 Evaluate integrals using decomposition method.
- 2.2 Evaluate integrals using integration by parts with examples.
- 2.3 Apply the Bernoulli's rule for evaluating the integrals of the form $\int u.v dx$.
- 2.4 Evaluate the integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-III

3.0 Understand definite integral and use it in engineering applications

- 3.1 Use the fundamental theorem of integral calculus in solving problems
- 3.2 Calculate the definite integral over an interval.
- 3.3 Apply various properties of definite integrals in engineering problems.
- 3.4 Evaluate simple problems on definite integrals using the above properties.
- 3.5 Find definite integral as a limit of sum by considering an area.

Unit –IV

4.0 Understand definite integral and use it in Engineering applications

- 4.1 Find the Areas under plane curves and area enclosed between two curves using Integration.
- 4.2 Obtain the Volumes of solids of revolution and solve problems.

Unit –V

5.0 Understand Mean, RMS values and Numerical Methods

- 5.1 Obtain the Mean value and Root Mean Square (RMS) value of the functions in any given Interval.
- 5.2 Apply the Trapezoidal rule, Simpson's 1/3 rules for approximation of definite integrals and solve some problems.

Unit –VI

6.0 Solve Differential Equations in engineering problems.

- 6.1 Identify a Differential equation and find its order and degree

6.2 Form a differential equation by eliminating arbitrary constants.

6.3 Solve the first order first degree differential equations by the following methods:

- (i) Variables Separable.
- (ii) Homogeneous Equations.
- (iii) Exact Differential Equations
- (iv) Linear Differential equation of the form $\frac{dy}{dx} + Py = Q$,
Where P and Q are functions of x or constants.
- (v) Bernoulli's Equation (Reducible to linear form.)

6.4 Solve simple problems leading to engineering applications by using above methods.

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material
2. Quiz
3. Group discussion
4. Surprise tests
5. Seminars
6. Home Assignments
7. Mathematics for preparing competitive exams and solving old question papers on arithmetical ability.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	2					3	1, 2 ,7
CO2	3	2					3	1, 2 ,7
CO3	3	2					3	1, 2 ,7
CO4	3	2					3	1, 2 ,7
CO5	3	2					3	1, 2 ,7
CO6	3	2					3	1, 2 ,7

	MID SEM-I EXAM							
S.No	Unit Name	R	U	A	Remarks			
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)				
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)				
Total Questions		4	4	4				
MID SEM –II EXAM								
S.No	Unit Name	R	U	A	Remarks			
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)				
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)				
Total Questions		4	4	4				
	Semester End Examination							
Sl No	Unit No.	Questions to be set for SEE				Remarks		
		R		U	A			
1	I	4	1	9(a)	13(a)			
2	II							
3	III		2	10(a)	14(a)			
4	IV							
5	V		3	5, 6	9(b)	13(b)		
					11(a)	15(a)		
					11(b)	15(b)		
6	VI			7,8	10(b)	14(b)		
		12(a)			16(a)			
		12(b)			16(b)			
Total Questions		8		8	8			
Legend:		Remembering (R)	1 Mark					
		Understanding (U)	3 Marks					
		Application (A)	5 Marks					

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEM –I, III SEMESTER
SC-301- APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Integrate $(e^x - \sin x + x^4)$ with respect to x
2. Find $\int \frac{dx}{5x+7}$
3. Write Bernoulli's rule of integration
4. Find $\int x \log x \, dx$

PART-B

Instructions:

1. Answer **ALL** questions

02 X 03 = 06

2. Each question carries **THREE** marks

5 a) Evaluate $\int \frac{x^5}{1+x^{12}} dx$.

OR

5 b) Evaluate $\int \frac{dx}{(x^2+16)}$

6 a) Evaluate $\int x \sin x \, dx$

OR

6 b) Evaluate $\int \frac{3x+2}{(x-1)(2x+3)} dx$.

PART- C

Instructions:

1. Answer **ALL** questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7 a) Evaluate $\int \sqrt{x^2 + 2x + 5} \, dx$

OR

7 b) Evaluate: $\int \cos x \cos 2x \, dx$.

8 a) Find $\int x \tan^{-1} x \, dx$.

OR

8 b) Find $\int x^4 \cos 2x \, dx$.

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEM –II, III SEMESTER
SC-301-APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions 04 X 01 = 04
2 Each question carries **ONE** mark

1. Find $\int_0^1 (x^4 + 1) dx$
2. Evaluate : $\int_0^\pi \sin 3x dx$
3. Evaluate : $\int_0^1 \frac{1}{1+x^2} dx$
4. Write the formula to find area bounded by the curve $y= f(x)$, x-axis, between the limits $x=a$ and $x=b$

PART-B

Instructions: 1. Answer **ALL** questions 02 X 03 = 06
2. Each question carries **THREE** marks

5 a) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{1 - \sin 2x} dx$

OR

5 b) Evaluate: $\int_0^{\frac{\pi}{2}} \sin^2 x dx$

6 a) Find the area bounded by the line $2x + y = 8$, x-axis and the lines $x = 2$ and $x = 4$.

OR

6 b) Find the Volume of the Solid generated by revolving the part of the Circle

$x^2 + y^2 = 36$ From $x = 0$ to $x = 4$ about x – axis.

PART C

Instructions: 1. Answer **ALL** questions 02 X 05 = 10
2. Each question carries **FIVE** marks

7 a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

Or

7 b) Evaluate: $\int_0^{\frac{\pi}{2}} \log \cos x dx$

8 a) Find the area enclosed between the Parabolas $y = 3x - x^2$ and $y = x^2 - x$.

Or

8 b) Find the Volume of the Solid generated by the revolution of the area bounded by the

Ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, about x- axis.

BOARD DIPLOMA EXAMINATION (C-21)
III SEMESTER END EXAMINATION
SC-301-APPLIED ENGINEERING MATHEMATICS

Time: 2 hours

[Total Marks: 40]

PART-A

Instructions: 1. Answer **ALL** questions 08 X 01 = 08
2 Each question carries **ONE** mark

1. Find $\int (x^8 - \frac{5}{x}) dx$
2. Evaluate $\int_0^1 (x^2 + 1) dx$
3. Write the formula to find mean value of $y = f(x)$, in the interval (a, b)
4. Find the Order and Degree of the Differential Equation $x \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$.
5. Write Trapezoidal Rule to find the approximate value of $\int_a^b f(x) dx$.
6. Write the formula to find RMS value of $y = f(x)$ over the range $x=a$ and $x = b$.
7. Solve $\frac{dy}{dx} = e^{4x+y}$
8. Write the condition for exactness of the differential equation $M(x, y)dx + N(x,y)dy = 0$

PART-B

Instructions: 1. Answer **ALL** questions 04 X 03 = 12
2. Each question carries **THREE** marks

9.

a) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{1 - \sin 2x} dx$

OR

b) Find the approximate value of $\int_0^6 \frac{dx}{1+x}$ by taking $n = 6$ using Trapezoidal rule.

10.

a) Find the area bounded by the Parabola $y = x^2 - 2x + 1$ and x -axis.

OR

b) Form the Differential Equation from $y = Ae^x + Be^{3x}$ where A, B are arbitrary constants

11.

a) Find the RMS value of $\sqrt{\log x}$ over the range $x= 1$ and $x= e$

OR

b) Calculate approximate value of $\int_0^4 \frac{dx}{1+x}$ by taking $n = 4$ using Simpson's 1/3 rule

12.

a) Solve: $x \frac{dy}{dx} + 2y = \log x$.

OR

b) Solve: $x(1 - y^2)dx + y(1 - x^2)dy = 0$

PART C

Instructions:

1. Answer **ALL** questions
2. Each question carries **FIVE** marks

04 X 05 = 20

13.

a) Evaluate: $\int \frac{1}{x^2 + 8x + 25} dx$

OR

b) Find the RMS value of $y = \sqrt{8 - 4x^2}$ between $x = 0$ and $x = 2$

14.

a) Find the volume of solid generated by revolving the Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about Major axis

OR

b) Solve: $\frac{dy}{dx} = \sin(x + y)$

15.

a) A curve is drawn to passing through the points given by the following table:

x	1	1.5	2	2.5	3	3.5	4
y	3	3.4	3.7	3.8	2.7	2.6	2.1

Calculate the approximate area bounded by the curve, x-axis and the lines $x = 1$ and $x = 4$ using Simpson's 1/3 rule

OR

b) Evaluate: $\int_0^1 \sqrt{1 - x^2} dx$ approximately by taking $n = 4$ using Simpson's 1/3 rd Rule.

16.

a) Solve: $(y^2 - xy)dx = x^2 dy$.

OR

b) Solve: $\frac{dy}{dx} + y \cos x = y^3 \sin 2x$.

EC-302-DIGITAL ELECTRONICS

Course Title	Digital Electronics	Course Code	EC-302
Semester	III	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of electronics in Basic Physics at Secondary school level.

Course Outcomes

CO1	Convert Codes and Solve Boolean expressions using K-map.
CO2	Compare various digital IC logic families and identify them by their characteristics.
CO3	Develop Combinational logic circuits like Adders, MUX , De-mux, encoder, decoder and comparator circuits
CO4	Identify the need of sequential circuits and know different flip-flops.
CO5	Design Registers and counter circuits
CO6	Compare different types of memories and understand Converters.

After completion of the course, the student should be able to

COURSE CONTENT

UNIT 1 –

Basics of Digital Electronics

Duration: 16 Periods (L: 10– T: 6)

Convert number systems and Solve Boolean expressions using K-map.

Number systems --Conversion from one number system into another – performing arithmetic operations in binary-Use of weighted and Un-weighted codes- importance of parity Bit-Different postulates in Boolean algebra- Basic logic gates with truth table- universal logic gates - exclusive – OR gate with truth table- De-Morgan's theorems- AND, OR, NOT operations using NAND, NOR gates- De-Morgan's theorems related postulates to simplify Boolean expressions (up to three variables)- standard representations for logical functions (SOP and POS form)- Boolean expressions from the given truth table- Karnaugh map to simplify Boolean Expression (up to 4 variables only)

UNIT2 –Digital IC logic families

Duration: 08 Periods (L: 08– T: 0)

Compare various digital IC logic families and identify them by their characteristics.

Classification of digital logic families- Important characteristics of Digital ICs- requirements of TTL and CMOS ICs - Propagation delay and Noise margin- Fan-in and Fan-out capacity- Power dissipation- Figure of merit of a logic family- explain TTL NAND gate with open collector- TTL NAND gate with Totem pole output- CMOS NAND gate circuit – Compare logic families- IC numbers of two input Digital IC Logic gates.

UNIT 3–Develop Combinational logic circuits like Adders ,MUX, De-mux, encoder, decoder and comparator circuits.

Duration: 14 Periods (L: 10– T: 4)

Concept of combinational logic circuits- Half adder circuit -truth table- Half-adder using NAND gates only & NOR gates only- Full adder circuit - Truth table- Full-adder using two Half-adders and an OR – gate - a 4 Bit parallel adder using full – adders- 2's complement parallel adder/ subtractor circuit- Serial adder -Performance of serial and parallel adder- Operation of 4 X 1 Multiplexers- Operation of 1 to 4 demultiplexer- IC numbers - applications- 3 X 8 decoder- BCD to decimal decoder- Decoders- Decimal to BCD encoder- IC numbers -Applications - Tri-state buffer - Types of tri-state buffers-Applications - Digital comparator.

UNIT 4–Identify the need of sequential circuits and know different flip-flops.

Duration: 10 Periods (L: 8– T: 2)

Concept of Sequential logic circuits- NAND and NOR latches with truth tables-Necessity of clock - Clocked SR flip flop circuit using NAND gates- Need for preset and clear inputs - Circuit of Clocked JK flip flop (using S-R flip-flops) with truth table -Race around condition- Master slave JK flip flop circuit - clocked D and T flip flops - Truth table, Circuit diagram and timing diagram- Symbols of above Flip Flops- Truth tables - Applications for each type of flip flop

UNIT 5–Design Registers and counter circuits using flip-flops.

Duration: 14 Periods (L: 10– T: 4)

- Need for a Register - Types of registers- 4 bit shift left and shift right registers - 4-bit bi-directional shift Register - Parallel in parallel out shift register - Universal shift register (74194) - Applications of shift registers. 4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter–Differences between synchronous and asynchronous counters- asynchronous 3 bit up-down counter -Ring counter- applications

UNIT 6– Compare different types of memories and understand Converters.

Duration: 13 Periods (L: 10– T: 3)

Types of memories - Memory read operation, write operation, access time, memory capacity, address lines and word length- ROM and RAM- Diode ROM- - static RAM and dynamic RAM- Flash ROM.

Operational amplifiers- Instrumentation amplifiers- A/D binary weighted resistors- R-2R ladder circuits - D/A converters- counter method and successive approximation method.

Specific Learning Outcomes: upon completing this course the student will be able to

1.0 Understand the basics of Digital Electronics

- 1.1 Retrieving inter system conversions of Binary, Octal and Hexadecimal number systems.
- 1.2 Memorizing binary addition, subtraction, Multiplication and Division.
- 1.3 Perform subtraction of binary numbers in 2's complement method.
- 1.4 State the use of weighted and Un-weighted codes and list the types.
- 1.5 Work out 8421, Excess-3 codes.
- 1.6 Convert a given binary number into Gray code and vice-versa.
- 1.7 Explain the use of alphanumeric codes (ASCII & EBCDIC)
- 1.8 State the importance of parity Bit.
- 1.9 State different postulates in Boolean algebra.
- 1.10 State and Prove De-Morgan's theorems.
- 1.11 Interpret the basic logic gates.
- 1.12 Explain the working of universal logic gates (NAND, NOR gates).

- 1.13 Explain the working of special purpose (exclusive – OR and exclusive NOR) gates.
- 1.14 Realize basic gates using NAND, NOR gates.
- 1.15 Realize Special Purpose gates using NAND / NOR gates.
- 1.16 Apply De-Morgan's theorems related postulates to simplify Boolean expressions (up to four variables).
- 1.17 Infer standard representations for logical functions (SOP and POS form)
- 1.18 Find Boolean expressions from the given truth table and draw the logic circuit.
- 1.19 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in SOP form.
- 1.20 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in POS form.

2.0 Understand different logic families.

- 2.1 Classify digital logic families (like TTL, CMOS and ECL).
- 2.2 Outline the important characteristics of Digital ICs
- 2.3 Explain logic levels and Voltage requirements of TTL and CMOS ICs.
- 2.4 Define propagation delay , Noise margin, Power dissipation and figure of merit of a Logic family
- 2.5 Define Fan-in and Fan-out capacity of a digital IC.
- 2.6 Explain the working of open collector TTL NAND gate with a circuit diagram.
- 2.7 Explain the working of Totem pole output TTL NAND gate with a circuit diagram.
- 2.8 Explain the working of CMOS NAND gate with a circuit diagram.
- 2.9 Compare and contrast TTL, CMOS and ECL logic families.
- 2.10 Give IC numbers of Digital IC Logic gates (One for each type).

3.0 Understand the working of combinational logic circuits.

- 3.1 Explain about combinational logic circuit.
- 3.2 Discuss half adder and full adder with logic diagram, function table and output expressions.
- 3.3 Implement half adder circuit using basic gates and Universal gates.
- 3.4 Realize full-adder using two Half-adders and an OR – gate.
- 3.5 Explain the working of 4 Bit parallel adder circuit using full adders.
- 3.6 Explain 2's complement parallel adder/ subtractor circuit.

- 3.7 Explain the working of a serial adder circuit.
- 3.8 Compare the performance of serial and parallel adder.
- 3.9 Discuss the operation of multiplexer and Decoder/De-multiplexer.
- 3.10 Explain the operation of 4 X 1 Multiplexer with necessary diagrams.
- 3.11 Explain the operation of 1 to 4 De Multiplexer with necessary diagrams.
- 3.12 Describe the operation of decoder/ encoder.
- 3.13 Explain the operation of 3 x 8 decoder with relevant diagrams.
- 3.14 Explain the working of BCD to decimal decoder circuit.
- 3.15 Explain the working of Decimal to BCD encoder circuit.
- 3.16 State the need for a tri-state buffer and give the two types of tri-state buffers.
- 3.17 Explain the operation of 2 bit digital comparator and draw its circuit.
- 3.18 Give the IC numbers of Multiplexers, decoders in TTL/CMOS logic families
- 3.19 Mention the applications of Multiplexers, Decoders/De Multiplexers and Encoders .

4.0 Understand the working of Sequential logic circuits: Flip Flops

- 4.1 Explain about Sequential logic circuit.
- 4.2 Distinguish between combinational and sequential circuits.
- 4.3 Explain NAND and NOR latches with logic diagrams.
- 4.4 State the necessity of clock and explain different clocking methods.
- 4.5 Explain clocked SR flip flop circuit using NAND gates.
- 4.6 State the need for preset and clear inputs.
- 4.7 Explain the circuit of JK flip flop (using S-R flip-flops) with truth table.
- 4.8 What is race around condition in JK flip-flop?
- 4.9 Explain the working of master slave JK flip flop circuit with necessary diagrams.
- 4.10 Explain the level clocked D and T flip flops with the help of truth table, logic diagram and timing diagram.
- 4.11 List any 2 commonly used IC numbers of flip flops of each type.
- 4.12 List two applications for each type of flip flop.

5.0 Understand the working of Sequential logic circuits: Registers and Counter

- 5.1 State the need for a Register and Classify the registers.
- 5.2 Explain the working of 4 bit shift left and shift right registers with a circuit and timing diagram.

- 5.3 Explain the working of 4-bit bi-directional shift register with a circuit and timing diagram.
- 5.4 Explain parallel in parallel out shift register with a circuit and timing diagram.
- 5.5 List any four common applications of shift registers.
- 5.6 Define a counter and modulus of a counter.
- 5.7 Explain the working of asynchronous 3 bit up-down counter with a circuit and Timing diagram.
- 5.8 Explain the working of 4-bit asynchronous up counter with a circuit and Timing diagram.
- 5.9 Explain the working of 4-bit synchronous counter with a circuit and Timing diagram.
- 5.10 Explain the working of decade counter with a circuit and Timing diagram.
- 5.11 Distinguish between synchronous and asynchronous counters.
- 5.12 List any 2 commonly used IC numbers of Registers/Counters.
- 5.13 Explain the working of ring counter.
- 5.14 List any three applications for counters and ring counter.

6.0 Understand about memories and A/D and D/A converters.

- 6.1. Discuss the need of memory .
- 6.2. Define the terms memory read operation, write operation, access time, memory capacity and word length
- 6.3. Classify various types of memories.
- 6.4. Explain the working of diode ROM.
- 6.5. Compare static RAM and dynamic RAM.
- 6.6. Compare RAM and dynamic ROM.
- 6.7. State the need for Flash ROM.
- 6.8. Explain the use of op amp and Instrumentation amplifiers.
- 6.9. Explain the OP amp instrumentation amplifier circuit.
- 6.10. Distinguish between Op amp and instrumentation amplifier.
- 6.11. State the need of A/D and D/A conversion.
- 6.12. Define the terms resolution, Accuracy, Monotonicity and settling time of D/A converter.
- 6.13. Draw and explain the circuit of D/A converter using binary weighted resistors.

- 6.14. Draw and explain the circuit of D/A converter using R-2R ladder network.
- 6.15. Explain the operation of A/D converter using counter method with a block diagram.
- 6.16. Explain A/D converter using successive approximation method with a block diagram.
- 6.17. Compare the performance of above A/D converters

RECOMMENDED BOOKS

1. Digital Computer Electronics by Malvino and leach. 3rd edition Tata McGraw-Hill Education
2. Modern Digital Electronics By RP JAIN TMH
3. Digital Electronics: Principles & Applications by Roger L. Tokheim -McGraw-Hill Education, 2008
4. Digital Electronics by GK Kharate, Oxford University Press.

e-links

1. www.nptel.com
2. www.electronics4u.com

Suggested student activities.

1. Learn how to Test the digital IC's and submit a report.
2. Propose how to manage the e-waste.
3. Perform trouble shooting of the not working equipment in the lab.
4. Learn the latest CMOS IC equivalents of the TTL IC's.
5. Prepare a simple PCB to perform verification of truth table for basic gates.
6. Prepare a PPT on the day to day application of the gates you have studied.

CO PO Mapping Matrix

Course Outcome		CL	Linked PO	Teaching Periods
CO1 :	Convert number systems and Solve Boolean expressions using K-map.	R/U	1,2,10	16
CO2 :	Compare various digital IC logic families and identify them by their characteristics.	R/U	1,2,5,6,7	8
CO3 :	Design adders using Combinational logic.	R/U/A	1,2,9	14
CO4 :	Develop Combinational logic circuits like MUX , De-mux, encoder, decoder and comparator circuits.	R/U/A	1,2,5,7	10
CO5 :	Identify the need of sequential circuits and design registers using flip-flops.	R/U/A	1,2,5	14
CO6 :	Compare different types of memories and understand Converters.	R/U/A	1,2,3,7	13

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	
S.No	Unit Name	MID SEM-II EXAM			
		R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	

SMESTER END EXAMINATIONS

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI			7,8	10(b)	14(b)	
					12(a)	16(a)	
					12(b)	16(b)	
Total Questions		8		8	8		

C-21 III SEMESTER
EC-302 DIGITAL ELECTRONICS
MODEL PAPER MID- SEM I

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1 = 4M

1. Convert the binary number 1101101 into its decimal equivalent.
2. Draw the logic symbol of AND and OR gates.
3. Define propagation delay with reference to digital IC.
4. Write CMOS IC nos. of AND and NAND gates.

PART – B

Answer ALL questions.

2 x 3 = 6 M

- 5 (a) Perform 2's complement of subtraction for the binary numbers 10110 – 110110

OR

- 5(b) Draw the symbol of NAND gate, write its truth table and output expression.

- 6(a) Define Fan-in and Fan-out capacity of a digital IC.

OR

- 6(b) Write the specifications of digital IC's.

PART – C

Answer ALL questions.

2 x 5 = 10 M

- 7(a) Explain the working of universal logic gates NAND and NOR with truth tables.

OR

- 7(b) Simplify the Boolean expression using De-Morgan's theorems and draw its simplified logic circuit.

$$\underline{A}\underline{B}\underline{C}\underline{D} + \underline{B}\underline{A}\underline{C}\underline{D} + \underline{C}\underline{B}\underline{A}\underline{D} + \underline{A}\underline{B}\underline{C}\underline{D} + \underline{B}\underline{C}\underline{A}\underline{D}$$

- 8(a) Draw the TTL totem pole circuit and explain.

OR

- 8(b) Compare the various logic families.

C-21 III SEMESTER
EC-302 DIGITAL ELECTRONICS
MODEL PAPER MID- SEM II

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1 = 4M

1. Define combinational logic circuit.
2. Draw the circuit of full adder using half adders.
3. Define a multiplexer.
4. Write any 2 IC nos. of multiplexers.

PART – B

Answer ALL questions.

2 x 3 = 6 M

- 5 (a) Explain the operation of full adder with a truth table.

OR

- 5(b) Compare the performance of serial adder and parallel adder.

- 6(a) Write the truth table of 1 x 4 de-multiplexer.

OR

- 6(b) Write any 3 applications for each of MUX and decoders.

PART – C

Answer ALL questions.

2 x 5 = 10 M

- 7(a) Explain the working of 4-bit parallel adder using half adders.

OR

- 7(b) Explain 2's complement parallel adder/subtractor circuit.

- 8(a) Write the truth table of 1 x 8 demultiplexer and draw its circuit.

OR

- 8(b) Explain the working of BCD to decimal decoder circuit.

C-21 III SEMESTER
EC-302 DIGITAL ELECTRONICS
MODEL PAPER - SEMESTER END EXAMINATION

TIME: 2 HOURS

MAX. MARKS : 40

PART-A

Answer ALL questions.

8 x 1 = 8M

1. State any 2 postulates of Boolean algebra.
2. Define a de-multiplexer.
3. What is edge-triggering with reference to clock.
4. Draw the symbol of D and T flip-flop
5. List any 2 IC numbers of JK flip-flop.
6. Define modulus of a counter.
7. Define memory access time.
8. Define accuracy and resolution of converters.

PART – B

Answer ALL questions.

4 x 3 = 12 M

- 9 (a) List out the specifications of digital IC's.

OR

- 9(b) Explain clocked SR flip flop using NAND gates.

- 10(a) Realize a half adder using NAND gates only.

OR

- 10(b) Distinguish between synchronous and asynchronous counters.

- 11(a) Write the logic symbol and negative edge triggered truth table of D flip-flop.

OR

- 11(b) State the need of a register and list its types.

- 12(a) Draw the circuit of a decade counter.

OR

- 12(b) Differentiate between ROM and RAM.

PART – C

Answer ALL questions.

2 x 5 = 10

M

13(a) Simplify the Boolean expression $\sum \pi M(1,3,6,8,14,15)$ using K- map and draw its simplified logic circuit.

OR

13(b) Explain the working of 4-bit left shift register with a circuit and timing diagram.

14(a) Explain the working of 4-bit parallel adder using full adders.

OR

14(b) Explain the working of diode ROM.

15(a) Explain the working of parallel-in and parallel-out register with circuit and timing diagram.

OR

15(b) Explain the working of master slave JK flip-flop circuit with necessary diagrams.

16(a) Explain successive approximation method.

OR

16(b) Explain the R-2R ladder network.

EC-303-ELECTRONIC DEVICES AND CIRCUITS

Course Title	Electronic Devices and Circuits	Course Code	EC-303
Semester	III	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

Pre requisites :

This course requires the basic knowledge of Physics and Mathematics at Secondary school level ,and about operation of diode and Transistor

Course Outcomes:

Upon completion of the course, the student should be able to

Course Outcome	
CO1	Analyze various types of DC power supplies.
CO2	Interpret the various types of small signal amplifiers.
CO3	Construct multi stage and feedback amplifiers using Transistors
CO4	Construct tuned amplifiers and power amplifiers using Transistors
CO5	Understand the concepts of operational amplifiers
CO6	Design wave shaping circuits using Diodes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	-	1	1	3
CO2	3	3	3	2	3	3	3
CO3	3	2	3	3	2	3	3
CO4	3	1	3	3	1	3	3
CO5	3	1	2	1	2	1	3
CO6	3	1	3	3	3	2	3

Course Contents

Unit -1: DC Power supplies

Duration: 12 periods

Need for DC power supply- Half wave, Full wave and Bridge rectifiers-RMS value, Average value, Ripple factor, Voltage regulation. Filters: C, LC, and CLC. Zener regulator –IC Regulators

Unit 2 –Small signal and Multistage amplifiers

Duration: 12 Periods (L: 8–T:4)

Classify amplifiers- small signal amplifier- Multistage amplifiers – Need for multistage amplifiers-Different parameters- 2-stage RC coupled amplifier- 2-stage Transformer coupled amplifier- 2-stage Direct coupled amplifier- Darlington pair- Cascode amplifier-

Unit-3: Feedback amplifiers and Oscillators

Duration: 13 Periods (L: 8–T:4)

Feedback Amplifiers:- Concept of feedback- four types of negative feedback amplifiers- Effect of negative feedback- Merits and De-merits of Negative Feedback.

Oscillators: Barkhausen criteria in oscillators- Oscillator circuits- Hartley oscillator- Colpitts oscillator- Crystal Oscillator- Expressions for frequency of oscillation and condition for sustained oscillations of the above circuits- Reasons for instability in oscillator circuits- Remedies for instability in oscillators- Advantages of crystal oscillators- Merits and demerits of RC and LC oscillators.

UNIT -4:Tuned and Power amplifiers

Duration: 13 Periods (L:9–T:4)

Tuned amplifier: Tank circuit-single tuned amplifier-Double tuned amplifier-Stragger tuned amplifier
Power Amplifier:- Difference between Voltage and Power amplifiers- Classification of power amplifiers- Class A single ended- Push-pull amplifier circuit- Effect of distortion in amplifiers- Choice of Class A , Class B Class AB Amplifier and Class C Amplifiers- Applications of Class C Amplifiers - Efficiencies of different types of power amplifiers(A,B, AB &C)

UNIT- 5: Non Linear Waveshapingcircuits

Duration: 12 Periods (L: 8–T:4)

Clippers and Clampers: Design of simple clippers- Clamper circuits - Applications of clippers and clampers**Time Base generators:** Sweep or Time Base signal-Errors in sweep-Applications of Voltage and current Time basecircuits

UNIT -6:OperationalAmplifier

Duration: 13 Periods (L:9–T:4)

Need for differential amplifier- Differential amplifier- Operation -- differential gain and common mode gain- Function of an operational amplifier- Symbol - Inverting and Non inverting inputs of Op Amp- Important characteristics of ideal operational amplifier- Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage,InputoffsetCurrent-blockdiagramandpinoutdiagramofIC741-

PinconfigurationofIC741-Typical values of Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current- Power supply requirements of Operational Amplifier- Concept of virtual ground and Virtual short- Single supply operation of Operational Amplifier- Pin configuration of single supply Op Amps such as CA 3011 ,LM324 - Features of above ICs.

Suggested Learning Outcomes:

After completing this course the student will be able to

1.0 Analyze the working of DC Power Supplies.

- 1.1 Explain the necessity of D.C. power supply in electronic circuits
- 1.2 Explain the working of Half Wave, Full Wave and Bridge rectifier circuits with wave forms.
- 1.3 Define the terms RMS value, average value, ripple factor and efficiency and give their expressions for the above circuits.
- 1.4 Define Voltage Regulation.
- 1.5 Explain the need for a filter circuit in power supplies.
- 1.6 Explain the operation of a rectifier circuit using Capacitor filter
- 1.7 Draw the input/output waveform of Rectifier with C Filter
- 1.8 Give the reasons for connecting a Bleeder Resistor across capacitor
- 1.9 Explain the working of LC Filter

- 1.10 Explain the working of CLC filters Circuit
- 1.11 List the applications where CLC filters are used
- 1.12 State the need for a regulated power supply
- 1.13 List important specifications of Regulated power supply
- 1.14 Draw the circuit of a simple Zener regulated DC Power supply.
- 1.15 Explain the working of Zener regulated power supply
- 1.16 Determine the Resistance value and wattage of Series Resistor for a given Input voltage, load voltage and load current in Zener Regulator circuit.
- 1.17 Compare positive and negative IC Regulators, Pin configurations and voltage levels.

2.0 Explain the working of Small signal and Multi-stage amplifiers

- 2.1 Classify amplifiers based on coupling, feedback and frequency
- 2.2 State the need for multi-stage amplifiers
- 2.3 Define gain, frequency response and bandwidth of multi-stage amplifier
- 2.4 Give the expressions for gain, frequency response and bandwidth of multi-stage amplifier
- 2.5 Solve simple problems on overall gain, overall frequency response and overall bandwidth of multi-stage amplifiers
- 2.6 Draw 2-stage RC coupled amplifier circuit.
- 2.7 Explain the operation of 2-stage RC coupled amplifier.
- 2.8 Explain the frequency response of the above circuit.
- 2.9 Draw 2-stage Transformer coupled amplifier circuit.
- 2.10 Explain the operation of 2-stage Transformer coupled amplifier
- 2.11 Explain the frequency response of the above circuit.
- 2.12 Draw 2-stage Direct coupled amplifier circuit.
- 2.13 Explain the operation of 2-stage Direct coupled amplifier
- 2.14 Draw Darlington pair circuit.
- 2.15 Explain the operation of Darlington pair circuit.
- 2.16 Give the expression for current gain of Darlington pair circuit
- 2.17 Explain high current gain amplifier using Darlington pair
- 2.18 Draw and explain Cascode amplifier.

3.0 Explain the working of Feedback amplifiers and Oscillators

- 3.1 Draw the basic block diagram of a feedback amplifier.
- 3.2 Derive the expression for gain in a feedback amplifier.
- 3.3 Compare negative and positive feedback.
- 3.4 Draw the block diagram of voltage series feedback amplifier.
- 3.5 Draw the block diagram of voltage shunt feedback amplifier
- 3.6 Draw the block diagram of current series feedback amplifier
- 3.7 Draw the block diagram of current shunt feedback amplifier
- 3.8 State the effect of negative feedback on gain
- 3.9 State the effect of negative feedback on bandwidth
- 3.10 State the effect of negative feedback on input impedance
- 3.11 State the effect of negative feedback on output impedance
- 3.12 List the advantages of negative feedback amplifiers.
- 3.13 Solve simple problems on effect of negative feedback on gain, bandwidth, Z_i and Z_o
- 3.14 State the condition for an amplifier to work as oscillator.
- 3.15 Mention the requisites of an oscillator.
- 3.16 State Barkhausen criteria in oscillators.
- 3.17 Classify oscillator circuits.
- 3.18 Draw the Hartley oscillator circuit.
- 3.19 Explain the working of Hartley oscillator circuit
- 3.20 Mention the condition for sustained oscillations in Hartley Oscillator
- 3.21 Give the expression for frequency of oscillations in Hartley Oscillator
- 3.22 Draw the Colpitts oscillator circuit.
- 3.23 Explain the working of Colpitts oscillator circuit
- 3.24 Mention the condition for sustained oscillations in Colpitts Oscillator
- 3.25 Give the expression for frequency of oscillations in Colpitts Oscillator
- 3.26 Draw the equivalent circuit of crystal and explain.
- 3.27 Draw the transistor crystal oscillator circuit.
- 3.28 Explain the working of transistor crystal oscillator circuit
- 3.29 List the advantages of crystal oscillator

- 3.30 State the reasons for instability in oscillator.
- 3.31 Mention the remedies to avoid instability in oscillators.
- 3.32 Compare the LC and RC oscillators

4.0 Analyze Tuned and Power amplifiers

- 4.1 Draw and explain double tuned amplifier circuit
- 4.2 Draw class C tuned amplifier circuit.
- 4.3 Explain class C tuned amplifier circuit with waveforms
- 4.4 List applications of tuned circuits
- 4.5 State the need for a power amplifier.
- 4.6 Distinguish between voltage and power amplifiers.
- 4.7 Classify power amplifier based on conduction.
- 4.8 Define Conversion efficiency
- 4.9 Define distortion in power amplifier
- 4.10 Draw the circuit of class A amplifier with resistor load.
- 4.11 Explain operation of class A amplifier with resistive load
- 4.12 Derive the expression for efficiency of the above circuit.
- 4.13 Draw the circuit of class A amplifier with transformer load.
- 4.14 Explain the operation of class A amplifier with transformer load.
- 4.15 Derive the expression for efficiency of the above circuit.
- 4.16 Draw the circuit of class – B push-pull amplifier.
- 4.17 Explain the operation of class-B push-pull amplifier
- 4.18 Derive the expression for efficiency of class-B push-pull amplifier.
- 4.19 List the advantages & disadvantages of push-pull amplifier.
- 4.20 Draw the circuit of complementary symmetry push-pull amplifier.
- 4.21 Explain the operation of complementary symmetry push-pull amplifier
- 4.22 List the conditions to avoid thermal run away in a power transistor
- 4.23 State the necessity of heat sink for a power transistor.
- 4.24 List different types of heat sinks and mounting methods.

5.0 Explain the working of Operational amplifier

- 5.1 State the need for differential amplifier
- 5.2 Draw and explain the circuit diagram of differential amplifier

- 5.3 Give reasons for not implementing differential amplifier with discrete components.
- 5.4 Define the terms differential gain and common mode gain
- 5.5 State the function of an operational amplifier.
- 5.6 Draw the symbol of an operational amplifier.
- 5.7 Explain inverting and Non inverting inputs of Op Amp
- 5.8 State the important characteristics of ideal operational amplifier with practical values.
- 5.9 Define Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage and current.
- 5.10 Draw and explain the Pin configuration of IC741
- 5.11 Give typical values of Open loop gain, Slew rate, CMRR, Input offset voltage and current.
- 5.12 Explain the power supply requirements of Operational Amplifier
- 5.13 Explain the concept of virtual ground and Virtual short
- 5.14 Give the pin configuration of single supply op-amps such as CA 3011, LM324
- 5.15 List 6 important features of above ICs
- 5.16 Explain the operation of adjustable voltage regulator(LM317)
- 5.17 Give the formula for output voltage of adjustable regulators

6.0 Non Linear Wave shaping Circuits and Sweep Generators

- 6.1 List the different types of clippers.
- 6.2 Explain the unbiased and biased clippers with waveforms
- 6.3 Explain the double ended clipper with waveforms
- 6.4 Explain the principle of clamper circuit with waveforms
- 6.5 Mention the applications of clippers and clampers
- 6.6 Design simple clippers and clampers for a given input and output waveform
- 6.7 Define Sweep Voltage.
- 6.8 State the fundamental consideration of sweep waveform.
- 6.9 Distinguish between voltage and current time-base generation
- 6.10 List errors in sweep signal
- 6.11 Draw simple voltage time base generator
- 6.12 Explain the operation of voltage time base generator
- 6.13 Draw simple current time base generator
- 6.14 Explain the operation of current time base generator

- 6.15 Draw the Bootstrap sweep circuit
- 6.16 Explain the operation of Bootstrap sweep circuit
- 6.17 Draw the Miller sweep circuit
- 6.18 Explain the operation of Miller sweep circuit
- 6.19 List the applications of Voltage and current Time base circuits.

References

RECOMMENDED BOOKS:

1. Electronic Devices and Circuits by JB Gupta
2. Electronic Devices and Circuits by Salivahana and Vallava raj
3. Electronic Devices and Circuit theory and applications by Robert Boylested
4. Principles of Electronics by VK Mehta
5. Electronic devices and applications by B. Somanathan Nair, PHI.
6. Electronic Devices and Circuits by David A. Bell Prentice hall
7. Operational Amplifiers by Ramakanth Gaykward
8. Linear integrated circuits by Roy Choudary

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	
S.No	Unit Name	MID SEM-II EXAM			
		R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
	Total Questions	4	4	4	

SEMESTER END EXAMINATION

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI			7,8	10(b)	14(b)	
					12(a)	16(a)	
		12(b)			16(b)		
Total Questions		8		8	8		

BOARD DIPLOMA EXAMINATIONS
III SEMESTER, MIDSEM – I
EC-303 ELECTRONIC DEVICES AND CIRCUITS.

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. Define RMS and average value.
2. Define voltage regulation.
3. List amplifiers based on coupling only.
4. Define gain and frequency response of an amplifier.

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

1 x 3 = 6 Marks

5a. Explain the need for a filter in power supply.

(OR)

b. State the need for regulated power supply.

6a. Draw the circuit of 2-stage RC coupled amplifier circuit.

(OR)

b. Draw the circuit of 2-stage transformer coupled amplifier circuit.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

2x 5 = 10 Marks

7a. Explain the working of zener regulated power supply.

(OR)

b. Explain the working of HWR with waveforms.

8a. Explain the operation of Darlington pair circuit with a neat fig.

(OR)

b. Explain the frequency response of RC coupled amplifier.

BOARD DIPLOMA EXAMINATIONS
III SEMESTER, MIDSEM – II
EC-303 ELECTRONIC DEVICES AND CIRCUITS.

Time: 1 Hour

Max. Marks: 20

PART – A

Instructions: i. Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. What is positive feedback?
2. List any 2 advantages of negative feedback.
3. List any 2 applications of tuned circuits.
4. Define conversion efficiency.

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks

3x 3 =6 Marks

5a. Classify oscillator circuits,

(OR)

b. Mention the conditions for sustained oscillations in Hartley oscillator.

6a. Classify power amplifiers based on conduction.

(OR)

b. Draw the circuit of class B push-pull amplifier.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 =10 Marks

7a. Compare positive and negative feedback.

(OR)

b. Draw and explain Colpitts oscillator circuit.

8a. Explain the operation of Class A amplifier with transformer load.

(OR)

b. Explain the operation of complementary symmetry push pull amplifier.

BOARD DIPLOMA EXAMINATIONS
III SEMESTER END EXAMINATION
EC-303 ELECTRONIC DEVICES AND CIRCUITS.

Time: 2 Hours

Max. Marks: 40

PART-A

Instructions: Answer **all** questions. Each question carries **one** mark.

8 X 1 = 8 marks

1. Define RMS and average value.
2. What is negative feedback?
3. Define sweep voltage.
4. State the function of operational amplifier.
5. State the need for a differential amplifier.
6. What is inverting and non-inverting input of op-amp.
7. List the errors in sweep signal.
8. Draw the circuit of series unbiased clipper.

PART – B

Instructions: Answer **the following** questions. Each question carries **three** marks 4 x 3 =12

Marks

- 9 a. Draw the input and output waveforms of rectifier with C filter.

(OR)

- b. List the ideal characteristics of an ideal OP-amp.

- 10 a. Compare LC and RC oscillators.

(OR)

- b. Draw the equivalent circuit of crystal and explain.

- 11 a. Draw and Pin configuration of IC741

OR

- b. Define input impedance and slew rate.

- 12a. Explain double – ended clipper circuit with waveforms.

OR

- b. List the applications of voltage and current time base generators.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks 4 x 5 =20
Marks

13a. Explain the working of FWR with waveforms.

(OR)

b. Draw and explain the PIN diagram of OP-amp.

14 a. Draw the block diagram of voltage shunt feedback amplifier

(OR)

b. Explain the working of bootstrap voltage time base generator.

15 a. State the important characteristics of ideal operational amplifier with practical values.

(OR)

b. Explain the working of variable voltage regulator circuit.

16 a. Explain the operation of Miller sweep circuit.

(OR)

b. Draw and explain the circuit of shunt biased clipper with waveforms.

EE-304-ELECTRICAL AND ELECTRONIC MEASURING INSTRUMENTS

Course Title	Electrical and Electronic Measuring Instruments	Course Code	EE-304
Semester	III	Course Group:	Core
Teaching Scheme in periods. (L : T : P)	4 : 1 : 0	Credits :	3
Methodology :	Lecture + Tutorial	Total Contact Periods :	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic principles of electricity and simple mechanical terms.

Course Outcomes

At the end of the course, the student will have the ability to:

CO 1	Classify measuring instruments
CO 2	Select suitable meter depending on the type of application
CO 3	Measure various electrical parameters using electromechanical measuring instruments
CO 4	Measure R, L, C parameters
CO 5	Describe various transducers and sensors
CO 6	Compare various electronic and digital instruments

BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Basics of Measuring Instruments	10	4	1		9(a)	13(a)
2	Voltage and Current Measuring Instruments	15					
3	Power and Energy Measuring Instruments	15		2		10(a)	14(a)
4	Measurement of Basic Circuit Elements	10					
5	Transducers and Sensors	12		3	5,6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)
6	Electronic & Digital Instruments	13					
Total		75	8		8	8	

Course Contents

UNIT 1 - Basics of Measuring Instruments

Duration: 10 Periods (L:8- T: 2)

Definitions of accuracy, precision, error, resolution and sensitivity - important electrical quantities to be measured - their units -names of instruments to measure them - classification of instruments -different types of torques (deflection, controlling and damping torques) in the indicating instruments - types of errors.

UNIT 2 – Voltage and Current Measuring Instruments

Duration: 15 Periods (L:12 – T:3)

M.C. and M.I types of ammeters and voltmeters - their construction and working – errors – remedies – comparison - shunts and multipliers for M.C instruments – problems on shunts and multipliers for M.C instruments - Dynamometer type ammeter, voltmeter and wattmeter– construction, working, and errors in them.

UNIT 3 – Power and Energy Measuring Instruments

Duration: 15 Periods (L:12 – T:3)

Need for instrument transformers - applications of instrument transformers - measurement of power - measurement of energy – single phase induction type energy meter -construction and working, error and adjustments –construction and connections of a three - phase energy meter - construction and working of Westonsynchroscope.

UNIT 4 – Measurement of Basic Circuit Elements

Duration: 10Periods (L: 8– T:2)

Classification of resistance -methods of resistance measurement -basic Ohmmeter circuit– difference in series and shunt type ohmmeters - construction and working of megger– measuring earth resistance using Megger – working principle, construction and applications of potentiometer - measurement of inductance – measurement of capacitance.

UNIT 5 – Transducers and Sensors

Duration: 12 Periods (L: 9 – T:3)

Definition of transducer - need of transducer - classification of transducers - factors influencing selection of transducer - applications of transducers– thermocouple - thermister - working principle and use of strain gauge - construction, working and use of LVDT -basic concept of sensors and its applications– semiconductor sensors.

UNIT 6 – Electronic & Digital Instruments

Duration:13Periods (L:10 – T:3)

Basic components of analog electronic instruments - working of rectifier type voltmeter and ammeter -basic components of digital (digital electronic) instruments - advantages of digital instruments over analog instruments - types of digital voltmeters -specifications of digital voltmeter - working of digital multimeter and its specifications -working of single phase digital energy meter with block diagram - working of three phase digital energy meter with block diagram - working of digital frequency meter with block diagram - use of tongtester (clamp meter) – comparison between digital and electromechanical measuring instruments.

Recommended Books

1. A.K.Sawhney - Electrical and Electronic measuring instruments –Dhanpat Rai & Sons.
2. E.W.Golding and F.C.Widdis – Electrical Measurements and measuring instruments– Wheeler publishers.
3. David A Bell - Electronic Instrumentation and Measurements–Oxford.
4. B.L.Theraja- Electrical Technology -S.Chand& Co.
5. Khandpur - Modern Electronic Equipment
6. J.B.Gupta- Electrical and Electronic measuring instruments.
7. Harris - Electrical measurements
8. K.B.Bhatia- Study of Electrical Appliances and Devices– Khanna Publishers

Suggested E-learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <https://nptel.ac.in/courses/108105053/>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1. Define the following terms related to measuring instruments
 - i. accuracy
 - ii)precision
 - iii)error
 - iv)resolution
 - v) sensitivity
- 1.2. List any six important electrical quantities to be measured by giving their units
- 1.3. Mention the names of instruments to measure the various electrical quantities.
- 1.4. Classify instruments on the basis of construction and output as analog and digital instruments.

- 1.5. Classify the electro mechanical instruments according to principle of working.
 - 1.6. Classify the instruments on basis of method of measuring the value as absolute and secondary instruments.
 - 1.7. Distinguish between absolute and secondary instruments
 - 1.8. State the types of secondary instruments (indicating, integrating and recording) by giving suitable examples.
 - 1.9. State the purpose of obtaining deflecting, controlling and damping torques in indicating instruments.
 - 1.10. Explain the methods of obtaining i) deflecting torque ii) controlling torque and iii) damping torque in indicating instruments.
 - 1.11. Classify the errors according to its source (gross, systematic and random)
-
- 2.1 Describe the construction of permanent magnet moving coil instrument.
 - 2.2 Explain the working of permanent magnet moving coil instrument (voltmeter/ammeter).
 - 2.3 Solve simple problems on deflecting torque $T_d = NBIA$
 - 2.4 List the three types of errors commonly occurring in moving coil (M.C.) instruments.
 - 2.5 Mention the remedies for the commonly occurring errors in M.C instruments.
 - 2.6 State advantages and disadvantages of M.C instruments.
 - 2.7 List the applications of M.C instruments.
 - 2.8 Describe the construction and working of moving iron (M.I) i) Attraction type Instrument ii) Repulsion type Instrument.
 - 2.9 List the errors commonly occurring in M.I. Instruments.
 - 2.10 State the advantages and disadvantages of M.I. instruments.
 - 2.11 Compare M.C. and M.I instruments.
 - 2.12 Describe the method of extending the range of moving coil ammeter with the help of shunt.
 - 2.13 Describe the method of extending the range of moving coil voltmeter with the help of multiplier.
 - 2.14 Solve the problems on shunts and multipliers used for moving coil instruments.
 - 2.15 Describe the construction of dynamometer type instruments
 - 2.16 Explain the working of dynamometer type instruments
 - 2.17 List the common errors in the dynamometer instruments.
 - 2.18 List the advantages and disadvantages of dynamometer instruments.

- 3.1 State the need for instrument transformers (current transformer-CT and potential transformers -PT).
 - 3.2 List the applications of CT and PT.
 - 3.3 State the precautions when using CT.
 - 3.4 Draw the circuit diagram for measuring power with wattmeter in single-phase circuit in conjunction with instrument transformers.
 - 3.5 Draw the circuit diagram and explain the methods of measuring power and power factor in 3-phase circuit using single, two and three wattmeters
 - 3.6 Describe the construction of a 1-phase induction type energy meter.
 - 3.7 Explain the working of a 1-phase induction type energy meter.
 - 3.8 Define meter constant.
 - 3.9 State the common errors and their remedies in 1-phase energy meter.
 - 3.10 Describe construction and connections of a 3-phase energy meter.
 - 3.11 Describe the construction of Weston synchroscope.
 - 3.12 Explain the working of Weston synchroscope.
-
- 4.1. Classify the resistance into low, medium and high values giving examples for each.
 - 4.2. List the methods of measurement of i) low resistance ii) medium resistance and iii) high resistance
 - 4.3. Draw the circuit diagram of basic ohm-meter.
 - 4.4. Explain the working of basic ohm-meter.
 - 4.5. Describe series type ohm-meter.
 - 4.6. Describe shunt type ohm-meter.
 - 4.7. Distinguish between shunt and series ohm-meters.
 - 4.8. Describe the construction of megger.
 - 4.9. Explain the working of megger.
 - 4.10. Explain the method of measurement of earth resistance using earth megger. (construction and working of earth megger is not required).
 - 4.11. Describe the construction of basic potentiometer with a legible sketch.
 - 4.12. Explain the working of basic potentiometer with a legible sketch.
 - 4.13. Explain the measurement of unknown resistance using potentiometer.
 - 4.14. List the applications of potentiometer.
 - 4.15. List various bridges used to measure inductance.
 - 4.16. List various bridges used to measure capacitance.

- 5.1 Define transducer.
 - 5.2 State the need of transducers in measurement systems.
 - 5.3 Classify transducers
 - i. based on the principle of transduction ii) as primary and secondary iii) as passive and active iv) as analog and digital v) as transducers and inverse transducers
 - 5.4 Explain the factors influencing the choice of transducer.
 - 5.5 State the applications of transducers.
 - 5.6 Explain the use of thermocouple for the measurement of temperature.
 - 5.7 Explain the measurement of temperature using thermister in a bridge circuit.
 - 5.8 State the working principle of strain gauge.
 - 5.9 Describe the construction of Linear Variable Differential Transformer(LVDT).
 - 5.10 Explain the working of LVDT.
 - 5.11 State the advantages and disadvantages of LVDT.
 - 5.12 Explain the concept of sensor.
 - 5.13 List the applications of sensors.
 - 5.14 Explain semiconductor sensors.
-
- 6.1 List the basic components of analog electronic instruments.
 - 6.2 List various analog electronic instruments.
 - 6.3 Explain the working of rectifier type voltmeter and ammeter.
 - 6.4 List the basic components of digital (digital electronic) instruments.
 - 6.5 List the advantages of digital instruments over analog instruments.
 - 6.6 List the types of digital voltmeters.
 - 6.7 Mention the specifications of digital voltmeter.
 - 6.8 Explain the working of digital multimeter by giving its specifications.
 - 6.9 Explain the working of single phase digital energy meter with block diagram.
 - 6.10 Explain the working of three phase digital energy meter with block diagram.
 - 6.11 Explain the working of digital frequency meter with block diagram.
 - 6.12 State the uses of tong tester (clamp meter).
 - 6.13 Compare digital and electromechanical measuring instruments.

Suggested Student Activities

1. Prepare a report on the methods adopted for calibration of digital energy meters in TSSPDCL/TSNPDCL.
2. Prepare a report on various meters used in nearby industries or substations.
3. Visit any nearby factory / industry and prepare a report on applications of various transducers in that industry clearly mentioning the purpose.
4. Using megger, determine the earth resistance of the earth pit at your college and prescribe suitable measures to maintain the earth resistance at optimum value
5. Prepare posters indicating usage of suitable meters/ instruments with circuits to measure current, voltage, power and energy in DC and AC (Single phase) circuits
6. Mini project on measurement methods of Resistance, Inductance and Capacitance
7. Student visits lab to identify the available electrical measuring instruments
8. Visit MRT division Electricity Department to understand the testing and repair of various measuring instruments. Write a report on observations.
9. Visit any Electrical / Electronic Measuring Instrument manufacturing industry to observe and understand the construction and working of various meters. Write a Report on observation.
10. Quiz
11. Group discussion
12. Surprise test
13. Assignment
14. Seminar

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	-	-	1	-	-	1	1,4,7
CO2	3	-	-	1	-	-	1	1,4,7
CO3	3	-	-	1	-	-	1	1,4,7
CO4	2	-	-	1	-	-	1	1,4,7
CO5	2	-		1	-	-	1	1,4,7
CO6	2	-		1	-	-	1	1,4,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	4	1		9(a)	13(a)
II					
III		2		10(a)	14(a)
IV					
V		3	5,6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)
VI			7,8	10(b), 12(a), 12(b)	14(b), 16(a), 16(b)
Total Questions	8			8	8

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

DEEE III SEMESTER MID SEMESTER-I EXAMINATION

Corse Code:EE-304

Duration:1

Hour

Course Name: Electrical and Electronic Measuring Instruments

Max.Marks:20

PART-A

Instructions: Answer **all** questions, Each Question carries one mark **4x1 = 4 Marks**

1. Define accuracy related to measuring instruments.
2. Classify errors according to its source.
3. List the three types of errors commonly occurring in moving coil instruments.
4. List the advantages of dynamometer instruments.

PART-B

Answer **two** questions. Each question carries three marks

2x 3 = 6 Marks

5. a) List any six important electrical quantities to be measured and mention the meter used to measure.

OR

- b) State the purpose of obtaining damping torque in indicating instruments.

6. a) List the applications of moving coil instruments.

OR

- b) Compare moving coil and moving iron instruments in any three aspects.

PART-C

Instructions: Answer **two** questions. Each question carries five marks

2x 5 = 10

Marks

7. a) Explain the methods of obtaining controlling torque in indicating instruments.

OR

- b) Distinguish between absolute and secondary instruments.

8. a) Explain the working of permanent magnet moving coil instrument.

OR

- b) Describe the method of extending the range of moving coil ammeter with the help of shunt.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

DEEE III SEMESTER MID SEMESTER-II EXAMINATION

Corse Code:EE-304

Duration:1

Hour

Course Name: Electrical and Electronic Measuring Instruments

Max.Marks:20

PART-A

Instructions: Answer **all** questions, Each Question carries one mark **4x1 = 4 Marks**

- 1) List the applications of current transformer
- 2) State the need for instrument transformers
- 3) List the applications of potentiometer
- 4) List various bridges used to measure capacitance

PART-B

Instructions: Answer **two** questions. Each question carries three marks **2x 3 = 6**

Marks

- 5) a) State the precautions when using CT.

OR

- b) State the common errors in 1-phase energy meter.

- 6) a) Draw the circuit diagram of basic ohm-meter.

OR

- c) Write various methods of measuring high resistance.

PART-C

Instructions: Answer **two** questions. Each question carries five marks **2x 5 = 10**

Marks

- 7) a) Describe the construction of Weston synchroscope.

OR

b) Draw the circuit diagram for measuring power with wattmeter in single– phase circuit in conjunction with instrument transformers.

8) a) Explain the working of basic potentiometer with a legible sketch.

OR

b) Distinguish between shunt and series ohm-meters in any five aspects.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

DEEE III SEMESTER

SEMESTER END EXAMINATION

Corse Code: EE-304

Duration:2 hours

Course Name: Electrical and Electronic Measuring Instruments

Max.Marks:40Marks

PART-A

Answer **all** questions

8x1 =8 Marks

- 1) Define resolution of a measuring instrument.
- 2) State the need for instrument transformers.
- 3) Define transducer.
- 4) List various bridges used to measure inductance.
- 5) List the applications of sensors.
- 6) Classify transducers based on the principle of transduction.
- 7) State the uses of tong tester.
- 8) List the types of digital voltmeters.

PART-B

Answer **four** questions

4 x 3 = 12 Marks

- 9) a) State the types of secondary instruments.

OR

- b) State the applications of transducers.

- 10 a) State the precautions while using current transformer.

OR

- b) List the advantages of digital instruments over analog instruments.

11. a) State the disadvantages of Linear Variable Differential Transformer.

OR

- b) State the working principle of strain gauge.
12. a) List the basic components of analog electronic instruments.

OR

- b) Mention the specifications of digital voltmeter.

PART-C

Answer **four** questions

4 x 5 = 20 Marks

13. a) Describe the method of extending the range of moving coil volt meter with the help of multiplier.

OR

- b) Explain the use of thermocouple for the measurement of temperature.
14. a) Explain the working of basic ohm-meter.

OR

- b) Explain the working of rectifier type voltmeter.
15. a) Describe the construction of Linear Variable Differential Transformer.

OR

- b) Explain the factors influencing the choice of transducer.
16. a) Explain the working of digital multimeter.

OR

- b) Explain the working of digital frequency meter with block diagram.

EE-305-ELECTRICAL CIRCUITS

Course Title	Electrical Circuits	Course Code	EE-305
Semester	III	Course Group	Core
Teaching Scheme in periods (L : T : P)	4 : 1 : 0	Credits	3
Methodology	Lecture + Tutorial	Total Contact	75
CIE	60 Marks	~~Periods~~ SEE	40 Marks

Pre requisites

This course requires the knowledge of basic electrical engineering.

Course Outcomes

At the end of the course, the student will have the ability to:

CO 1	Apply Kirchhoff's laws and star delta transformations to complex circuits
CO 2	Apply network theorems to solve DC circuits
CO 3	Familiarize the fundamentals of alternating quantities
CO 4	Solve problems on single phase A.C. series circuits
CO 5	Solve problems on single phase A.C. parallel circuits
CO 6	Solve problems on poly phase balanced circuits

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Kirchhoff's Laws and Star - Delta Transformation	12	4	1		9(a)	13(a)
2	Network Theorems	13					
3	Fundamentals of A.C	10					
4	Single phase A.C. Series Circuits	15		2		10(a)	14(a)
5	Single phase A.C. Parallel Circuits	14					
6	Poly Phase Circuits	11					
			3	5,6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)	
				7,8	10(b), 12(a), 12(b)	14(b), 16(a), 16(b)	
Total		75	8		8	8	

Course Contents

UNIT 1 - Kirchhoff's Laws and Star - Delta Transformation

Duration: 12 Periods (L: 9 - T:3)

Active and Passive circuits - Junction, branch and loop in circuits -Insufficiency of Ohm's law to solve complex circuits, Kirchhoff's laws – Mesh analysis - Star - Delta configurations, star-delta transformations.

UNIT 2– Network Theorems

Duration: 13 Periods (L: 10 – T: 3)

Ideal Voltage source, Ideal current source- Source transformation technique-Superposition theorem- Thevenin's Theorem -Norton's Theorem- Maximum power transfer theorem with reference to D.C.-Problems on the above.

UNIT 3 – Fundamentals of A.C

Duration: 10 Periods (L: 8 – T: 2)

Definition of Alternating quantity, cycle, time period, frequency, amplitude, instantaneous value and angular velocity - Average value - effective value/R.M.S value – form factor – peak factor - definitions and derivations - calculations of these values for sine wave, half wave rectified sine wave, full wave rectified sine wave, triangular and square wave forms - Representation of alternating quantities by equation, graphs and phasor diagrams - Phase and phase difference–Understanding of 'j' notation for alternating quantities ,transformation from polar to rectangular notations and vice-versa.

UNIT 4 - Single phase A.C. Series Circuits

Duration: 15 Periods (L: 12 – T: 3)

Resistance, inductance and capacitance as circuit elements - concept of reactance, Derive the expression for voltage, current, impedance, power including waveforms and phasor diagrams in pure resistive, inductive and capacitive circuits - Derive the impedance, current, phase angle, power and power factor in R-L, R-C, L-C &R-L-C series circuits including phasor diagrams. Impedance triangle, phase angle, power factor, active and reactive components of power in above circuits – Definition of Resonance in series circuits and expression for resonant frequency-Q-factor-Importance of Q- factor- Problems on series circuits and series resonance.

UNIT 5 - Single phase A.C. Parallel Circuits

Duration: 14 Periods (L:11 – T: 3)

Derive the impedance (RMS Values), current (RMS Values), phase angle, power and power factor in R-L, R-C, LC and R-L&C parallel circuits including phasor diagrams. – Solve simple problems on parallel circuits by vector method, Admittance method and by 'j' notation –Parallel RLC resonance circuit –Condition for resonance in parallel circuit- Q-factor and resonance frequency-problems

UNIT 6 - Poly phase circuits

Duration: 11 Periods (L:9 – T: 2)

Definition of Poly phase - Generation of 2 phase and 3 phase EMF's - Representation of 2 phase and 3 phase EMF's by equations, waveforms and phasor - phase sequence - Current in neutral in 2 phase and 3 phase system - phasor diagram showing relation between phase and line quantities, Relation between phase and Line values of voltages and currents – 3 phase power equation - Problems on 3 phase balanced circuits –Advantages of poly-phase systems over single-phase systems.

Recommended Books

1. Electrical Technology - Vol - I by B.L. Theraja- S.Chand&co.
2. Introduction to Electrical Engg. by V.K.Mehta
3. Electrical Technology by Hughes.
4. Problems in Electrical Engg. by Parker Smith
5. Engineering Circuit analysis by William Hayt and Jack E,kemmerly-TMH
6. Electrical Circuits by A.Chakraborty- Dhanapat Rai and Sons
7. Network and Systems by D. Roy Chowdary- New age international publishers
8. Electric Circuit Theory by K. Rajeshwaran-Pearson educations,2004
9. Network Analysis by Van Valkenburg, PHI.
10. Electrical Circuits by Joseph Edminister- Schaum series
11. Fundamentals of Electric circuits – Alexander Sadiku- TMH
12. Electric circuits by Mahmood Nahvi, Joseph A Edminister-TMH.

Suggested E-learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <http://www.freeengineeringbooks.com/electrical-books-download/Electrical-Engineering-basics.php>
5. <https://electrical-engineering-portal.com/theorems-network-reductions#circuit-theorems>
6. <https://nptel.ac.in/courses/108102042/>
7. <https://nptel.ac.in/courses/108108076/>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 Differentiate between active and passive circuits.
 - 1.2 Define junction in circuits
 - 1.3 Define loop in circuits
 - 1.4 Define branch in circuits
 - 1.5 State the limitations of Ohm's law.
 - 1.6 State Kirchhoff's current law
 - 1.7 State Kirchhoff's voltage law.
 - 1.8 Solve problems by applying KVL and KCL
 - 1.9 Explain Mesh analysis
 - 1.10 Solve simple problems on meshanalysis.
 - 1.11 Explain star and delta circuits
 - 1.12 Explain the concept of circuit transformation and equivalent circuits
 - 1.13 Develop transformation formulae for star- delta transformations
 - 1.14 Solve problems on star delta transformation
-
- 2.1 Define ideal voltage source
 - 2.2 Define ideal current source
 - 2.3 Explain source transformation technique
 - 2.4 Solve simple problems on source transformation
 - 2.5 State Superposition theorem.
 - 2.6 State Thevenin's theorem.
 - 2.7 State Norton's theorem
 - 2.8 State maximum power transfer theorem.
(All the theorems with reference to D.C only)
 - 2.9 Derive the condition for maximum power transfer
 - 2.10 Solve simple problems on network theorems

- 3.1 Define alternating quantity
 - 3.2 Define cycle of an alternating quantity
 - 3.3 Define frequency of an alternating quantity
 - 3.4 Define time period of an alternating quantity
 - 3.5 Define amplitude of an alternating quantity
 - 3.6 Define angular velocity of an alternating quantity
 - 3.7 Define the instantaneous value of an alternating quantity
 - 3.8 Define maximum value of an alternating quantity
 - 3.9 Define Average value of an alternating quantity
 - 3.10 Define R.M.S value of an alternating quantity
 - 3.11 Define form factor of an alternating quantity
 - 3.12 Define peak factor of an alternating quantity
 - 3.13 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of sine wave
 - 3.14 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of half wave rectified sine wave
 - 3.15 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of full wave rectified sine wave
 - 3.16 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of triangular wave
 - 3.17 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of square wave
 - 3.18 Define the terms phase and phase difference (No problems).
 - 3.19 Define j operator.
 - 3.20 Convert polar quantities to rectangular quantities and vice-versa.
-
- 4.1 Define the terms resistance, inductance and capacitance
 - 4.2 Define reactance
 - 4.3 Define active power, reactive power and apparent power
 - 4.4 Mention the units of active power, reactive power and apparent power
 - 4.5 Draw current, voltage waveforms, phasor diagram of pure resistive circuit
 - 4.6 Derive the expression for voltage, current, impedance, power in pure resistive circuit
 - 4.7 Draw current, voltage waveforms, phasor diagram of pure inductive circuit
 - 4.8 Derive the expression for voltage, current, impedance, power in pure inductive circuit
 - 4.9 Draw current, voltage waveforms, phasor diagram of pure capacitive circuit
 - 4.10 Derive the expression for voltage, current, impedance, power in pure capacitive circuit
 - 4.11 Draw current, voltage waveforms, phasor diagram, power triangle, impedance triangle of R-L series circuit
 - 4.12 Derive the expression for voltage, current, impedance, power and power factor in R-L series circuit
 - 4.13 Draw current, voltage waveforms, phasor diagram, power triangle, impedance triangle of R-C series circuit

- 4.14 Derive the expression for voltage, current, impedance, power and power factor in R-C series circuit
- 4.15 Draw current, voltage waveforms, phasor diagram, power triangle, impedance triangle of L-C series circuit
- 4.16 Derive the expression for voltage, current, impedance, power and power factor in L-C series circuit
- 4.17 Draw current, voltage waveforms, phasor diagram, power triangle, impedance triangle of R-L-C series circuit
- 4.18 Derive the expression for voltage, current, impedance, power and power factor in R-L-C series circuit
- 4.19 Solve simple problems on R-L, R-C, L-C, R-L-C series circuits
- 4.20 Define resonance in series circuits
- 4.21 State the condition for resonance in series circuit
- 4.22 Derive resonant frequency of single-phase series RLC circuit.
- 4.23 Solve simple problems on series resonance
- 4.24 Define Q- factor of single-phase series RLC circuit
- 4.25 State the importance of Q-factor.
- 4.26 Derive the expression for Q-factor of single-phase series RLC circuit
- 4.27 Solve simple problems on Q-factor

- 5.1 Draw phasor diagram of R-L parallel circuit
- 5.2 Derive the expression (RMS Values) for current, impedance, power and power factor in R-L parallel circuit
- 5.3 Draw phasor diagram R-C parallel circuit
- 5.4 Derive the expression (RMS Values) for current, impedance, power and power factor in R-C parallel circuit
- 5.5 Draw phasor diagram of L-C parallel circuit
- 5.6 Derive the expression (RMS Values) for current, impedance, power and power factor in L-C parallel circuit
- 5.7 Draw phasor diagram of R-L&C parallel circuit
- 5.8 Derive the expression (RMS Values) for current, impedance, power and power factor in R-L&C parallel circuit.
- 5.9 Solve simple problems on R-L, R-C, L-C, R-L & C parallel circuits
- 5.10 Solve simple problems on parallel circuits by vector method
- 5.11 Solve simple problems on parallel circuits by Admittance Method
- 5.12 Solve simple problems on parallel circuits by j- notation method
- 5.13 Define resonance in parallel circuits
- 5.14 State the condition for resonance in parallel circuit
- 5.15 Derive resonant frequency of single phase parallel RL&C circuit.
- 5.16 Solve simple problems on parallel resonance
- 5.17 Define Q- factor of single phase parallel RL&C circuit
- 5.18 Derive the expression for Q-factor of single phase parallel RL&C circuit
- 5.19 Solve simple problems on Q-factor

- 6.1 Define the term 'Poly Phase'.
- 6.2 Explain the method of generation of 2 phase emfs
- 6.3 Explain the method of generation of 3 phase emfs.
- 6.4 Write the expressions for Poly phase emfs
- 6.5 Represent poly phase emfs by phasor diagram
- 6.6 Represent poly phase emfs by waveforms
- 6.7 Define phase sequence
- 6.8 Compute the current flowing neutral conductor in 2-phase system
- 6.9 Compute the current flowing neutral conductor in 3-phase system
- 6.10 Derive the relation between line and phase values of current and voltage in 3 phase star circuit
- 6.11 Derive the relation between line and phase values of current and voltage in 3 phase delta circuits.
- 6.12 Derive the equation for power in 3 phase circuit.
- 6.13 Solve simple problems in three-phase system with balanced loads.
- 6.14 List the advantages of 3 phase system over single phase system.

Suggested Student Activities

1. Prepare a chart on various electrical circuit theorems and their practical applications.
2. Write a report on practical applications of Single phase AC circuits and Three phase AC circuits with their operating voltages and other electrical parameters.
3. Visit nearby Industry to familiarize with single phase and poly phase circuits
4. Quiz
5. Group discussion
6. Surprise test

CO-PO Mapping Matrix

	Basic and Discipline specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools	Engineering Practices for society, Sustainability	Project Management	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	3	2	1			3	1,2,3,4,7
CO2	3	3	2	1			3	1,2,3,4,7
CO3	3	3		1			3	1,2,4,7
CO4	3	3		1			3	1,2,4,7
CO5	3	3		1			3	1,2,4,7
CO6	3	3		1			3	1,2,4,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	4	1		9(a)	13(a)
II					
III		2		10(a)	14(a)
IV					
V		3	5,6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)
VI					
Total Questions	8		8	8	

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

EE III SEMESTER MID SEMESTER-I EXAMINATION

Course Code: EE-305

Duration: 1 Hour

Course Name: Electrical Circuits

Max. Marks: 20

PART-A

Answer all questions, Each Question carries one mark

4x1 = 4 Marks

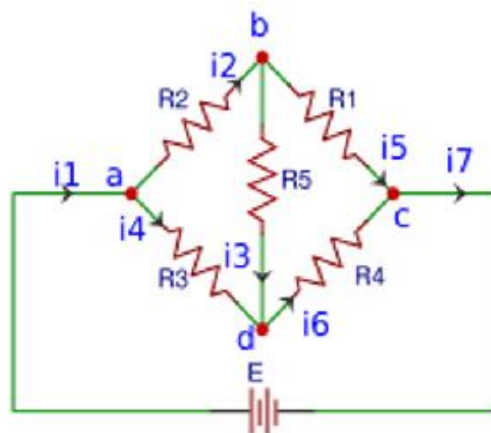
- 1) State Kirchhoff's current law.
- 2) Define junction of an electrical network
- 3) What is an ideal voltage source?
- 4) State Thevenin's theorem.

PART-B

Answer two questions. Each question carries three marks

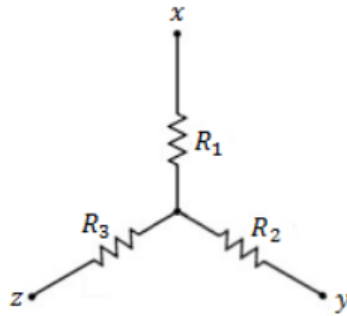
2x3 = 6 Marks

- 5) a) Find the magnitude and direction of the unknown currents in below circuit. Given $i_1 = 10\text{A}$, $i_2 = 6\text{A}$ and $i_5 = 4\text{A}$.



OR

- b) Convert the below star network to an equivalent delta network if $R_1 = R_2 = R_3 = 2\Omega$.



- 6) a) State how to convert a voltage source to current source with an example.

OR

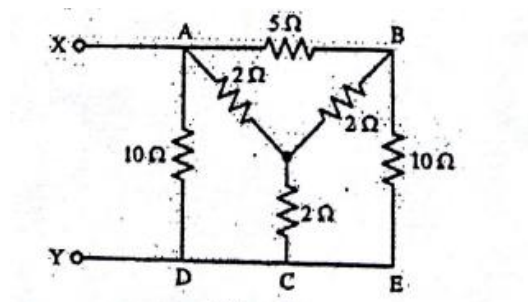
- b) State superposition theorem.

PART-C

Answer two questions. Each question carries five marks

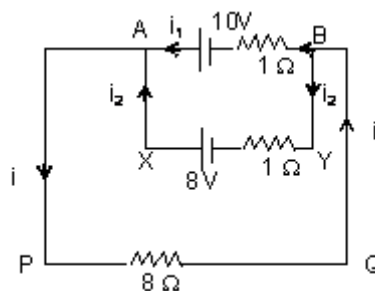
2x 5 = 10 Marks

- 7) a) Find the equivalent resistance between X and Y for the circuit shown below

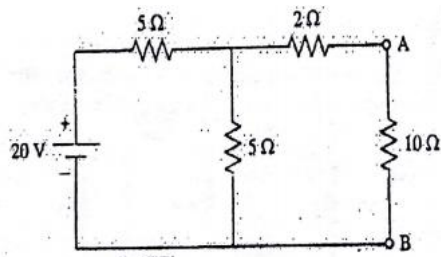


OR

- b) Find the current through 8Ω resistor for the network shown below by using Kirchhoff's law.

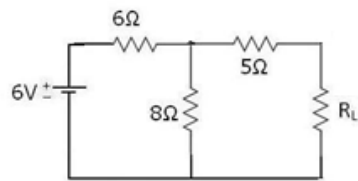


- 8) a) Determine the current through 10Ω resistor of the network shown below by using Norton theorem.



OR

- b) Find the value of R_L for the given network below so that the power drawn by R_L is maximum.



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MODEL QUESTION PAPER

EE III SEMESTER MID SEMESTER-II EXAMINATION

Course Code: EE-305

Duration: 1 Hour

Course Name: Electrical Circuits

Max. Marks: 20

PART-A

Answer all questions, Each Question carries one mark $4 \times 1 = 4$ Marks

- 1) Define form factor
- 2) Convert $3 + j4$ to polar quantity.
- 3) Draw the power triangle of single phase series RC circuit.
- 4) Draw the phasor diagram of pure inductor.

PART-B

Answer two questions. Each question carries three marks

$2 \times 3 = 6$ Marks

- 5) a) Give the expression of rms value and average value of half wave rectified sine wave.

OR

- b) Define the phase and phase difference of alternating quantities.
- 6) a) Give the expressions of impedance and power factor of single phase series RL circuit.

OR

- b) Give the expressions of Q-factor and resonant frequency of single phase series circuit.

PART-C

Answer two questions. Each question carries five marks

$2 \times 5 = 10$ Marks

- 7) a) Derive the expression for RMS value and average value of full wave rectified sine wave.

OR

b) Derive the expression for peak factor and form factor of a square wave.

8) a) Derive the expression for resonant frequency of a series RLC circuit.

OR

b) A coil having resistance of 7Ω and inductance of 30 mH is connected to 230V, 50 Hz single phase supply. Calculate the circuit current and power factor.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

DEEE III SEMESTER

SEMESTER END EXAMINATION

Corse Code: EE-305

Duration: 2 hours

Course Name: Electrical Circuits

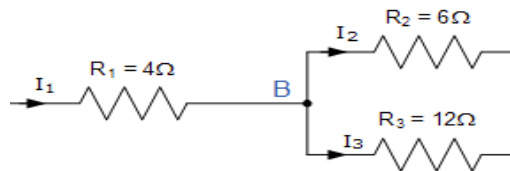
Max. Marks: 40 Marks

PART-A

Answer **all** questions

8x1 = 8 Marks

- 1) Find the current I_2 in the below circuit given $I_1 = 10\text{ A}$ and $I_3 = 7\text{ A}$.



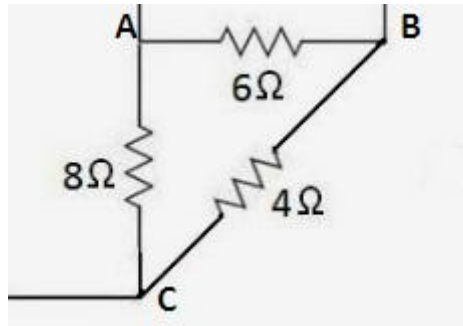
- 2) Define a) Average value and b) RMS value.
- 3) Write the voltage and current relationships in a three phase circuits for a star connected balanced load.
- 4) What is the current through a capacitor $C = 10\text{ nF}$ connected to a single phase 50 V , 50 Hz voltage source?
- 5) Define Q-factor.
- 6) State the condition for resonance in parallel circuits.
- 7) Define the term polyphase.
- 8) State any two advantages of 3 phase system over single phase system.

PART-B

Answer four questions

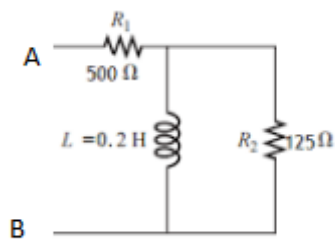
4 x 3 = 12 Marks

- 9) a) Transform the given delta network to star.



OR

- b) Find the impedance between A and B in the below circuit when it is energized by $v(t) = 100\sin 314t$ Volts.



- 10 a) Determine the average value, RMS value and form factor of single phase AC 230 V, 50Hz full wave rectified sine wave.

OR

- b) Write the expressions for Poly phase emfs and represent them by phasor diagram.

11. a) Derive the resonant frequency of single phase parallel RLC circuit.

OR

- b) Give the expression for impedance and current of single phase parallel RLC circuit.

12. a) Calculate the power in 3 phase balanced resistive circuit connected to 3 phase 440V, 50Hz carrying line current of 0.5A.

OR

- b) Write the expression for power in balanced three phase star circuit and delta circuit.

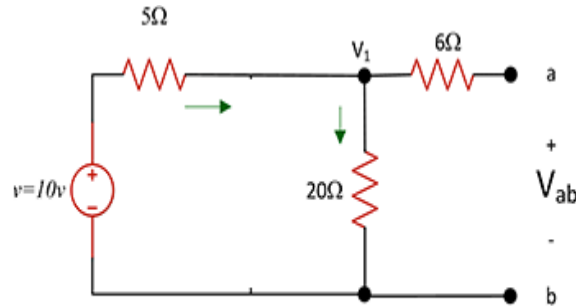
PART - C

Instructions: (1) Answer the following questions

(2) Each question carries **five** marks.

Marks: 4 X 5 = 20

13. a) Find the Thevenins equivalent of the circuit shown below:



OR

- b) Derive an expression for resonant frequency of a parallel RLC circuit.

14. a) A current of 10A flows through a non-inductive resistance in series with a coil when supplied at 250V, 50Hz. If the voltage across the resistance is 250V and across the coil is 400V, calculate a) impedance of the coil and b) total power consumed by the circuit.

OR

- b) Explain how to generate the 3 phase emf's with neat figures.

15. a) A parallel RLC circuit with a $16\ \Omega$ resistance, $8\ \Omega$ inductive reactance, and $20\ \Omega$ capacitive reactance is supplied by a 120-V power supply. What are the values of currents through R, L and C, total line current and active power?

OR

- b) A parallel RC circuit has a power supply of 100 V, 60 Hz. A current of 10A flows through the resistor and a current of 10A flows through the capacitor. Calculate the values of line current, true power, reactive power, apparent power and power factor?

16. a) Three identical impedances are connected in delta to a 3-phase 400 V, 50Hz supply. The line current is 34.65 A and the total power taken from the supply is 14.4 kW. Calculate the resistance and reactance values of each impedance.

OR

- b) Three coils each having a resistance of $20\ \Omega$ and inductive reactance of $15\ \Omega$ are connected in star to a 3-phase, 400V, 50Hz supply. Calculate a) line current, and b) power consumed.

EC-306-ELECTRONIC DEVICES LAB

Course Title	Electronic Devices Lab	Course Code	EC-306
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic skills of Handling Basic Electronics tools and Components, knowledge of connecting cables and meters

Course Contents

I. Amplifiers and Oscillators

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response.
 - a) Observe the effect of connecting and disconnecting the emitter bypass capacitor on gain and distortion.
 - b) Observe the effect of emitter bypass capacitor C_e on voltage across Emitter Resistance using CRO.
 - c) Measure the output power using ac power meter
2. Implement Colpitt's oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
3. Implement Hartley oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
4. Implement transistor Astable multi vibrator circuit and observe the waveforms on CRO.

II. Special Semiconductor Devices

5. Plot the characteristics of a) Photodiode b) photo transistor
6.
 - a) Implement a Twilight switch using a Phototransistor and a Relay
 - b) Replace Phototransistor with LDR and Test
- 7.

- a) Plot the VI characteristics of different color LEDs & determine the V_f (forward voltage drop)
 - b) Test the above devices with DMM & Analogue multimeter and identify the Terminals
- 8.
- a) Plot the characteristics of i) LDR ii) Thermistor iii) VDR
 - b) Test the above devices with DMM & Analogue multimeter
- 9.
- a) Implement a simple Temperature controller using Thermistor and a Relay
 - b) Use a VDR /Trigistor for protection against high voltage surges and verify
- 10.
- a) Plot the characteristics of opto coupler MCT2E
 - b) Test the given optocoupler and identify its terminals
- 11.
- a) Use MCT 2E to switch on a 6V lamp connected to RPS by applying a Low voltage 1.5 V signal from a cell at input
 - b) Implement a simple timer using 1 M Ω Resistor , 1000 mfd capacitor ,Transistor BC148 and a Relay

III. Wave shaping Circuits

Realize Clipper and Clamper circuits and observe the waveforms on CRO

- 12.
- a) Realize Series and Parallel diode clippers
 - b) Assemble and test Positive and negative clipper circuits with and without bias
- 13.
- a) Implement Amplitude limiter (two diodes connected back to back) and observe the waveform on CRO.
 - b) Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO
14. Implement Boot-strap sweep circuit and observe the sweep wave form.
15. Implement Miller sweep circuit and observe the waveform.

Suggested Student Activities

- i. Collection of catalogues and specification sheets, preparation of a chart displaying symbols of passive components and connectors/cables.
- ii. Collection of the contributors (scientists) and contribution details to the field of Electrical and Electronics engineering

- iii. Any other such activities that can contribute to the student's knowledge in respect of this course.
- iv. Record the best practices used in the disposal of E-waste and precautions in the operation of electrical appliances.

Course Outcome		Linked PO	
CO1	Apply the basics of transistor to construct amplifiers, oscillators and multi-vibrators and analyze the effect of circuit components	1,2,3,8,9,10	12
CO2	Identify different special semiconductor devices and apply the knowledge of special semiconductor devices in special applications	1,2,3,4,5,6,8,9,10	18
CO3	Apply the knowledge of semiconductor components in realizing and analyzing wave shaping circuits	1,2,3,4,8,9,10	15
			45

E Learning Resources

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in
4. studentboxoffice.in

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III Semester Mid Examination-I Model Question paper

DECE III semester practical Examination

Corse Code:EC-306

Duration:2 hours

Course Name: Electronic Devices Lab

Max.Marks:20

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii)Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration, choose appropriate values when not mentioned in the question

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response. Record the effect of emitter bypass capacitor on gain of the amplifier.
 - b) Implement Colpitt's oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
 - c) Implement Hartley oscillator and observe the effect of Varying the tank circuit component values and observe output waveforms on CRO. Record your observations.
4. Implement transistor Astable multi vibrator circuit and observe the waveforms on CRO and record your observations.
- 5.Implement the Photo diode circuit to show that the resistance of the photo diode varies with light and also measure the current through the Photodiode. Record your observations.

State Board of Technical Education and Training, Telangana

III Semester Mid Examination-II Model Question paper

DECE III semester practical Examination

Corse Code:21EC-306P
hours

Duration:2

Course Name: Electronic Devices Lab

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration, choose appropriate values when not mentioned in the question

- 1.. Implement the Photo transistor circuit to show that the resistance of the photo transistor varies with light and also measure the current through the Photo transistor. Record your observations.
- 2.a) Implement a Twilight switch using a Phototransistor and a Relay
b) Replace Phototransistor with LDR and record the observations.
3. a) Plot the VI characteristics of white, red and green color LEDs & determine the V_f (forward voltage drop)
b) Test the above devices with DMM & Analogue multimeter and identify the Terminals
- 4.a) Plot the V-I characteristics and response characteristics of i) LDR
b) Test the above devices with DMM & Analogue multimeter
5. a) Implement a simple Temperature controller using Thermistor and a Relay
b) Use a VDR for protection against high voltage surges and verify

State Board of Technical Education and Training, Telangana

Semester End Examination Model Question paper

DECE III semester practical Examination

Corse Code:EC-306

Duration:3 hours

Course Name: Electronic Devices Lab

Max.Marks:40

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii)Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration ,choose appropriate values when not mentioned in the question

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response. Record the effect of emitter bypass capacitor on gain of the amplifier.
 - d) Implement Colpitt's oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
 - e) Implement Hartley oscillator and observe the effect of Varying the tank circuit component values and observe output waveforms on CRO. Record your observations.
4. Implement transistor Astable multivibrator circuit and observe the waveforms on CRO and record your observations.
- 5.Implement the Photo diode circuit to show that the resistance of the photo diode varies with light and also measure the current through the Photodiode. Record your observations.
- 6.. Implement the Photo transistor circuit to show that the resistance of the photo transistor varies with light and also measure the current through the Photo transistor. Record your observations.
- 7.a) Implement a Twilight switch using a Phototransistor and a Relay
 - b) Replace Phototransistor with LDR and record the observations.
8. a) Plot the VI characteristics of white, red and green color LEDs & determine the Vf (forward voltage drop)
 - b) Test the above devices with DMM & Analogue multimeter and identify the Terminals
- 9.a) Plot the V-I characteristics and response characteristics of i) LDR
 - b) Test the above devices with DMM & Analogue multimeter

10. a) Implement a simple Temperature controller using Thermistor and a Relay
b) Use a VDR for protection against high voltage surges and verify
11. a) Plot the characteristics of optocoupler MCT2E
b) Test the given optocoupler and identify its terminals
12. a) Use MCT 2E to switch on a 6V lamp connected to RPS by applying a Low voltage 1.5 V signal from a cell at input b) Implement a simple timer using 1 M Ω Resistor , 1000 mfd capacitor , Transistor BC148 and a Relay
13. Construct and test Positive and negative clipper circuits with and without bias
14. Implement Amplitude limiter (two diodes connected back-to-back) and observe the waveform on CRO.
b) Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO
15. Implement Boot-strap sweep circuit and observe the sweep wave form.

EE-307-CIRCUITS LAB

Course Title	Circuits Lab	Course Code	EE-307
Semester	III	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	:60 Marks	SEE	40 Marks

Pre requisites:

This course requires

- Data handling through graphs:
 - Select proper X & Y parameters
 - Choose proper scale
 - Analyse the trend of the graph
 - Correlate trend of the graph with the relation between the parameters
- Use of Voltmeter, Ammeter, Wattmeter & CRO
- The knowledge of electrical circuits

Course Outcomes:

At the end of the course the students will have the ability to:

Course Outcomes	
CO1	Verify Ohms law
CO2	Apply Kirchhoff's laws to solve electric circuits
CO3	Apply network theorems to solve electric circuits
CO4	Verify the voltage, current phasor relationship in 1- Φ AC circuits with R, RL and RC loads

Suggested Learning Outcomes

1.0 Verify Ohms law

- 1.1 Verify Ohm's law
- 1.2 Verify limitations of Ohm's law

2.0 Apply Kirchhoff's laws to solve electric circuits

- 2.1 Verify Kirchhoff's current law in a DC circuit
- 2.2 Verify Kirchhoff's voltage law in a DC circuit

3.0 Apply network theorems to solve electric circuits

- 3.1 Verify Thevenin's theorem in a DC circuit
- 3.2 Verify Norton's theorem in a DC circuit
- 3.3 Verify Maximum power transfer theorem in a DC circuit
- 3.4 Verify Super position theorem in a DC circuit with two sources

4.0 Verify the voltage, current phasor relationship in 1- Φ AC circuits with R, RL and RC loads

- 4.1 Verify that the voltage and current for 1- Φ AC circuit with pure R- load are in-phase using CRO and draw the phasor diagram.
- 4.2 Verify that the current in 1- Φ AC circuit with pure RL - load lags the voltage using CRO and draw the phasor diagram.
- 4.3 Verify that the current in 1- Φ AC circuit with pure RC - load leads the voltage using CRO and draw the phasor diagram.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER
MID SEMESTER-I EXAMINATION

Corse Code: EE-307
Course Name: Circuits Lab

Duration: 1 Hour
Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Verify Ohm's law
2. Verify limitations of Ohm's law
3. Verify Kirchhoff's current law in a DC circuit
4. Verify Kirchhoff's voltage law in a DC circuit

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER
MID SEMESTER-II EXAMINATION

Corse Code: EE-307
Course Name: Circuits Lab

Duration: 1 Hour
Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Verify Thevenin's theorem in a DC circuit
2. Verify Norton's theorem in a DC circuit
3. Verify Maximum power transfer theorem in a DC circuit
4. Verify Super position theorem in a DC circuit with two sources

State Board of Technical Education and Training, Telangana

Model Question paper

DEEE III Semester

Semester End Examination

Corse Code: EE-307

Duration: 2 Hour

Course Name: Circuits Lab

Max.Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Verify Ohm's law
2. Verify limitations of Ohm's law
3. Verify Kirchhoff's current law in a DC circuit
4. Verify Kirchhoff's voltage law in a DC circuit
5. Verify Thevenin's theorem in a DC circuit
6. Verify Norton's theorem in a DC circuit
7. Verify Maximum power transfer theorem in a DC circuit
8. Verify Super position theorem in a DC circuit with two sources
9. Verify that the voltage and current for 1- Φ AC circuit with pure R- load are in-phase using CRO and draw the phasor diagram.
10. Verify that the current in 1- Φ AC circuit with pure RL - load lags the voltage using CRO and draw the phasor diagram.
11. Verify that the current in 1- Φ AC circuit with pure RC - load leads the voltage using CRO and draw the phasor diagram.

EC-308-Digital Electronics Lab

Course Title	Digital Electronics Lab	Course Code	EC-308
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact /Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic skills of Handling bread boards and PCB.

Course outcomes:

On successful completion of the course, the students will be able to attain below Course Outcome

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Identify Basic Gates and Logic Families	R/U/A	1,2,3,4,5,6,7,8	9
CO2	Realization of Boolean Functions using Gates	R/U/A	1,2,3,4	15
CO3	Verification of truth tables of Multiplexers and DeMultiplexers/encoder, BCD decoder.	R/U/A	1,2,3	9
CO4	Flip Flops & Timing Circuits Counters & Shift Registers	A	1,2,3,10	12
				45

Course Contents:

I. Basic Gates and Logic Families

1. Identify Digital ICs and noting down pin details from data sheets

- Identify the given digital ICs and draw the pin diagrams. (Use TTL and CMOS ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs).
- Realize basic gate functions using toggle switches and a bulb.

2. Verify the truth tables of basic gates using universal gates.

- Verify the truth table of 7403 IC (open collector quad 2input NAND gate).
- Verify the Truth table of 4073 IC.

3.

- Implement OR gate using NAND gates only and verify the Truth Table
- Implement NOT gate using using NOR gates only and verify the Truth Table

4.

- Verify the truth table of AND gate using NOR gates only.

- b) From the data sheets find out CMOS equivalent of above ICs.

II. Realizing Boolean Functions.

5.

- a) Verify the truth table of XOR using TTL NAND gates only.
- b) Verify the truth table of XOR using CMOS NOR gates only.
- c) From the data sheets find out CMOS Equivalent of XOR ICs.

6.

- a) Implement a given Boolean function using basic gates and verify the truth table.
- b) Implement a given Boolean function using NAND gates only and verify the truth table.

7.

- a) Verify the truth table of half adder using basic gates only.
- b) Verify the truth table of half adder using NAND gates only.

8.

- a) Verify the truth table of full adder using 2 half adders.
- b) Implement a full adder using NOR gates only.

III. Realization of Boolean Functions using Multiplexers and Demultiplexers

- 9. a) Verify the truth table of IC 74153MUX.

- b) Verify the truth table of IC 74154 DE-MUX.

- 10. a) Verify the function of 74148 Encoder and write the truth table

- b) Verify the function of 74138 Decoder and write the truth table

- 11. a) Verify the to decimal decoder and write function of BCD its truth table.

- b) Verify the function of decimal BCD to encoder and write its truth table.

IV. Flip Flops & Sequential Circuits

- 12. a) Construct clocked RS FF using NAND gates and Verify its truth table.

- b) Verify the truth table of CD 4013 Dual D flip Flop

- 13. a) Verify the functionality and truth table of 74L71 RS flip flop with Preset and Clear

- b) Verify the Truth table of JK FF using 7476 IC.

- 14. a) Construct and verify the function of decade counter using 7490 ICs.

- b) Verify the function of up/down counter using 74190, 74193

- 15. a) Verify the function of CD 4029 up/down counter.

- b) Verify the function of shift register (ICs like 7495 or 74194 etc.)

- c) Verify the function of Johnson counter using CD 4017 IC

EE-309-ELECTRICAL MEASUREMENTS LAB

Course Title	Electrical Measurements Lab	Course Code	EE-309
Semester	III	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	:Lecture + Practical	Total Contact Periods	45
CIE	:60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic electricity and fundamentals of various measuring instruments

Course Outcomes

At the end of the course the students will have the ability to:

Course Outcome	
CO1	Compare calibrated meter readings with standard meters
CO2	Illustrate the methods of range extension in A.C. & D.C. meters
CO3	Interpret the various methods to measure unknown resistance
CO4	Demonstrate various methods of measuring power in three phase circuit

Suggested Learning Outcomes

1.0 Compare calibrated meter readings with standard meters

- 1.1 Calibration and testing of single phase energy meter
- 1.2 Calibration of dynamometer wattmeter
- 1.3 Calibration of PMMC Ammeter and PMMC voltmeter
- 1.4 Calibration of LPF wattmeter

2.0 Illustrate the methods of range extension in A.C. & D.C. meters

- 2.1 Extend the range of D.C. ammeter by using shunt resistances (low range to high range)
- 2.2 Extend the range of D.C. voltmeter by using series multiplier(low range to high range)
- 2.3 Extend the range of A.C. ammeter by using C.T.(high range to low range)
- 2.4 Extend the range of A.C. voltmeter by using P.T.(high range to low range)

3.0 Interpret the various methods to measure unknown resistance

3.1 Measurement of low and medium resistance by volt-ampere method

3.2 Measurement of resistance by Kelvin's double Bridge.

3.3 Measurement of earth resistance using digital earth tester

3.4 Measurement of insulation resistance using digital insulation tester

4.0 Demonstrate various methods of measuring power in AC circuits

4.1 Measurement of power in a three-phase balanced circuit with two watt meter method

4.2 Measurement of single phase power by 3-voltmeter and 3-Ammeter methods

Note:

1. Every student has to bring insulated tool kit and follow the general safety precautions throughout the lab sessions
2. Whenever handling/using a meter check for 'zero' position of the pointer and adjust for 'zero' position if there is any deviation.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

MODEL QUESTION PAPER

DEEE III SEMESTER

MID SEMESTER-I EXAMINATION

Course Code: EE-309

Duration: 1 Hour

Course Name: Electrical Measurements Lab

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Calibration and testing of single phase energy meter
2. Calibration of dynamometer wattmeter
3. Calibration of PMMC Ammeter and PMMC voltmeter
4. Calibration of LPF wattmeter
5. Extend the range of D.C. ammeter by using shunt resistances (low range to high range)
6. Extend the range of D.C. voltmeter by using series multiplier (low range to high range)

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING,
TELANGANA**

MODEL QUESTION PAPER

DEEE III SEMESTER

MID SEMESTER-II EXAMINATION

Course Code: EE-309

Duration: 1 Hour

Course Name: Electrical Measurements Lab

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Extend the range of A.C. ammeter by using C.T.(high range to low range)
2. Extend the range of A.C. voltmeter by using P.T.(high range to low range)
3. Measurement of low and medium resistance by volt-ampere method
4. Measurement of resistance by Kelvin's double Bridge.
5. Measurement of earth resistance using digital earth tester
6. Measurement of insulation resistance using digital insulation tester

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-309

Duration: 2 Hour

Course Name: Electrical Measurements Lab

Max.Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Calibration and testing of single phase energy meter
2. Calibration of dynamometer wattmeter
3. Calibration of PMMC Ammeter and PMMC voltmeter
4. Calibration of LPF wattmeter
5. Extend the range of D.C. ammeter by using shunt resistances (low range to high range)
6. Extend the range of D.C. voltmeter by using series multiplier (low range to high range)
7. Extend the range of A.C. ammeter by using C.T. (high range to low range)
8. Extend the range of A.C. voltmeter by using P.T. (high range to low range)
9. Measurement of low and medium resistance by volt-ampere method
10. Measurement of resistance by Kelvin's double Bridge.
11. Measurement of earth resistance using digital earth tester
12. Measurement of insulation resistance using digital insulation tester
13. Measurement of power in a three-phase balanced circuit with two watt meter method
14. Measurement of single phase power by 3-voltmeter and 3-Ammeter methods

HU-310 - Communication and Life Skills Lab

Course Title	Communication and Life Skills Lab	Course Code	HU-310
Semester	III	Course Group	Practical
Teaching Scheme in Periods- L: T:P	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours	45
CIE	60 Marks	SEE	40 Marks

Rationale:

The course is designed to impart listening skills and life skills to the students of diploma which will help them a great deal in personal and professional fronts.

Prerequisites:

The course requires the basic knowledge of vocabulary, grammar, and four language learning skills, viz. Listening, Speaking, Reading and Writing.

Course Contents

I. Listening Skills-I

Duration: 6 (L 2 P 4)

- A paragraph
- A song
- A recipe
- A dialogue

II. Life Skills – I

Duration: 6 (L2 P 4)

1. Introduction to Life Skills

- What are life skills?
- Importance of life skills
- Practicing life skills

2. Attitude

- Features of attitude
- Attitude and behaviour
- Attitude formation
- Positive attitude
- Negative attitude
- Overcoming negative attitude
- Attitude at workplace

3. Adaptability

- Need for adaptability
- Willingness to experiment
- Fear of failure
- Think ahead
- Stay positive
- Open mind
- Curiosity
- Being in present

III. Listening Skills – II

Duration: 9 (L 3 P 6)

- Biography
- Interview
- A Report
- Telephone Conversation

IV. Life Skills – II

Duration: 9 (L 3 P 6)

4. Goal setting

- Importance of setting goals
- What is goal setting
- Short term goals
- Long term goals
- Achieve goals using SMART

5. Motivation

- Why motivation
- Characteristics of motivation
- Extrinsic motivation
- Intrinsic motivation

6. Time Management

- Features of time
- Secrets of time management
- Time wasters
- Prioritisation
- Productive time
- Time Quadrant

V. Life Skills – III

Duration: 6 (L 2 P 4)

7. Creativity

- Flexibility
- Curiosity
- Determination
- Innovative ideas

8. Critical Thinking

- Observation
- Curiosity
- Introspection
- Identify biases
- Critical Analysis

9. Problem Solving and Decision Making

- Define the problem
- Generate Options
- Evaluate and choose an option
- Implement Solution
- Monitoring and seeking feedback

VI. Life Skills – IV

Duration: 9 (L 3 P 6)

10. Leadership Qualities and Teamwork

- Significance of Leadership
- Factors of leadership
- Leadership styles
- Leadership Skills
- Importance of Teamwork
- Characteristics of a good team
- Benefits of teamwork
- Problems of teamwork
- Qualities of team player

11. Stress Management/Managing Emotions

- Components of Emotions
- Stress busters
- Managing Emotions
- Emotions at workplace

12. Core Human Values / Forming Values

- Honesty and integrity
- Work Ethics
- Ego and Respect
- Trust and Truthfulness
- Social Responsibility
- Character formation
- Designing Destiny

Course Outcomes:

	At the end of the course the students will have the ability to:
Listening Skills - I	Identify the main or the central idea. Listen for specific details. Learn the pronunciation.
Listening Skills - II	Listen for drawing inferences. Listen for accuracy. Listen to convey ideas.
Life Skills – I	Know the Life Skills. Practice life skills for a better life. Think positively. Develop positive attitude. Overcome negative attitude. Develop adaptability in any situation.
Life Skills – II	Know the importance of setting goals. Set goals using SMART features. Get inspired to get success. Get personal and professional success. Manage time effectively. Learn various time management techniques. Learn the importance of prioritisation.
Life Skills – III	Learn to be creative. Think innovatively. Know the reasons for a problem. Learn to overcome problems. Learn the various techniques to solve the problems. Learn to make proper decisions on time. Think ‘out of the box’. Think critically.
Life Skills – IV	Develop trust and confidence. To develop healthy and wealthy life. Know how to be a leader. Learn the qualities of a good leader. Learn the qualities of a good team. Learn the advantages and disadvantages of a team. Differentiate between Eu-stress and Distress. Manage stress effectively.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
310.1	-	-	-	-	3		3	5,7
310.2	-	-	-	-	3	2	3	5,6,7
310.3	-	-	-	-	3	3	3	5,6,7
310.4	-	-	-	-	2	2	3	5,6,7
310.5	-	-	-	-	2	2	3	5,6,7
310.6		-	--	--	2		3	5,7

Suggested Student Activities:

- Listening Comprehension
- Seminars
- Presentations
- Games using Online Dictionaries
- Sharing the information using emails, chats and groups
- Find a solution to the problem
- Making innovative things through recycling
- Creating advertisements
- Five-minute activities on Life Skills
- Watching videos on life skills and making presentations
- Case studies
- Role Plays
- Dialogues

Evaluation Pattern:

I. Continuous Internal Examination:

60 Marks

a. Mid Sem- I	20 marks
Syllabus:	
i. Listening Skills - I	
ii. Life Skills - I	
b. Mid Sem – II	20 Marks
Syllabus:	
i. Listening Skills - II	
ii. Life Skills - II	
c. Internal assessment:	20 marks

i. Seminars:	10 marks
ii. Assignments:	5 marks
iii. Lab record submission:	5 marks

II. Semester End Examination :

40 Marks

a. Listening:	10 Marks
b. Life Skills topics:	15 Marks
c. Viva Voce :	15 Marks

References:

- Flint, Chris and Jamie Flockhart *Listening: A2 (Collins English for Life: Skills)* Collins. 2013
- Brown, Stephen E. *English in Everyday Life*. McGraw-Hill Education. 2008
- Mohanraj, Jayashree. *Let Us Hear Them Speak: Developing Speaking-Listening Skills in English*. Sage. 2015
- Susan Earle – Carlin. *Q Skills for Success: Listening and Speaking 5: Student Book with Online Practice*. Oxford University Press. 2013
- Kumar, Sanjay and Pushpa Latha. *Communication Skills: A Work Book*. Oxford University Press. 2018
- Carnegie, Dale. *The Leader in You*. Simon & Schuster: 1995
- Carnegie, Dale. *The Art of Public Speaking*. Prabhat Prakashan. New Delhi. 2013
- Kaye, Martin. *Goal Setting (Workbook Included): Goals & Motivation: Introduction To A Complete & Proven Step-By-Step Blueprint For Reaching Your Goals (Goal Setting Master Plan 1)*. Kindle Edition. MK Coaching. 2016.
- West, Steven. *Critical Thinking Skills: Practical Strategies for Better Decision making, Problem-Solving and Goal Setting*. Kindle Edition. 2018
- Tracy, Brain. *Goals*. Berret-Koehler Publishers Inc. San Francisco. 2017
- Tracy, Brain. *Master your Time Master your Life*. Penguin Random House Inc. New York. 2017
- Sean Covey. *The 7 Habits of Highly Effective Teens*. Simon and Schuster, 2011

E-Learning Resources:

- <http://www.bbc.co.uk/worldservice/learningenglish/youmeus/learnit/learnitv39.shtml>
- https://www.examenglish.com/leveltest/listening_level_test.htm
- https://www.oxfordonlineenglish.com/listening?utm_referrer=https%3A%2F%2Fwww.google.co.in%2F
- <https://takeielts.britishcouncil.org/prepare-test/free-ielts-practice-tests/listening-practice-test-1>
- <https://learnenglish.britishcouncil.org/en/listening>

- f. <https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=listening>
- g. <https://www.businessenglishsite.com/business-english-listening.html>

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION - I
HU-310- COMMUNICATION AND LIFE SKILLS LAB

Time : 1 Hour

Total Marks: 20

Marks

Part – A

10 marks

1. Listening Comprehension:

5 X 2 = 10

(Teacher should give the questions before reading the passage given below)

There are two problems which cause great worry to our educationists – the problem of religious and moral instruction in a land of many faiths and the problem arising out of a large variety of languages.

Taking up the education of children we see that they should be trained to love one another, to be kind and helpful to all, to be tender to the lower animals and to observe and think right. The task of teaching them how to read and write and to count and calculate is important, but it should not make us lose sight of the primary aim of moulding personality in the right way.

For this it is necessary to call into aid, culture, tradition and religion. But in our country, we have in the same school, to look after boys and girls born in different faiths and belonging to families that live diverse ways of life and follow different forms of worship associated with different denominations of religion. It will not do to tread the easy path of evading the difficulty by attending solely to physical culture and intellectual education.

It is not right for us in India to be dissuaded from this by considerations as to overtaking the young mind. What is necessary must be done and it is not in the fact too great a burden.

On the basis of reading the above passage, answer the following questions:

1. Which two problems have our educations to face?
2. What is the primary aim of the education of children?
3. How should the problem of religious and moral instruction be dealt with?
4. Which basic training is the writer talking about?
5. How can we serve the spiritual needs of school children?

PART- B

10 Marks

Instruction: Answer any one of the questions in 150 words.

2. What are the benefits of developing an optimistic sense towards your life?
3. Give an instance from your life when you adapted yourself to a new situation.

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION - II
HU-310- COMMUNICATION AND LIFE SKILLS LAB

Time : 1 Hour

Total Marks: 20 Marks

Part – A

10 marks

1. Listening Comprehension:

5 X 2 = 10

(Teacher should give the questions before reading the passage given below)

Isaac Newton figured out why objects fall to the ground and why the planets move the way they do. Isaac Newton was born in Lincolnshire, England, in 1643. His father died before he was born but, despite having a difficult childhood, he gained a place at Cambridge University. When the plague broke out he was forced to stay at home and, with so much free time on his hands, Newton started to wonder about what made things fall.

Newton said that he was inspired to think about forces when he saw an apple fall from a tree. He came up with the theory of gravity, an invisible force that pulls all of the objects in the Universe together, and the reason things don't float off into the sky.

In 1685, Newton described his Laws of Motion – a mathematical guide to how an object's movement is affected by speed and mass. Two years later, Newton published his ideas about gravity in a book which contains many of the foundations of modern science.

Newton also invented a new kind of telescope called a reflector. It used a mirror to collect light instead of lenses, and was much more powerful than existing telescopes. He also showed that white light was made up of all the colours of the rainbow.

1. What did Isaac Newton find?
2. Where did Isaac Newton born?
3. Which disease broke out in his childhood?
4. What was the telescope that Isaac Newton invented?
5. From which colour rainbow is made up of?

PART- B

10 Marks

Instruction: Answer any one of the questions in 150 words.

2. What were the short term goals which you set to yourself and how you managed to achieve them in the recent past?
3. Explain -
 - i) how you prioritise your tasks.
 - ii) how you manage your time in the best possible way.

BOARD DIPLOMA EXAMINATION (C-21)
SEMESTER END EXAMINATION
HU-310- COMMUNICATION AND LIFE SKILLS LAB

Time: 3 Hours

Total Marks: 40

Marks

Part – A

10 marks

- 1. Listen to the following passage and answer the questions give below it. 5 X 2 = 10**
(Teacher should give the questions before reading the passage)

Some of us think that writing is only for writers. But writing is for all of us. As Julia Cameron notes in her book *The Right to Write: An Invitation and Initiation into the Writing Life*, “I believe we all come into life as writers.” Writing can be beneficial for all of us, because it can be therapeutic. One of the most powerful parts of therapy is cultivating the ability to observe our thoughts and feelings, said Elizabeth Sullivan, a licensed marriage and family therapist in San Francisco. And that’s what writing helps us do.

“Most of us do not think in complete sentences but in self-interrupted, looping, impressionistic cacophony,” she said. Writing helps us track our spinning thoughts and feelings, which can lead to key insights (e.g., I don’t want to go to that party; I think I’m falling for this person; I’m no longer passionate about my job; I realize how I can solve that problem; I’m really scared about that situation.) Writing is “speaking to another consciousness – ‘the reader’ or another part of the self. We come to know who we really are in the present moment,” she said. Writing also creates a mind-body-spirit connection, she said. “When you use your hands to pen or type something directly from your brain, you are creating a powerful connection between your inner experience and your body’s movement out in the world.” We hold worries, fears and memories in our bodies, Sullivan said. When we use the body in positive ways – such as dancing or writing — we stay in the present moment, we inhabit our bodies, and we can heal ourselves, she said. “Writing is a small movement but it is incredibly powerful when you are writing down what is in your mind.”

Free writing or journaling is simply writing what’s on your mind. It’s letting it all hang out without censoring yourself. According to Sullivan, this could be: “Today I woke up and found the car window smashed and I wondered if the glass replacement guys go out at night and do it.”

“Poetry is a natural medicine; it is like a homeopathic tincture derived from the stuff of life itself—your experience,” writes John Fox in *Poetic Medicine: The Healing Art of Poem-Making*.

Sullivan suggested writing a short letter to a loved one. Imagine this person has written to you and asked you: “How are you doing, really?” Another exercise is to “write to someone with whom you have ‘unfinished business’ without sending it.” The goal is for you to gain a clearer understanding of your own thoughts and feelings about the person, she said.

Answer the following questions:

1. Why does Julia Cameron believe that we all come into life as writers
2. What is the most important therapeutic quality of writing?
3. Whose consciousness does a writer touch through his or her writing?
4. How does Elizabeth Sullivan describe our thinking? Why does she say so?
5. Which word in the passage means ‘a coarse unpleasant noise’?

Part – B

15 marks

2. Seminar Presentations on Life Skills topics:

Part – C

15 marks

3. Viva Voce.

EE-311: SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	EE-311
Semester	III	Course Group	Core
Teaching Scheme in periods (L : T :P)	0:0:8	Credits	2.5
Methodology	Activities	Total Contact Periods	120
CIE	Rubrics	SEE	Nil

Suggested Course Outcomes

CO.1 Address the identified needs of the community collaboratively to facilitate positive social change.

- Prepare a chart related to the topics covered in the present semester.
- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participate in Haritha Haram and submit a small report about the activities.
- Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- Seminar on problems with possible solutions in the campus or nearby places
- Group discussions or enacting a play on topics creating awareness about socio-economic problems
- Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- Participate in NCC

(PO5, 6,7)

CO.2 Listen attentively to others and respond appropriately

- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participating in Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Participate in quiz on technical aspects or current affairs
- Participate in Mock Interview

(PO5, 6,7)

CO.3 Adapt your style to the occasion, task, and audience

- Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Seminar on problems with possible solutions in the campus or nearby places
- Participate in Mock Interview

(PO5, 6,7)

CO.4 Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.

- a. Prepare a chart related to the topics covered in the present semester.
- b. Refer to an e-journal and submit a summary report on upcoming technologies.
- c. Visit factory / industry and submit a report/PPT on the observations made.
- d. Prepare a mini project and submit report.
- e. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- f. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- g. Seminar on problems with possible solutions in the campus or nearby places
- h. Participate in Mock Interview

(PO5, 6,7)

CO.5 Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations

- a. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- b. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6,7)

CO.6 Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.

- a. Participate in Haritha Haram and submit a small report about the activities.
- b. Participate in Swatch Bharath and write an essay on the importance of the program
- c. Participate in NCC

(PO5, 6,7)

CO.7 Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6,7)

CO.8 Ability to recognize their strengths and those of others to work towards a shared vision.

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6,7)

CO.9 Act in alignment with one's own values to contribute to one's life-long growth and learning.

- a. Physical activities such as sports, yoga, meditation and other relaxation techniques

(PO5, 6,7)

CO.10 Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.

- a. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- b. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- c. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- d. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6,7)

CO	Outcome	CO/PO Mapping
CO1	Address the identified needs of the community collaboratively to facilitate positive social change.	5,6,7
CO2	Listen attentively to others and respond appropriately	5,6,7
CO3	Adapt your style to the occasion, task, and audience	5,6,7
CO4	Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.	5,6,7
CO5	Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations	5,6,7
CO6	Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.	5, 6, 7,

CO7	Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others	5, 6, 7,
CO8	Ability to recognize their strengths and those of others to work towards a shared vision	5, 6, 7,
CO9	Act in alignment with one's own values to contribute to one's life-long growth and learning.	5, 6, 7
CO10	Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.	5, 6, 7

Note: The above COs may be mapped to other POs from 1 to 4 apart from PO's 5 to 07 depending on the topic

Suggested Student Activities

1. Prepare a chart related to the topics covered in the present semester.
2. Refer to an e-journal and submit a summary report on upcoming technologies.
3. Visit factory / industry and submit a report/PPT on the observations made.
4. Prepare a mini project and submit report.
5. Listen to expert talk, guest lecture, youtube video and write a summary.
6. Participate in Haritha Haram and submit a small report about the activities.
7. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
8. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
9. Participate in Swatch Bharath and write an essay on the importance of the program
10. Group discussions or enacting a play on topics creating awareness about socio-economic problems
11. Physical activities such as sports, games, yoga, meditation and other relaxation techniques
12. Participate in quiz on technical aspects or current affairs
13. Seminar on problems with possible solutions in the campus or nearby places
14. Participate in NCC
15. Participate in Mock interviews

Note: The above student activities will be assessed using rubrics. A sample rubrics template is given below. The subject teacher can assess students using rubrics with atleast four relevant aspects.

RUBRICS MODEL (For assessing Presentation skills)

Aspects	Needs improvement	Satisfactory	Good	Exemplary
Collection of data	Collects very limited information	Collect much Information with very limited relevance to the topic	Collects some basic information with little bit of irrelevance	Collects a great deal of information with relevance
Presentation of data	Clumsy presentation of data	Presents data well; but presentation needs to be more meaningful	Presents data well but need to improve clarity	Presents data in an understandable yet concise manner
Fulfill team's roles & duties	Performs very little duties but Unreliable.	Performs very little duties and is inactive	Performs nearly all duties	Performs all duties of assigned team roles
Shares work equally	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded
Interaction with other team mates	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening to others	Listens, but sometimes talks too much	Listens and speaks a fair amount
Audibility and clarity in speech	Hardly audible and unclear	Very little audibility and clarity	Audible most of the time with clarity	Audible and clear
Understanding content	Lacks content understanding and is clearly a work in progress	Little depth of content understanding	Some depth of content understanding is evident but needs improvement	Insight and depth of content understanding are evident
Content Presentation	Content is inaccurate and information is not presented in a logical order making it difficult to follow	Content is accurate and information is not presented in a logical order making it difficult to follow	Content is accurate but some information is not presented in a logical order but is still generally easy to follow	Content is accurate and information is presented in a logical order

Suggested additional aspects for assessing Leadership Qualities:

1. Carrying self
2. Punctuality
3. Team work abilities
4. Moral values
5. Communication skills
6. Ensures the work is done in time

Suggested additional aspects for assessing “Participation in social task”

- 1 Interested to know the current situation of society.
- 2 Shows interest to participate in given social task.
- 3 Reliable
- 4 Helping nature
- 5 Inter personal skills
- 6 Ensures task is completed

Suggested additional aspects for assessing “Participation in Technical task”

1. Updated to new technologies
2. Identifies problems in society that can be solved using technology
3. Interested to participate in finding possible technical solutions to identified project
4. Reliable
5. Interpersonal skills

Suggested additional aspects for Carrying Self:

- 1 Stand or sit straight.
- 2 Keep your head level.
- 3 Relax your shoulders.
- 4 Spread your weight evenly on both legs.
- 5 If sitting, keep your elbows on the arms of your chair, rather than tightly against your sides.
- 6 Make appropriate eye contact while communicating.
- 7 Lower the pitch of your voice.
- 8 Speak more clearly.

C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

IV SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Cred its	Examination Scheme						
			Instruction periods per week			Total Periods per semest er		Continuous internal evaluation			Semester end examination			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal evaluati on	Max Mark s	Min Mark s	Total Mark s	Min marks for Passing including internal
1	SC-401	Advanced Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35
2	EE-402	DC Machines and Batteries	4	1	0	75	3	20	20	20	40	14	100	35
3	EE-403	AC Machines	4	1	0	75	3	20	20	20	40	14	100	35
4	ME-414	Basic Mechanical Engineering	4	1	0	75	3	20	20	20	40	14	100	35
5	EE-405	Electrical Power Systems	4	1	0	75	3	20	20	20	40	14	100	35
6	EE-406	Electrical Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50
7	EE-407	DC Machines Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	EE-408	Electrical CAD Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	EE-409	AC Machines Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	HU-410	Employability Skills Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
11	EE-411	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics			--	-
Activities: student performance is to be assessed through Rubrics														

SC-401 - ADVANCED ENGINEERING MATHEMATICS

Course Title	Advanced Engineering Mathematics	Course Code	SC-401
SEMESTER	IV	Course Group	Foundation
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the knowledge of Engineering Mathematics at Diploma first year level and Applied Engineering Mathematics at Diploma 3rd Semester level.

Course Outcomes:

At the end of the course, the student will have the ability to:

CO 1	Solve simple Homogeneous Linear Differential Equations
CO 2	Solve simple Non-Homogeneous Linear Differential Equations and apply them in solving engineering problems.
CO 3	Express $f(x)$ as a Fourier series in the given interval $(c, c + 2\pi)$
CO 4	Express $f(x)$ as a Fourier Half-Range Cosine series and Sine series in $(0, \pi)$
CO 5	Find Laplace transforms of simple functions.
CO 6	Find Inverse Laplace transforms of simple functions and solve Linear Differential Equations using Laplace Transformations.

Course Contents:

Unit – I

Duration: 07 Periods (L: 5 – T: 2)

Homogeneous Linear Differential equations with constant coefficients

Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.

Unit – II

Duration: 16 Periods (L: 13 – T: 3)

Non-Homogeneous Linear Differential equations with constant coefficients

Non-homogenous linear differential equations with constant coefficients of the form $(D)y = X$, where X is in the form $k(a \text{ constant}) e^{ax}$, $\sin(ax)$, $\cos(ax)$, x^n , ($n = 1, 2, 3$) Complimentary Function (CF), Particular Integral (PI) and General Solution (GS).

Unit-III

Duration: 14 Periods (L: 11 – T: 3)

Fourier series

Orthogonality of trigonometric functions, Representation of a function in Fourier series over the interval $(c, c+2\pi)$, Euler's formulae, sufficient conditions for existence of Fourier series for a function $f(x)$. Even, Odd functions and Fourier series over the Interval $(0, 2\pi)$ and $(-\pi, \pi)$

Unit – IV

Duration: 08 Periods (L: 7 – T:1)

Fourier Half-range series

Representation of a function $f(x)$ as a Fourier Half-range Sine series and Cosine series over the interval $(0, \pi)$

Unit – V

Duration: 14 Periods (L: 11 – T: 3)

Laplace Transformations:

Definition, sufficient conditions for existence of Laplace Transform, Laplace Transform of elementary functions, linearity property, Change of scale property, First shifting theorem, multiplication by t^n , division by t , Laplace Transform of derivatives and integrals, unit step function, Laplace Transform of second shifting theorem

Unit – VI

Duration: 16 Periods (L: 13 – T: 3)

Inverse Laplace transforms:

Inverse Laplace transforms- shifting theorems and change of scale property, multiplication by s^n and division by s – Inverse Laplace Transform using partial fractions – convolution theorem (no proof) – application of Laplace Transformations to solve ordinary differential equations of second order with initial conditions.

Recommended Books:

1. Higher Engineering Mathematics, B.S. Grewal.
2. Laplace Transforms - Murray R. Spiegel.
3. Ordinary Differential Equations – R. S. Aggarwal.
4. Fourier Series – A.R. Vasishtha and Gupta.

Suggested E-Learning references:

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html

2. E-books: www.mathebook.net

Suggested Learning Outcomes

At the end of the course, the student will have the ability to:

Unit-I

1.0 Solve Homogeneous linear differential equations with constant coefficients in engineering situations

- 1.1 Solve Differential equations of the type $(aD^2 + bD + c)y = 0$ when the roots of the Auxiliary Equation (A.E) are real & different, real & repeated and complex.
- 1.2 Solve the higher order homogeneous linear differential equations with constant coefficients.

Unit-II

2.0 Solve Non-Homogeneous linear differential equations with constant coefficients in engineering situations

- 2.1 Apply the concept of complementary function, particular Integral to get general solution of a differential equation.
- 2.2 Solve n^{th} order differential equation of the type $f(D)y = X$ where $f(D)$ is a polynomial of second order and X is a function of the form $k, e^{ax}, \sin(ax), \cos(ax), x^n$.
- 2.3 Solve simple problems on the above types of 2.2

Unit-III

3.0 Understand the Fourier series expansion of functions

- 3.1 Know the orthogonality of functions in an interval.
- 3.2 Identify Fourier series of a function in the interval $(C, C+2\pi)$ and use the Euler's Formulae for determining the Fourier coefficients.
- 3.3 Write sufficient conditions for the existence of Fourier series for a function.
- 3.4 Expand Fourier series of simple functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$.
- 3.5 Expand Fourier series for even and odd functions in the interval $(-\pi, \pi)$
- 3.6 Solve simple problems on even and odd functions in the interval $(0, 2\pi)$ and $(-\pi, \pi)$

Unit- IV

4.0 Understand the Half – Range Fourier series expansion of functions

- 4.1 Expand Half – Range Cosine series of a function in the range $(0, \pi)$.
- 4.2 Expand Half – Range Sine series of a function in the range $(0, \pi)$.

4.3 Solve simple problems on Half – Range Cosine and Sine series over the interval $(0, \pi)$

Unit-V

5.0 Understand Laplace transforms

- 5.1 Apply the definition of Laplace Transform and find Laplace transform of standard functions
- 5.2 Identify the sufficient conditions for existence of Laplace Transform.
- 5.3 Use the properties of Laplace Transform – Linearity property, First shifting theorem, Change of Scale property in solving simple problems.
- 5.4 Apply formulae for Laplace transform of $t^n f(t)$, $\frac{f(t)}{t}$, $f^n(t)$, $\int_0^t f(u)du$ in terms of Laplace transform of $f(t)$ to solve simple problems
- 5.5 Identify unit step function and write the Laplace Transform of unit step function
- 5.6 Apply Second shifting theorem in solving simple problems.

Unit-VI

6.0 Use Laplace transforms and Inverse Laplace transforms to solve differential equation in engineering problems

- 6.1 Define inverse Laplace Transform and write inverse Laplace Transforms of standard functions.
- 6.2 Solve simple problems on Inverse Laplace Transforms.
- 6.3 Write Shifting theorems and Change of scale property of inverse Laplace Transform.
- 6.4 Solve simple problems on 6.2
- 6.5 Write inverse Laplace Transforms corresponding to Laplace Transform of the functions $t^n f(t)$, $\frac{f(t)}{t}$, $f^n(t)$, $\int_0^t f(u)du$
- 6.6 Solve simple problems on 6.5
- 6.7 Define convolution of two functions and state convolution theorem.
- 6.8 Solve simple problems on Convolution theorem.
- 6.9 Use Laplace and inverse Laplace Transforms to solve simple differential equations of Second order.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests

5. Seminars
6. Home Assignments.
7. Mathematics for preparing competitive exams and solving old question papers on Arithmetical ability.

CO-PO Mapping Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapped POs
CO1	3	2					3	1,2, 7
CO2	3	2					3	1,2, 7
CO3	3	2					3	1,2, 7
CO4	3	2					3	1,2, 7
CO5	3	2					3	1,2, 7
CO6	3	2					3	1,2, 7

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1 page and 2 pages respectively

Unit No	Questions to be set for SEE				
	R		U	A	
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions		8		8	8

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEM –I, IV SEMESTER
SC-401- ADVANCED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions 04 X 01 = 04

2 Each question carries **ONE** mark

1. Write the General solution of $(aD^2+bD+c)y = 0$, whose roots of auxiliary equation are real and distinct.
2. Find the roots of auxiliary equation of the differential equation $(D^2 + 2D + 1)y = 0$
3. Find the Particular Integral of $(D^2 - 4D + 1)y = e^{8x}$
4. Find the P.I of $(D^2 - 9)y = \cos 3x$

PART-B

Instructions: 1. Answer **ALL** questions 02 X 03 = 06

2. Each question carries **THREE** marks

5 a) Solve $(D^2 + 4D + 13)y = 0$

OR

5 b) Solve $(D^2 + 16)y = 0$

6 a) Solve $(D^2 + 4D + 4)y = 5 + e^{-2x}$

OR

6 b) Find P.I of $(D^3 + D)y = \sin 2x$

PART- C

Instructions: 1. Answer **ALL** questions 02 X 05 = 10

2. Each question carries **FIVE** marks

7 a) Solve $(D^3 - 2D^2 - 4D + 8)y = 0$

OR

7 b) Solve $(D^3 - 6D^2 + 11D - 6)y = 0$

8 a) Solve $(D^2 + 36)y = \sin^2 x$

OR

8 b) Solve : $(D^2 - 3D + 2)y = x + x^2$

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEM –II, IV SEMESTER
SC-401- ADVANCED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Define periodic function and give one example
2. Define Fourier series of the function $f(x)$ in the interval $(0, 2\pi)$
3. Write Half-range sine series of $f(x)$ in the interval $(0, \pi)$
4. Find a_0 for $f(x) = e^x$ in $0 < x < \pi$

PART-B

Instructions:

1. Answer **ALL** questions

02 X 03 = 06

2. Each question carries **THREE** marks

5 a) If $f(x) = x^2$ in $(0, 2\pi)$, then find the value of a_n in Fourier series of $f(x)$

OR

5 b) If $f(x) = |x|$ in $(-\pi, \pi)$, then find the value of a_1 in Fourier series of $f(x)$

6 a).Find the value of a_n in half-range Cosine series for the function $f(x) = e^x$ in $(0, \pi)$

OR

6 b) Obtain the Fourier Half – Range Sine series for $f(x) = (\pi - x)$ in the interval $(0, \pi)$

PART- C

Instructions:

1. Answer **ALL** questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7 a) Obtain the Fourier series for $f(x) = x$ in the interval $0 < x < 2\pi$

OR

7 b) Find the Fourier series for $f(x) = (x - x^2)$ in the interval $(-\pi, \pi)$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots + = \frac{\pi^2}{12}$$

8 a) Express $f(x) = \pi x - x^2$ as a half-range Sine series in $(0, \pi)$

OR

8 b) Find the half –range cosine series for the function $f(x) = x^2$ in the interval $(0, \pi)$

BOARD DIPLOMA EXAMINATION, (C-21)
IV SEMESTER END EXAMINATION
SC-401- ADVANCED ENGINEERING MATHEMATICS

Time: 2 hours

[Total Marks: 40]

PART-A

Instructions:

1. Answer **ALL** questions

08 X 01 = 08

2 Each question carries **ONE** mark

1. Find the roots of auxiliary equation of the differential equation $(D^2 + 4D)y = 0$.
2. Define Fourier Series for the function $f(x)$ in the interval $(c, c+2\pi)$
3. Find the Particular Integral of $(D^2 - 4D + 1)y = e^x$
4. Find $L(e^{2t} + \cos 3t)$
5. Find $L(t + 5\cos ht)$
6. State the First Shifting theorem of Laplace Transforms.
7. Find $L^{-1}\left(\frac{1}{s-3} + \frac{s}{s^2+4}\right)$
8. Find $L^{-1}\left(\frac{1}{2s+5}\right)$

PART-B

Instructions:

1. Answer **ALL** questions

04 X 03 = 12

2. Each question carries **THREE** marks

9a) Solve $(D^2 + D + 1)y = 4e^{3x}$

OR

9 b) Find $L(t\cos 3t)$

10 a) Find Half Range Sine Series of $f(x) = x$ in $(0, \pi)$

OR

10 b) Find $L^{-1}\left(\frac{s+1}{s^2+6s-7}\right)$

11 a) If $L\{f(t)\} = \frac{20-4s}{s^2-4s+20}$, find $L\{f(3t)\}$

OR

11 b) Find $\int_0^\infty t \cdot e^{-2t} \sin 3t dt$ using Laplace Transform Technique

12 a) Show that $L^{-1}\left(\frac{1}{s(s^2+a^2)}\right) = \frac{1-\cos at}{a^2}$

OR

12 b) Find $L^{-1} \left(\frac{s}{(s+2)^2+4} \right)$

PART- C

Instructions:

1. Answer **ALL** questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13 a) Solve: $(D^2 + D - 2) y = x + \sin x$

OR

13 b) Find $L[te^t \sin 3t]$

14 a) Expand $f(x) = x^2$ as a Fourier series in the interval $(-\pi, \pi)$

OR

14 b) Find $L^{-1} \left(\frac{s}{(s+1)^2(s^2+1)} \right)$

15 a) Find $L \left(\frac{\sin 3t \cdot \cos t}{t} \right)$

OR

15 b) Evaluate $L \left\{ \int_0^t \frac{\sin t}{t} dt \right\}$

16 a) Find $L^{-1} \left(\frac{1}{(s+1)(s+2)} \right)$ using Convolution theorem.

OR

16 b) Solve the differential equation $y'' - 2y' - 8y = \sin t$, when $y(0) = 3$, $y'(0) = 6$ by Laplace Transform method.

EE-402-DC MACHINES AND BATTERIES

Course Title	DC Machines and Batteries	Course Code	EE-402
SEMESTER	IV	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic principles of electricity and magnetism.

Course Outcomes

At the end of the course, the student will have the ability to:

CO 1	Describe the construction and working of D.C Generator
CO 2	Compare the performance characteristics of D.C Generators
CO 3	Explain the principle and performance of D.C Motors
CO 4	Compare the performance characteristics of D.C Motors
CO 5	Apply different methods to control speed, testing and braking of D.C Motor
CO 6	Compare different types of Batteries

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Fundamentals of D.C Generators	14	Q4	Q1		Q9(a)	Q13(a)
2	Armature Reaction and Characteristics of D.C Generator	11					
3	Fundamentals of D.C Motors	15		Q2		Q10(a)	Q14(a)
4	Starters, Characteristics and Applications of D.C Motors	10					
5	Speed control, Testing and Braking of D.C Motors	15		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Batteries	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Contents

UNIT 1- Fundamentals of D.C Generators

Duration: 14 Periods (L: 11 - T: 3)

Dynamically induced E.M.F- Fleming's right hand rule - electromechanical energy conversion - working principle of D.C generator - simple loop generator – construction and functions of each part of D.C generator with neat sketches - Lap and Wave windings – E.M.F equation -Classification of generators based on excitation- Voltage and Current equations of different types of D.C Generators with schematic diagrams– power stages of DC generator - losses in D.C machines-efficiency –condition for maximum efficiency - simple problems

UNIT 2 - Armature Reaction and Characteristics of D.C Generator

Duration: 11 Periods (L:9 - T: 2)

Armature reaction, Demagnetization & Cross magnetization-Derivation for AT_d per pole and, AT_c per pole- simple problems-commutation –methods of improving commutation- O.C.C, internal, external characteristics of Separately excited, Shunt, Series and Compound generators- Conditions for building up of EMF – reasons for not building up of E.M.F. - Critical field resistance and critical speed from O.C.C - parallel operation of generators - Applications of D.C generators – Welding Generator.

UNIT 3– Fundamentals of D.C Motors

Duration: 15 Periods (L:12 - T:3)

Fleming's left hand rule - working of D.C motors – significance of back E.M.F.-classification of DC motors- Connection diagrams, voltage and current equations for different D.C motors-Problems – Torque equation-Armature torque (T_a) , shaft torque (T_{sh}) and loss torque(T_L) –Problems on Torque- Different losses-power stages-efficiency-Problems on losses and efficiency.

UNIT4 : Starters, Characteristics and Applications of D.C Motors

Duration: 10 Periods (L: 8– T:2)

Necessity of starter- 3-point starter, 4-point starter. Electrical and mechanical characteristics of D.C Shunt, Series and compound motors-Applications of D.C motors

UNIT 5 : Speed control ,Testing and braking of D.C Motors

Duration: 15 Periods (L: 12 – T:3)

Necessity of speed control- Speed controls for D.C shunt motors (flux control, armature voltage control and voltage control methods) - advantages and disadvantages -methods of speed control for DC series motors- problems. Brake test on D.C. Motors- Performance curves- Swinburne's Test-advantages and disadvantages- problems. Types of braking –

Advantages of Electrical braking- methods of Electrical braking- Plugging, Rheostatic braking and Regenerative braking applied to DC shunt and DC series motors- simple problems on plugging and rheostatic braking

UNIT 6 : Batteries

Duration:10 Periods (L:8 T:2)

Classification of cells - primary cells and secondary cells - construction of Lead acid cell - chemical reaction during charging and discharging of lead acid cell - applications - charging of Batteries – precautions during charging and discharging - trickle charging - indications of fully charged battery - capacity of a battery - factors affecting the capacity of the battery - Ampere-Hour efficiency - Watt- Hour efficiency - problems - flat plate battery - tubular battery - applications - Lithium-ion cell- applications - super capacitor - applications - metal air electrochemical cell – refuelable battery - applications - maintenance free battery – applications - methods of disposing batteries.

Recommended Books

1. Electrical Technology by H.Cotton
2. Electrical Technology –Vol –I by B.L.Theraja.
3. Electrical Technology –Vol –II by B.L.Theraja.
4. Electrical Machines by P.S.Bhimbhra
5. Electrical Machines by M.V.Deshpande
6. Electrical Machines by JB Gupta

Suggested E-learning references

1. <http://electrical4u.com/>
2. <https://nptel.ac.in/syllabus/108106070/>
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <https://nptel.ac.in/courses/108108076/>
5. <https://nptel.ac.in/courses/108105053/>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 Define dynamically induced E.M.F.
- 1.2 State Fleming's right hand rule.
- 1.3 Define Electromechanical energy conversion.
- 1.4 State principle of working of D.C generator.
- 1.5 Explain the working of simple loop generator.
- 1.6 Describe the construction of DC generator

- 1.7 State the functions of each part of D.C generator with neat sketches.
 - 1.8 Describe the working of D.C Generator.
 - 1.9 List the types of windings of D.C Machine (i) Lap (ii) Wave.
 - 1.10 Compare lap winding and wave winding
 - 1.11 Derive the E.M.F equation of D.C generator.
 - 1.12 Solve simple problems on E.M.F equation.
 - 1.13 Classify generators based on excitation.
 - 1.14 Write voltage and current equations for different types of D.C Generators with schematic diagrams.
 - 1.15 Explain power stages in D.C. machine
 - 1.16 List the losses incurred in the D.C machines.
 - 1.17 Define efficiency of DC Generator
 - 1.18 Derive the condition for maximum efficiency.
 - 1.19 Solve problems on losses and efficiency.
-
- 2.1. Define armature reaction.
 - 2.2. Describe the armature reaction with sketches.
 - 2.3. Describe the phenomenon of demagnetization & cross magnetization.
 - 2.4. Derive the formula for AT_d , AT_c / Pole.
 - 2.5. Solve simple problems on AT_d , AT_c / Pole .
 - 2.6. Define Commutation.
 - 2.7. List the methods to improve commutation.
 - 2.8. Draw and explain O.C.C, internal and external characteristics of Separately excited generator
 - 2.9. Draw and explain O.C.C, internal and external characteristics of Shunt generator.
 - 2.10. Draw and explain O.C.C, internal and external characteristics of Series generator
 - 2.11. Draw and explain O.C.C, internal and external characteristics of Compound generators.
 - 2.12. List the conditions for building up of EMF and reasons for not building up of E.M.F in DC generators.
 - 2.13. Define critical field resistance and critical speed from O.C.C
 - 2.14. Explain the necessity of parallel operation of DC generators.
 - 2.15. List the conditions for parallel operation of generators.
 - 2.16. State the use of equalizer ring in parallel operation.
 - 2.17. List the applications of D.C generators.
 - 2.18. Describe the working of welding generator with a sketch.
-
- 3.1 State Fleming's left hand rule.
 - 3.2 Describe the working of D.C motors
 - 3.3 Write the significance of back E.M.F and its formula.

- 3.4 Classify D.C motors.
- 3.5 Write voltage and current equations for different D.C motors.
- 3.6 Solve problems on back E.M.F
- 3.7 Derive torque equation of D.C motor.
- 3.8 Develop the formulas for armature torque (T_a), shaft torque (T_{sh}) and loss torque(T_L).
- 3.9 Solve problems on torque.
- 3.10 Explain power stages in D.C. motor.
- 3.11 List the different losses in D.C motor.
- 3.12 Define efficiency of D.C motor
- 3.13 Solve problems on losses and efficiency.

- 4.1. State the necessity of starter.
- 4.2. Describe the construction and working of 3-point starter with neat sketch.
- 4.3. Describe the construction and working of 4-point starter with neat sketch.
- 4.4. Draw and explain the electrical characteristics of D.C Shunt motor.
- 4.5. Draw and explain the mechanical characteristics of D.C Shunt motor
- 4.6. Draw and explain the electrical characteristics of D.C Series motor.
- 4.7. Draw and explain the mechanical characteristics of D.C Series motor
- 4.8. Draw and explain the electrical characteristics of D.C compound motor (cumulative and differential compound) .
- 4.9. Draw and explain the mechanical characteristics of D.C compound motor (cumulative and differential compound).
- 4.10. List the applications of D.C motors

- 5.1 State the need of speed control of DC Motors.
- 5.2 List the different methods of speed controls for D.C shunt motors.
- 5.3 Describe the speed control of D.C shunt motor by flux control method
- 5.4 Describe the speed control of D.C shunt motor by armature control method
- 5.5 Describe the speed control of D.C shunt motor by voltage control method
- 5.6 List the advantages and disadvantages of various speed control methods of D.C Shunt Motor.
- 5.7 Solve problems on speed control of DC shunt motor
- 5.8 List the different methods of speed control for D.C series motors.
- 5.9 Describe the speed control methods of D.C series motor.
- 5.10 List the advantages and disadvantages of speed control methods of D.C series motor.
- 5.11 Solve problems on speed control of DC series motor
- 5.12 Describe the method of conducting brake test on D.C shunt motor with neat sketch
- 5.13 Describe the method of conducting brake test on D.C series motor with neat sketch
- 5.14 Describe the method of conducting brake test on D.C compound motor with neat sketch
- 5.15 Explain different performance curves.
- 5.16 List the advantages and disadvantages of brake test on different types of D.C Motors.
- 5.17 Solve problems on brake test on different types of D.C Motors.

- 5.18 Describe the method of conducting Swinburne's test.
- 5.19 Solve problems on Swinburne's test
- 5.20 List the advantages and disadvantages of Swinburne's test.
- 5.21 State the necessity of braking
- 5.22 List the types of braking
- 5.23 State the advantages of electrical braking
- 5.24 List the types of electrical braking
- 5.25 Explain plugging in DC shunt motor and DC series motor
- 5.26 Solve simple problems
- 5.27 Explain rheostatic or dynamic braking in DC shunt and series motor
- 5.28 Solve simple problems
- 5.29 Explain the concept of regenerative braking in DC shunt and DC series motor

- 6.1. Classify cells
- 6.2. Define primary cells and secondary cells
- 6.3. Compare primary and secondary cells
- 6.4. State types of storage cells
- 6.5. Describe the construction of Lead acid cell.
- 6.6. Write chemical reactions during charging and discharging of lead acid cell
- 6.7. List the applications of Lead acid cell
- 6.8. Describe charging of Batteries by a) Constant current method b) Constant voltage method
- 6.9. List the precautions during charging and discharging.
- 6.10. Define trickle charging
- 6.11. List the indications of full charged battery.
- 6.12. Define capacity of a battery
- 6.13. List the factors affecting the capacity of the battery
- 6.14. Define a) Ampere-Hour efficiency and b) Watt- Hour efficiency
- 6.15. Solve problems on the Ampere-Hour efficiency and Watt-Hour efficiency
- 6.16. Compare flat plate and tubular battery
- 6.17. List the applications of flat plate battery
- 6.18. List the applications of tubular battery
- 6.19. Describe the construction of Lithium-ion cell.
- 6.20. Write chemical reaction during charging and discharging of Lithium-ion battery
- 6.21. Give the applications of Lithium-ion cell
- 6.22. State the importance of super capacitor
- 6.23. List the applications of super capacitor

- 6.24. Describe the working of metal air electrochemical cell
- 6.25. List the applications of metal air battery
- 6.26. State the importance of refuelable battery
- 6.27. List the applications of refuelable battery
- 6.28. Define maintenance free battery.
- 6.29. List the applications of maintenance free batteries
- 6.30. List different methods of disposing batteries.

Suggested Student Activities

1. Prepare charts on types of starters used for various DC motors clearly labeling the parts.
2. Visit nearby shop or show room which sells batteries and inverters (UPS) and prepare a report on the observations made during visit.
3. Identify a faulty battery and service the same using standard tools.
4. Prepare a report of the conditions of batteries available in the Institute.
5. For given voltage, current, Ah ratings of individual cell, and required voltage and current rating of battery, prepare a report of calculations for number of cells and their method of connections.
6. Visit any industry and write a report on the DC machines used in that industry
7. Prepare a chart on DC motor speed control techniques
8. Make charts of various types of DC motors and generators, electrical equivalent circuit diagrams clearly indicating voltages and currents flowing in the machine. Also write the formulae of armature current, field current, line or load current, terminal voltage and back emf or induced emf
9. Quiz
10. Group discussion
11. Surprise test.

CO-PO Mapping Matrix

	Basic and discipline specific knowledge	Problem analysis	Design / development of solutions	Engineering Tools, Experimentation and Testing	Engineering practices for society sustainability and environment	Project Management	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3						3	1,7
CO2	3		1	1			3	1,3,4,7
CO3	3						3	1,7
CO4	3			1			3	1,4,7
CO5	3		1	2			3	1, 3,4,7
CO6	3			1	1		3	1,4,5,7

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
Total		60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U	A	
I	4	1		9(a)	13(a)
II					
III		2		10(a)	14(a)
IV					
V		3	5, 6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)
VI					
Total Questions	8		8	8	

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER MID SEMESTER-I EXAMINATION

Course Code: EE-402
Course Name: DC Machines and Batteries

Duration: 1 hour
Max.Marks:20

PART-A

Answer **all** questions, Each Question carries one-mark

4x1 = 4 Marks

1. State the working principle of DC generator
2. State different parts in a DC generator
3. State the effects of armature reaction in a DC generator?
4. Define critical field resistance in DC generator.

PART-B

Answer two questions. Each question carries three marks

2x 3 = 6 Marks

- 5 a) Draw the power flow diagram of a DC generator.

OR

- b) Compare lap winding and wave winding in any three aspects.

6. a) List the conditions to be satisfied for parallel operation of dc generators?

OR

- b) Define commutation and list the methods to improve it.

PART-C

Answer two questions. Each question carries five marks

2x 5 = 10 Marks

7. a) A long shunt compound generator delivers a load current of 400A at a terminal voltage of 250V. The armature resistance, series field and shunt field resistances are 0.04 ohm, 0.01 ohm and 125 ohms respectively. Calculate the generated emf and armature current. Allow 1 V per brush contact drop.

OR

- b) Derive the EMF equation of a DC Generator.

8. a) Explain the OCC of self-excited DC generator

OR

- b) Describe the working of welding generator.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER MID SEMESTER-II EXAMINATION

Course Code: EE-402
Course Name: DC Machines and Batteries

Duration:1 hour
Max.Marks:20

PART-A

Answer **all** questions, Each Question carries one mark

4x1 = 4 Marks

- 1) State the types of DC motors
- 2) State the losses in DC motors
- 3) Draw the torque Vs armature current characteristics for a D.C shunt motor.
- 4) List any two applications of D.C shunt motor

PART-B

Answer **two** questions. Each question carries three marks

2x 3 = 6 Marks

5. a) Write the significance of back E.M.F and its formula in DC motors
OR
b) Draw the circuit diagram of DC shunt motor and write the voltage and current equations.
- 6 a) Explain the necessity of starter in D.C Motors
OR
b) State the function of Hold on coil and over load release of a 3-point starter.

PART-C

Answer two questions. Each question carries five marks

2x 5 = 10 Marks

- 7 a) Derive the torque equation of a D.C Motor
OR
b) A 440 V shunt motor has armature resistance of 0.8 ohm and field resistance of 200 ohms. Determine the back e.m.f when giving an output of 7.46 KW at 85% efficiency.
8. a) Draw 3 point starter and label the parts.
OR
b) Draw and explain the mechanical characteristics of D.C series motor.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-402
Course Name: DC Machines and Batteries

Duration: 2 hours
Max. Marks: 40 Marks

PART-A

Answer **all** questions

8x1 = 8 Marks

- 1) Define armature reaction.
- 2) State the types of DC motors.
- 3) State the method of speed control of DC shunt motor which gives below normal speed
- 4) State any two applications of DC series motor.
- 5) State any two factors affecting speed of a DC motor.
- 6) State the methods electrical braking.
- 7) List any two applications of Lithium- ion cell.
- 8) Define trickle charging.

PART-B

Answer **four** questions

4 x 3 = 12 Marks

9. a) Draw the circuit diagram to conduct OCC of a DC separately excited generator and its characteristic curve.

OR

b) Draw the circuit diagram of speed control of DC shunt motor by field control method.

10. a) Draw Electrical and Mechanical characteristics of DC series motor.

OR

- b) List any three applications of maintenance free batteries.

11. a) State any three advantages of Swinburne's test in DC motors

OR

- b) State any three advantages of Electric Braking.

12. a) Compare Primary cells and secondary cells in any three aspects.

OR

- b) List the indications of fully charged battery.

PART-C

Answer **four** questions

4 x 5 = 20

Marks

13. a) A 10KW, 250 V DC shunt generator has total iron and friction losses of 600W. Its armature and shunt field resistances are 0.5Ω and 125Ω respectively. Calculate efficiency at rated load.

OR

- b) Explain the speed control of DC series motor by field diverter.

14. a) Draw the connection diagram of a 3 point starter and indicate the parts.

OR

- b) Compare flat plate battery and tubular battery in any five aspects.

15. a) The following readings are obtained during the brake test of DC shunt motor.

Spring balance readings = 10 Kg and 35 Kg, Diameter of the drum = 40 cm

Speed of the motor = 950 rpm Applied voltage = 200 V Line current = 30 A

Calculate the output and efficiency.

OR

- b) Explain the Plugging method of Electrical braking in DC shunt motor.

- 16.a) Explain the charging of a battery by constant voltage method.

OR

- b) A lead acid cell is discharged at a steady current of 5A for 11 hours. The average terminal voltage being 1.8 V. To restore it to its original state of charge a current of 3A for 30 hours is required, the average terminal voltage being 2.2V. Calculate the ampere hour efficiency(AH) and watt hour efficiency(WH).

EE-403-AC MACHINES

Course Title	AC Machines	Course Code	EE-403
SEMESTER	IV	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of electromagnetic circuits, and physical forces induced in conductors.

Course Outcomes

CO1	Describe the construction and working of single phase transformer
CO2	Determine the Equivalent circuit parameters of a single phase transformer
CO3	Evaluate the performance of single phase transformers
CO4	Describe the construction of three phase transformers and their applications
CO5	Analyze the behavior of alternators
CO6	To be familiar with the working of alternators

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Fundamentals of single phase transformers	10	Q4	Q1		Q9(a)	Q13(a)
2	Tests on single phase transformers	15					
3	Performance of single phase transformers	15		Q2		Q10(a)	Q14(a)
4	Three phase transformers	10					
5	Fundamentals of Alternators	15		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Performance of alternators	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Content

UNIT 1 : Fundamentals of single phase Transform

Duration: 10 Periods (L: 8 - T: 2)

Introduction to transformer-Classifications of transformers,-Construction of transformers-Theory of an ideal transformer –EMF equation derivation –Problems on calculation of EMF-Transformer ratio-Special transformers- expression for copper saving –applications

UNIT 2 :Tests on single phase transformers

Duration: 15 Periods (L:12 - T:3)

Working of Transformer on no load – Vector Diagram –Working of Transformer on load – Vector Diagram-Equivalent circuit of transformer-Short circuit test-Open circuit test-Determination of Equivalent circuit parameters-Problems – Sumpner's test

UNIT 3 Performance of single phase transformers

Duration: 15 Periods (L: 12 - T: 3)

Regulation-Derivation of approximate equation for regulation based on vector diagram for lagging, leading, unity power factor – Numerical problems on regulation-efficiency- condition for maximum efficiency – problems on efficiency- Calculation of all day efficiency for a given load cycle- problems on all day efficiency

UNIT 4 Three Phase Transformers

Duration: 10 Periods (L: 8 - T: 2)

Three Phase Transformers-Construction-Different transformer configurations-Applications of different transformer configurations-parallel operation -Tap changing gear - NO load and ON load tap changing procedure- Applications of three phase transformers -Special purpose transformers – Gas Insulated Transformer –advantages, disadvantages and applications.

UNIT 5 Alternators

Duration: 15 Periods (L:10 - T: 5)

Alternators –Types of alternators – Brief description of parts with sketches and function of each part, construction- Specifications-Assembly - Exciter and pilot exciter - Stationary armature type construction - Advantages, Concentrated and distributed windings - short pitch and full pitch coils - Effect of chording and distribution factors - EMF equation - Derivation – Problems- phasor diagram for unity, lagging and leading power factor loads –concept of powerformers – advantages, permanent magnet synchronous generator

UNIT 6 Performance of Alternators

Duration: 10 Periods (L: 8 – T: 2)

Regulation – Different methods of finding regulation- Calculation of regulation by synchronous impedance method- Necessity for parallel operation –Condition to be fulfilled for Synchronization,-Synchronisation by lamp methods – Procedure to connect a Diesel Engine generator to the supply mains –Load sharing – simple problems-Effect of change in excitation and input of an alternator connected to infinite bus.

Recommended Books

1. B.L. Theraja-Electrical Technology – Vol –II S.Chand& Co.
2. M.G Say –AC machines
3. P.S. Bhimbra–Electrical machines – Khanna Publishers
4. A.E. Fitzgerald, C. Kingsley and S. Umans Electrical machinery-McGraw Hill
5. MV Deshpande-Electric machines – Wheeler publishing.
6. BR Gupta and VandanaSinghal– Fundamentals of Electric machines

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://www.siemens.com/content/dam/internet/siemens-com/global/products-services>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

UNIT 1 : Fundamentals of single phase Transformer

- 1.1 Define the word ‘Transformer’
- 1.2 Explain the working principle of single-phase transformer.
- 1.3 State the reason for not operating transformer on DC Supply
- 1.4 Classify the transformers based on Number of phases
- 1.5 Classify the transformers based on Construction
- 1.6 Classify the transformers based on Function
- 1.7 Explain the constructional details of transformers.
- 1.8 State the purpose and function of each part of the transformer with legible sketch.
- 1.9 Explain about core type transformer
- 1.10 Explain about the shell type transformer.
- 1.11 Distinguish between core type and shell type transformers.
- 1.12 Define an Ideal Transformer
- 1.13 Derive the E.M.F equation of a single phase transformer.
- 1.14 Solve problems on EMF equation
- 1.15 Define Turns Ratio of transformer
- 1.16 Define Voltage transformation Ratio of transformer
- 1.17 Define Current transformation Ratio of transformer

- 1.18 List the special transformers used in industry.
- 1.19 Define an Auto transformer
- 1.20 Derive the expression for saving of copper in auto transformer
- 1.21 State the advantages of autotransformers
- 1.22 State the disadvantages of autotransformers
- 1.23 List the applications of transformers

UNIT 2 :Tests on single phase transformers

- 2.1 Explain working of transformer at No-Load with the help of its vector diagram.
- 2.2 Explain working of transformer at Load with the help of vector diagram for Unity power factor
- 2.3 Explain working of transformer at Load with the help of vector diagram for Lagging power factor
- 2.4 Explain working of transformer at Load with the help of vector diagram for leading power factor
- 2.5 State the losses taking place in a transformer.
- 2.6 State the effects of resistance and leakage reactance of primary and secondary windings.
- 2.7 State the significance of air gap
- 2.8 Draw the equivalent circuit of a transformer by approximation
- 2.9 Explain the procedure to find equivalent circuit parameters from No-load test on single phase transformer
- 2.10 Explain the procedure to find equivalent circuit parameters from short circuit test on single phase transformer
- 2.11 Problems on the computing the equivalent circuit parameters of a single phase transformer
- 2.12 Explain the procedure of conducting polarity test on single-phase transformer.
- 2.13 Explain the procedure of conducting Sumpner's test on a transformer
- 2.14 State the necessity of break down voltage test on transformer oil

UNIT 3 Performance of single phase transformers

- 3.1. Define Regulation
- 3.2. Derive the approximate equation of regulation for transformer.

- 3.3. Solve the problems to calculate the regulation of a single phase transformer for loads with unity power factor
- 3.4. Solve the problems to calculate the regulation of a single phase transformer for loads with lagging power factor
- 3.5. Solve the problems to calculate the regulation of a single phase transformer for loads with leading power factor
- 3.6. State the reason for using the unit KVA for the transformer rating
- 3.7. Derive efficiency of a single phase transformer
- 3.8. Find the condition for maximum efficiency of a single phase transformer
- 3.9. Compute numerical problems for calculating the efficiency of the transformer
- 3.10. Define all day efficiency
- 3.11. Solve numerical problems for calculating all day efficiency
- 3.12. Define Distribution transformer
- 3.13. Define Power Transformer
- 3.14. Differentiate between distribution transformer and power transformer.
- 3.15. Mention the reasons for failures of a transformer
- 3.16. State the reasons for humming noise near a transformer and the methods to reduce the noise level.

UNIT 4 Three Phase Transformers

- 4.1. State the advantages of 3 phase transformer over single phase transformer
- 4.2. List the different types of three phase transformers by giving their symbolic representation and voltage relationships.
- 4.3. State the applications of star-star transformer
- 4.4. Mention the applications of delta-star transformers
- 4.5. List the applications of star-delta transformers
- 4.6. State the applications of delta-delta transformers
- 4.7. State the need for parallel operation of transformer.
- 4.8. Mention the specifications of a transformer
- 4.9. State the Benefits for use of amorphous core in a transformer
- 4.10. Mention the conditions for parallel operation and load sharing of transformers.
- 4.11. State the necessity of cooling of power transformers.
- 4.12. Explain the methods of cooling of power transformer.
- 4.13. Draw a legible sketch of a power transformer

- 4.14. Explain the function of each part of a power transformer.
- 4.15. Explain the 'ON load' and 'OFF load' tap changing.
- 4.16. Explain the procedure for tap changing on load and no load tap changer
- 4.17. Mention the purpose of application of a transformer as phase shifter
- 4.18. Mention the purpose of application of a transformer as HVDC Transformer
- 4.19. State the purpose of application of a transformer as traction transformer
- 4.20. Mention the purposed of Isolation transformers.
- 4.21. List the advantages of Gas Insulated Transformer.
- 4.22. List the disadvantages of Gas Insulated Transformer.
- 4.23. List the applications of Gas Insulated Transformer.

UNIT 5 Alternators

- 5.1. Explain the Principle of working of Alternators
- 5.2. Describe the constructional details of Alternators with legible sketch.
- 5.3. Classify the alternators based on rotor construction
- 5.4. Explain the construction and working of Cylindrical rotor alternator
- 5.5. Explain the construction and working of salient pole rotor alternator
- 5.6. State the specifications of an alternator
- 5.7. State the advantage of Stationary Armature.
- 5.8. List the main parts of alternator
- 5.9. Mention the materials used for different parts of an alternator
- 5.10. Derive the expression for Chording factor
- 5.11. State the effect of chording factor
- 5.12. Derive the expression for Distribution factor
- 5.13. State the effect of Distribution factor
- 5.14. Derive EMF equation of an alternator taking into account distribution factor and pitch factor.
- 5.15. Solve simple problems on EMF equation
- 5.16. State the need for an exciter in an Alternator.
- 5.17. List the various types of exciters
- 5.18. Explain armature reaction of Alternator at different power factors
- 5.19. State the reasons for voltage variations on Load.
- 5.20. Define the term synchronous impedance.

- 5.21. State the effects of synchronous impedance on the operation of the Alternator
- 5.22. Draw the equivalent circuit representing armature resistance, leakage reactance and armature reaction reactance
- 5.23. Obtain the relation between No load EMF and terminal voltage in Alternator.
- 5.24. Draw the vector diagram for No load EMF in alternator at different load power factors
- 5.25. State the concept of powerformers.
- 5.26. List the advantages of powerformers.
- 5.27. Describe the construction and working of permanent magnet synchronous generator
- 5.28. List the applications of permanent magnet synchronous generator

UNIT 6 Performance of Alternators

- 6.1. Define regulation of an alternator.
- 6.2. List the different methods of finding the regulation of alternator.
- 6.3. Calculate the regulation by synchronous impedance method.
- 6.4. State the expressions for No load e.m.f. of alternator at different powerfactors
- 6.5. Solve problems on Synchronous impedance method.
- 6.6. Explain the necessity for parallel operation of three phase alternators
- 6.7. State the conditions for synchronization for three phase alternators
- 6.8. Define synchronization of alternators
- 6.9. List the methods of synchronization of alternators
- 6.10. Explain the procedure for synchronization of alternators by using Dark and Bright lamp method
- 6.11. Explain the procedure for synchronization of alternators by using Synchroscope
- 6.12. Describe the procedure to connect a Diesel Engine generator to the supply mains
- 6.13. Explain the method for adjusting the loads shared by two alternators (or one alternator with Infinite bus bar).
- 6.14. Explain the effect of change in input and excitation of an alternator connected to infinite bus.
- 6.15. Solve problems on load sharing.

Suggested Student Activities

- 1 Prepare charts on types of transformers clearly labelling the parts.
- 2 Visit nearby transformer in your surroundings and prepare a report on the observations made during visit along with photos.
- 3 Visit the transformer manufacturing unit and prepare a report
- 4 Prepare a report on different transformers available in your Institute.
- 5 Do the maintenance of 50MVA transformer
- 6 Make charts of various transformer configurations
- 7 Quiz
- 8 Group discussion
- 9 Surprise test.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	-	1	-	-	-	3	1, 3, 7
CO2	3	1	2	1	-	-	3	1, 2, 3,4,7
CO3	3	-	-	-	1	-	3	1, 5, 7
CO4	3	-	2	-	1	-	3	1, 3, 5,7
CO5	3	1	2	2	-	-	3	1 2,3,4,7
CO6	2	-	-	2	-	-	3	1,4,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed

¼ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

SUB CODE: EE-403

AC MACHINES

MID SEM -I EXAM MODEL PAPER

TIME: 1 HOUR

TOTAL MARKS: 20

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions

(2) Each question carries **one** mark.

1. Define Transformer.
2. Define Turns Ratio in transformer
3. Draw the vector diagram of a transformer on NO load
4. List the losses taking place in a transformer

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.

(2) Each question carries **three** marks.

5. a) A single phase transformer has 400 turns on the primary winding and 1000 turns on the secondary winding if it is operating at 50Hz supply with a maximum flux of 0.045wb find
(i) the primary and secondary induced emf

OR

- 5 b) What are the advantages of an Auto transformer
6. a) Draw the equivalent circuit of a transformer by approximation

OR

- 6 b) State the significance of airgap

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer the following questions.

(2) Each question carries **five** marks.

- 7 a) Distinguish between core type and shell type transformers.

OR

- 7 b) Explain the function of each part of the transformer.
- 8 a) Explain working of transformer at Load with the help of vector diagram for Unity power

OR

- 8 b) The resistances and leakage reactance's of a 30 kVA, 2400 V/240 V distribution transformer are $R_1 = 0.68 \Omega$; $R_2 = 0.0068 \Omega$; $X_{l1} = 7.8 \Omega$; $X_{l2} = 0.0780 \Omega$; Where subscript 1 denotes the 2400 V winding and subscript 2 denotes the 240 V winding. Each quantity is referred to its own side of the transformer. Draw the equivalent circuit referred to High Voltage side

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
MID SEM –II EXAM MODEL PAPER
SUB CODE: EE-403 **SUBJECT NAME : AC MACHINES**
TIME: 1 HOUR **TOTAL MARKS: 20**

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define Regulation
2. Define All Day Efficiency
3. State the applications of star-star transformer
4. State the necessity of cooling of power transformers

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5 a) State the reason for using the unit KVA for the transformer rating

OR

- 5 b) State the reasons for humming noise near a transformer

- 6 a) State the advantages of 3 phase transformer over bank of three single phase transformers

OR

- 6 b) State the need for parallel operation of a transformer

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

- 7a) Differentiate between distribution transformer and power transformer.

OR

- 7 b) A 500KVA ,6000/400 V ,1- ϕ transformer has a primary and secondary winding resistances of 0.4Ω and 0.0015Ω respectively. The Iron losses are 3.2KW, Calculate the efficiency of transformer on full load assuming the p.f of the load to be 0.8 lagging

- 8 a) Explain the OFF load tap changing method on a transformer

OR

- 8 b) Explain the methods of cooling of power transformer.

EE-403

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
SEMESTER END EXAM MODEL PAPER

SUB CODE: EE-403 **SUBJECT NAME: AC MACHINES**

TIME: 2 HOURS **TOTAL MARKS: 40**

PART – A

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

Marks: 8 X 1 = 8

1. List the applications of transformers
2. Define Regulation
3. List the main parts of alternator
4. State the need for parallel operation of a transformer
5. State the specifications of an alternator
6. List the types of exciters
7. Define regulation of an alternator.
8. List the different methods of finding the regulation of alternator

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.

Marks: 4 X 3 = 12

9a) State the losses taking place in a transformer

OR

9b) Calculate the e.m.f induced per phase in a 3- ϕ , 8-pole, 50 Hz star connected alternator. The stator has 160 slots and 6 conductors per slot. Assume $K_p=1$ and $K_d=0.96$. The flux per pole is 0.16 wb

10a) State the advantages of three phase transformers over bank of three single phase transformers

OR

10b) Explain the effect of change in input and excitation of an alternator connected to infinite bus

11a) Classify the alternators based on rotor construction

OR

11b) State the advantage of Stationary Armature.

12a) State the conditions for synchronization for three phase alternator

OR

12 b) Explain the necessity for parallel operation of three phase alternators

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks.

Marks: 4 X 5 = 20

13a) Derive the E.M.F equation of a single phase transformer.

OR

13 b) Derive the expression for Chording factor

14 a) Explain the function of each part of a power transformer

OR

14b) Two alternators working in parallel have induced *emf's* on open circuit of $230\angle 0^\circ$ and $230\angle 10^\circ$ and having reactances of $j2\ \Omega$ and $j3\ \Omega$ respectively. Calculate

- Terminal voltage
- Power delivered by each of the alternators to a resistive load of $6\ \Omega$.

Neglect alternator resistances

15a) Obtain the relation between No load EMF and terminal voltage in Alternator at leading power factor.

OR

15 b). Explain armature reaction of Alternator at different power factors

16a) Explain the procedure of synchronising of alternators by using synchroscope method

OR

16 b) A 200 kVA, 415 V, 50 Hz, 3- ϕ alternator has effective armature resistance of $0.01\ \Omega$ and an armature leakage reactance of $0.05\ \Omega$. Compute the voltage induced in the armature winding when the alternator is delivering rated current at a load pf of 0.8 lag and 0.8 lead

ME-414-BASIC MECHANICAL ENGINEERING

Course Title	Basic Mechanical Engineering	Course Code	ME-414
SEMESTER	IV	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of basic sciences at secondary school level

Course Outcomes

CO1	Compute stress, strain values and find the changes in axial, lateral and volumetric dimensions of bodies of uniform section under the action of normal forces.
CO2	Design of shaft on the basis of strength and rigidity.
CO3	Explain the Construction and working of IC Engines.
CO4	Describe the working of Boilers
CO5	Describe the construction and working of Steam and Hydraulic turbines
CO6	Compare various types of Pumps and select a lubricant for specific application.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Simple Stresses & Strains	13	Q4	Q1		Q9(a)	Q13(a)
2	Torsion in Shafts	12					
3	I.C Engines	15		Q2		Q10(a)	Q14(a)
4	Boilers	10					
5	Turbines	12		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Pumps & Lubricants	13					
Total		75	8		8	8	

COURSE CONTENT

UNIT-1 Simple Stresses & Strains

Duration: Periods 13(L: 10 – T:3)

Stress – strain - Poisson's ratio - elastic limit - statement of Hooke's law - stress-strain diagram with salient features for ductile materials under tensile stress - Elastic moduli - Young's modulus - Modulus of rigidity, - Bulk modulus - Working stress - Ultimate stress - Factor of safety-Related numerical problems.

UNIT-2 Torsion in Shafts

Duration: Periods 12(L: 10– T:2)

Classification of shafts - Function of shafts - Polar moment of inertia - Torsion equation- Maximum torque - Power transmitted by the shaft - Design of shaft based on strength and rigidity - Related numerical problems.

UNIT-3 I.C Engines

Duration: Periods 15 (L: 13 – T: 2)

Classification of heat engines and I.C engines –Construction of IC engines-Variety parts of Petrol and Diesel engines- 2-stroke and 4- stroke engines-Comparison between 2-stroke and 4- stroke engines-Comparison between petrol and diesel engines - Functions of carburetor, fuel injection pump- Governing of I.C engines.

UNIT-4 Boilers

Duration: Periods 10 (L:8– T: 2)

Boilers - Classification of boilers –Fire tube and water tube boilers-Comparison between Fire tube and water tube boilers -Construction and working of Simple vertical, Cochran, Lancashire, Babcock and Wilcox, Lamont and Benson boilers- Different boiler mountings and accessories.

UNIT-5 Turbines

Duration: Periods 12(L: 10 – T: 2)

Steam turbine -Working principle of impulse and reaction steam turbines- Comparison between impulse and reaction turbines -Working principle of the De Laval and Parson's reaction turbines - Classification of hydraulic turbines- Construction and working of Pelton wheel, Francis and Kaplan turbines-Comparison of different water turbines.

UNIT-6 Pumps& Lubricants

Duration: Periods 13 (L: 10– T: 3)

Hydraulic pumps – Classification –Construction and working of Reciprocating and Centrifugal pumps- Comparison between Reciprocating and Centrifugal pumps - Working principle of Jet and Submersible pumps -Lubricants - properties ,types, examples and their applications.

Recommended Books:

1. Strength of materials by Ramamrutham
2. Strength of materials by Surender Singh
3. Strength of materials by S.B.Junarker
4. General Mechanical Engineering by Lakshminarayana
5. Hydraulic Machinery by Jagadishlal
6. Strength of Materials,by .R.SKhurmi, S Chand and Co. Ltd.
7. Strength of Materials by R.K **Bansal**,Laxmi Publications
8. Fluid Mechanics by R.K Bansal, Laxmi Publications

SUGGESTED E-LEARNING REFERENCES

1. <https://nptel.ac.in/courses/>
2. https://en.wikipedia.org/wiki/Strength_of_materials
3. <http://ndl.ethernet.edu.et/bitstream/>

SUGGESTED STUDENT ACTIVITIES

- 1 Visit to nearby power plant station to identify different motors, pumps.
- 2 Visit nearby rice mill and identify different types of shafts used.
- 3 Study cut out models of IC Engines
- 4 Collect information on different lubricants used in Automobiles
- 5 Collect the information on different pumps used for various applications.

SUGGESTED LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1. Simple Stresses & Strains

- 1.1. Define stress
- 1.2. Define strain
- 1.3. Mention the different types of stresses.
- 1.4. Mention the different types of strains.
- 1.5. State Hooke's law
- 1.6. Define Modulus of elasticity
- 1.7. Draw typical stress-strain curve for an M S Specimen under tension

- 1.8. Define factor of safety
- 1.9. Define Poisson's ratio
- 1.10. State the relationship between elastic constants.
- 1.11. Solve simple problems on Stress.
- 1.12. Solve simple problems on Strain.
- 1.13. Solve simple problems on Poisson's ratio.
- 1.14. Solve simple problems on calculation of the dimensional changes in the bodies of uniform cross section subjected to tensile and compressive forces.

2. Torsion in Shafts

- 2.1. State the function of shafts.
- 2.2. Classify shafts.
- 2.3. Specify the standard sizes of shafts.
- 2.4. Define Polar moment of inertia
- 2.5. Give the expression for Polar moment of inertia of solid shaft.
- 2.6. Give the expression for Polar moment of inertia of hollow shaft.
- 2.7. Explain the terms involved in simple torsion equation.
- 2.8. Maximum torque transmitted and power transmitted.
- 2.9. Design the size of solid shaft-Strength point of view and stiffness point of view
- 2.10. Simple problems.

3. I.C Engines

- 3.1. Define I.C. Engine.
- 3.2. Classify heat engines.
- 3.3. Mention types of I.C engines.
- 3.4. Explain the construction of I.C. Engines.
- 3.5. Identify the various parts of Diesel engine and Petrol engine.
- 3.6. Explain the principle of 4-stroke diesel engine.
- 3.7. Explain the principle of 4-stroke petrol engine.
- 3.8. Explain the principle of 2-stroke diesel engine.
- 3.9. Explain the principle of 2-stroke petrol engine.
- 3.10. Distinguish between 4-stroke cycle and 2-stroke cycles.
- 3.11. Distinguish between diesel engine and petrol engine.
- 3.12. State the function of carburettor.

3.13. State the functions of fuel pump.

3.14. State the functions of Governor.

4. Boilers

4.1. Explain the function of a boiler.

4.2. Classification of boilers.

4.3. Compare fire tube boiler with water tube boiler.

4.4. Explain construction and working principle of simple vertical boiler.

4.5. Describe construction and working principle of Cochran boiler.

4.6. Explain construction and working principle of Lancashire boiler.

4.7. Describe construction and working principle of Babcock and Wilcox boiler.

4.8. Explain construction and working principle of Benson boiler

4.9. Describe Lamont boiler with a neat sketch.

4.10. List different mountings of a boiler.

4.11. Mention the necessity of Water level indicator

4.12. Write the necessity of Pressure gauge.

4.13. State the necessity of Stop valve

4.14. Mention the necessity of Feed check valve.

4.15. Write the necessity of Safety valve.

4.16. State the necessity of Fusible plug.

4.17. Explain the working principle of Super heater.

5. Turbines

5.1. Define turbine.

5.2. Explain the principle of working of a steam turbine.

5.3. Classify the turbines based on action of steam.

5.4. Explain the working principle of steam impulse turbine

5.5. Explain the working principle of steam Reaction turbine

5.6. Compare impulse turbine with steam reaction turbine.

5.7. Describe the working principle of the De Level and Parson's reaction turbines.

5.8. Classify the water turbines based on action of water.

5.9. Explain the construction and working of Pelton wheel.

5.10. Explain the construction and working of Francis turbine

5.11. Explain the construction and working of Kaplan turbine

5.12. Compare Pelton wheel, Francis and Kaplan turbines

6. Pumps & Lubricants

- 6.1. Define Pump
- 6.2. Explain the principle of operation of reciprocating pump.
- 6.3. Explain the constructional details of reciprocating pump.
- 6.4. Explain the principle of operation of centrifugal pump.
- 6.5. Explain the construction details of centrifugal pump.
- 6.6. Differences between a centrifugal pump and a reciprocating pump
- 6.7. Describe working principle and construction of double stage reciprocating pump.
- 6.8. Explain the principle of jet pump and submersible pump.
- 6.9. State the purpose of lubrication.
- 6.10. State the properties of a lubricant
- 6.11. List the types of lubricants with examples.
- 6.12. Mention the application of lubricants.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	1	-	-	2	-	3	1,2,5,7
CO2	2	2	-	-	3	-	3	1,2,5,7
CO3	2	-	-	-	2	-	3	1,5,7
CO4	2	-	-	-	2	-	3	1,5,7
CO5	2	-	-	-	2	-	3	1,5,7
CO6	2	-	-	-	3	-	3	1,5,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Blue Print of Marks for SEE

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b) Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b) Q16(a), Q16(b)
Total Questions	8			8	8

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER MID SEMESTER-I EXAMINATION

Corse Code: ME-414
Course Name: Basic Mechanical Engineering

Duration: 1 hour
Max.Marks: 20

PART-A

Answer **all** questions, Each Question carries one mark

4x1 = 4 Marks

1. State Hooke's law
2. Define Poisson's ratio
3. State the function of shafts
4. Give the expression for Polar moment of inertia of solid shaft

PART-B

Answer **two** questions. Each question carries three marks

2x 3 = 6 Marks

5. a) Define factor of safety

OR

b) Define Modulus of elasticity

6. a) Classify shafts.

OR

b) Give the expression for Polar moment of inertia of hollow shaft.

PART-C

Answer two questions. Each question carries five marks

2x 5 = 10 Marks

7. a) State the relationship between elastic constants

OR

b) Draw typical stress-strain curve for an M S Specimen under tension.

8. a) Explain the terms involved in simple torsion equation.

OR

b) Design the size of solid shaft from strength point of view.

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE IV semester Mid Semester-II Examination

Corse Code:ME-414
Course Name: Basic Mechanical Engineering

Duration:1 hour
Max.Marks:20

PART-A

Answer **all** questions, Each Question carries one mark

4x1 = 4 Marks

1. Define I.C. Engine
2. State the functions of fuel pump in an IC engine
3. State the necessity of boiler water level indicator
4. State the function of superheater

PART-B

Answer **two** questions. Each question carries three marks

2x 3 = 6 Marks

5. a) Classify heat engine

OR

- b) State the functions of carburetor in an IC engine

6. a) Classify boilers.

OR

- b) Compare fire tube boilers and water tube boilers in any three aspects.

PART-C

Answer **two** questions. Each question carries five marks

2x 5 = 10 Marks

7. a) Explain the construction of I.C. Engines

OR

- b) Distinguish between diesel engine and petrol engine in any five aspects.

8. a) Explain the operation of Lamont boiler with a neat sketch.

OR

- b) Explain the operation of Benson boiler with a neat sketch.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER
SEMESTER END EXAMINATION

Corse Code: ME-414
Course Name: Basic Mechanical Engineering
Max.Marks:40Marks

Duration:2 hours

PART-A

Answer **all** questions

8x1 =8 Marks

- 1) State Hooke's law
- 2) State the function of economizer
- 3) State the purpose of lubrication
- 4) Define IC engine
- 5) Classify turbines based on action of steam
- 6) Classify water turbines
- 7) State the desirable properties of lubricants
- 8) List the types of lubricants

PART-B

Answer **four** questions

4 x 3 = 12 Marks

- 9) a) Mention different types of stresses

OR

- b) Compare impulse turbine and reaction turbine in any three aspects.

- 10) a) State the function of speed governor in an IC engine.

OR

- b) List the applications of lubricants.

- 11) a) Compare impulse turbine and reaction turbine in any three aspects.

OR

- b) State the working principle of steam turbine.

- 12) a) Classify hydraulic turbines.

OR

- b) Compare centrifugal pump and reciprocating pump in any three aspects.

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks.

Marks: 4 X 5 = 20

- 13 a) Draw typical stress-strain curve for an M S Specimen under tension

OR

- b) Explain the working of Parson's reaction turbine with a neat sketch.

- 14 a) Explain the working of four stroke diesel engine with a neat sketch.

OR

- b) Explain the principle of operation of centrifugal pump.

- 15 a) Explain the working principle of Pelton wheel

OR

- b) Explain the working principle of Kaplan turbine

- 16 a) Explain the principle of operation of jet pump.

OR

- b) Distinguish between a centrifugal pump and a reciprocating pump in any five aspects

EE-405-ELECTRICAL POWER SYSTEMS

Course Title	Electrical Power Systems	Course Code	EE-405
Semester	IV	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of

- (i) Basic principle and working of generator, transformers
- (ii) Voltage and current calculations in the circuits using KCL,KVL

Course Outcomes

CO1 :	Explain various Energy sources & thermal power station.
CO2 :	Outline of construction and working of Hydroelectric power station and Nuclear Power station.
CO3 :	Examine various types of Transmission Systems.
CO4 :	Evaluate the performance of transmission lines
CO5 :	Explains of Line structures for Transmission and Distribution lines
CO6 :	Evaluate various aspects in Distribution systems.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Sources of Energy &Thermal Power Station	10	Q4	Q1		Q9(a)	Q13(a)
2	Hydro Electric Power Station &Nuclear Power Station	15					
3	AC & DC Transmission systems	13		Q2		Q10(a)	Q14(a)
4	Performance of the transmission lines	12					
5	Line structures for Transmission and Distribution	15		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Distribution systems	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Content

UNIT 1 - Sources of Energy & Thermal Power Station

Duration: 10 Periods (L:8– T:2)

Different sources of energy - Need for Non-Conventional Energy based power generation – Methods of generation of energy from different sources of power- Merits and Limitations of Conventional and Non-conventional sources - Thermal Power Station - pulverization, Condensation – Types of cooling towers.

UNIT 2– Hydro Electric Power Station & Nuclear Power Station

Duration: 15 Periods (L:12– T:3)

Hydro Electric Power Station - Factors for site selection and limitations in location – Hydrograph - Classification of hydroelectric power - Layout diagram of various Hydro Power Stations – Nuclear energy, fission and fusion reactions - Merits in using nuclear energy. Nuclear fuels - Working of moderator type nuclear power station with a block diagram - Materials used for coolant, reflector and control rods.

UNIT 3 –AC and DC Transmission systems

Duration: 13 Periods (L:11 – T:2)

Transmission Lines- classification of Transmission systems - Relative advantages of AC & DC Transmission - Basic Concept of High voltage DC Transmission - Types of HVDC transmission- Advantages and disadvantages of HVDC transmission - Types of conductors – Current distortion effects.

UNIT 4 - Performance of the transmission lines

Duration: 12 Periods (L:10 – T:2)

Transmission line parameters – Expressions for Inductance of transmission system – Problems on computing Inductance - Expression for capacitance of a transmission system- Problems on computing capacitance – Classify transmission lines - Regulation of short transmission lines – Percentage regulation – Problems on computing Percentage regulation – Ferranti Effect – Corona.

UNIT 5 - Line structures for Transmission and Distribution

Duration: 15 Periods (L:12 – T:3)

Components of Overhead lines – factors affecting conductors spacing and ground clearance - Sag-derivation- Factors affecting sag, Problems on calculating sag - Disadvantages of loose span – Insulators - Requirements of insulators - Types of Insulators – Advantages of Polymer insulators - Voltage distribution across string of suspension Insulators- string efficiency- Problems on string efficiency - Methods of improving string efficiency.

UNIT 6 – Distribution Systems

Duration:10 Periods (L:8 – T:2)

Definition of substation-need of substation- classification of sub-stations - Relative merits of indoor and outdoor sub-stations –Purpose of various equipment in sub-stations - Classification of Distribution systems - Steps in voltage drop calculation – problems – Micro Grid - Concept of smart GRID

Recommended Books

1. S.L.Uppal-Electrical Power
2. Soni,Guptha,Bhatnagar-Electrical Power Systems - DhanpatRai& Sons
3. A.T.Starr -Generation, Transmission and Utilisation
4. C.L.Wadhwa -Electrical Power Systems - New age international(P) limited
5. NEDCAP -Non Conventional Energy Guide Lines
6. J B Guptha -Electrical power plants
7. G.D. Roy Non conventional energy sources
8. CL Wadhwa -Electrical power Systems - New Age International(P) limited.
9. KR Padiyar - HVDC Power Transmission system Technology
10. S.N. Singh -Electrical Power generation, transmission and distribution.

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 List different sources of energy
- 1.2 Classify the sources of energy into conventional and non-conventional types.
- 1.3 State the necessity of developing non-conventional methods of power generation.
- 1.4 State the relative merits and limitations of Conventional and Non-Conventional types of sources.
- 1.5 State the method of generating electrical energy from Solar Power
- 1.6 State the method of generating electrical energy from Tidal Power
- 1.7 State the method of generating electrical energy from Wind power
- 1.8 State the method of generating electrical energy from Biomass

- 1.9 State the method of generating electrical energy from Geo Thermal Power
- 1.10 State the working principle of thermal power stations.
- 1.11 List the requirements for setting up of Thermal Power Station.
- 1.12 Draw the detailed line diagram of a condensing type thermal power station.
- 1.13 Explain the principle of working of each component of thermal power station.
- 1.14 Define Pulverization.
- 1.15 Mention the advantages of Pulverization
- 1.16 Define Condensation.
- 1.17 Mention the advantages of Condensation
- 1.18 State the necessity of cooling towers in thermal power plant
- 1.19 List the types of cooling towers used in thermal power plants.

- 2.1 State the principle of working of Hydro power station.
- 2.2 Mention the requirement and factors for site selection of Hydro Electric Power station.
- 2.3 Define Hydrograph.
- 2.4 Classify the Hydro Electric Power stations based upon head.
- 2.5 Classify the Hydro Electric Power stations based upon duty
- 2.6 Classify the Hydro Electric Power stations based upon location
- 2.7 Classify the Hydro Electric Power stations based upon hydraulic considerations.
- 2.8 Explain the working of High Head Power Station with layout diagram.
- 2.9 Explain the working of Medium Head Power Station with layout diagram.
- 2.10 Explain the working of low Head Power Station with layout diagram.
- 2.11 State the need of Surge Tank.
- 2.12 State the need of Forebay.
- 2.13 State the need of Spill gates.
- 2.14 State the importance of nuclear energy.
- 2.15 Explain fission reaction.
- 2.16 Explain fusion reaction.
- 2.17 State the merits of using nuclear energy
- 2.18 Mention the various nuclear fuels used in nuclear power station.
- 2.19 Explain the working of a Nuclear power station with a block diagram.
- 2.20 State the materials used for coolant.
- 2.21 State the materials used for Reflector.
- 2.22 State the materials used for control rods.

- 3.1 State the need of transmission lines.
 - 3.2 State the need of distribution lines.
 - 3.3 Classify transmission systems.
 - 3.4 State the advantages of D.C transmission systems.
 - 3.5 State the advantages of A.C transmission systems.
 - 3.6 State the advantages of extra high voltage transmission systems.
 - 3.7 Explain the effects of Supply frequency on Transmission lines.
 - 3.8 Explain the effects of Supply voltage on Transmission lines.
 - 3.9 State the effect of voltage on Line efficiency
 - 3.10 State the effect of voltage on Voltage drop.
 - 3.11 State the effect of voltage on Line loss.
 - 3.12 State the effect of voltage on Active & reactive Power.
 - 3.13 State the effect of voltage on Volume of conductor material.
 - 3.14 Explain the concept of HVDC transmission.
 - 3.15 List the types of HVDC transmission.
 - 3.16 List the advantages of HVDC transmission.
 - 3.17 List the disadvantages of HVDC transmission.
 - 3.18 Explain the different types of conductors used in transmission line.
 - 3.19 List various Current distortion effects.
 - 3.20 State Skin effect
 - 3.21 State Proximity effect
 - 3.22 State Spirality effect
-
- 4.1 List various transmission line parameters.
 - 4.2 State the expression for inductance of 1 phase system (No Derivation)
 - 4.3 Solve problems on inductance of 1 phase system
 - 4.4 State the expression for the inductance of 3 phase symmetrical round conductor.
(No Derivation)
 - 4.5 Solve problems on the inductance of 3 phase symmetrical round conductor.
 - 4.6 State the expression for the inductance of 3 phase asymmetrically spaced round
Conductors (No derivation)
 - 4.7 Solve problems on the inductance of 3 phase asymmetrically spaced round conductors
 - 4.8 State the expression for capacitance of 1 phase system (No Derivation)

- 4.9 Solve problems on capacitance of 1 phase system
- 4.10 State the expression for the capacitance of 3 phase symmetrical round conductor.
(No Derivation)
- 4.11 Solve problems on the capacitance of 3 phase symmetrical round conductor.
- 4.12 State the expression for the capacitance of 3 phase asymmetrically spaced round conductors (No derivation)
- 4.13 Solve problems on the capacitance of 3 phase asymmetrically spaced round conductors
- 4.14 Define Short transmission line.
- 4.15 Define Medium transmission line.
- 4.16 Define Long transmission line.
- 4.17 Define Regulation.
- 4.18 Define Percentage Regulation.
- 4.19 State the approximate formula for percentage regulation.(no derivation)
- 4.20 Compute the Sending end voltage for short transmission line
- 4.21 Compute the Sending end Power factor for short transmission line
- 4.22 Compute the Percentage Regulation for short transmission line
- 4.23 Draw the phasor diagram
- 4.24 State 'Ferranti' effect
- 4.25 Define Corona

- 5.1 State the main components of overhead lines
- 5.2 State the factors on which the conductor spacing and ground clearance depend
- 5.3 Define 'Sag'
- 5.4 State the factors affecting the sag
- 5.5 Derive an equation for the approximate method of calculating sag when the supports are at the same level in still air.
- 5.6 Derive an equation for the approximate method of calculating sag when the supports are at the same level with the effect of wind.
- 5.7 Derive an equation for the approximate method of calculating sag when the supports are at the same level with the effect of ice.
- 5.8 Solve the problems on calculating sag.
- 5.9 State the disadvantages of loose spans(sag more than prescribed value)
- 5.10 State the purpose of insulators in transmission and distribution lines
- 5.11 State the requirements of insulators.

- 5.12 List various types of Insulators.
 - 5.13 State applications of the Pin type insulators.
 - 5.14 State applications of the Strain type insulators.
 - 5.15 State applications of the Suspension type insulators.
 - 5.16 State applications of the Shackle type insulators.
 - 5.17 Define a Polymer insulator.
 - 5.18 State the advantages of Polymer insulators.
 - 5.19 Derive the voltage across individual disc of a string insulator (upto 3 discs).
 - 5.20 Solve problems on distribution of voltage across string
 - 5.21 Define Flashover.
 - 5.22 Define Puncture.
 - 5.23 Define String-efficiency.
 - 5.24 State the methods of improving string efficiency
-
- 6.1 State the need for substations.
 - 6.2 State the relative merits of indoor substation, outdoor substation and Gas insulated Substations over others.
 - 6.3 List the equipment used in substation.
 - 6.4 State the purpose of the Bus bars.
 - 6.5 State the purpose of the Transformers.
 - 6.6 State the purpose of the Switch gear.
 - 6.7 State the purpose of the Indicating and Metering equipment
 - 6.8 State the purpose of the Protective relays
 - 6.9 State the purpose of the Lightning arrestors
 - 6.10 State the purpose of the Wave trap.
 - 6.11 Distinguish between primary distribution and secondary distribution.
 - 6.12 State the purpose of Feeder.
 - 6.13 State the purpose of Distributors.
 - 6.14 State the purpose of Service mains.
 - 6.15 Classify the type of distribution systems according to Type of current.
 - 6.16 Classify the type of distribution systems according to Construction.
 - 6.17 Classify the type of distribution systems according to Service.
 - 6.18 Classify the type of distribution systems according to Number of wires.
 - 6.19 Classify the type of distribution systems according to Scheme of connections.

- 6.20 List the type of distribution systems.
- 6.21 State the advantages and disadvantages of Radial system
- 6.22 State the advantages and disadvantages of Ring main system.
- 6.23 List the steps to calculate the voltage drop in 1-phase A.C. distributors
- 6.24 Solve problems on voltage drop calculations in A.C. Distributors.
- 6.25 Solve problems on voltage drop calculations in D.C Distributors.
- 6.26 Define Micro Grid.
- 6.27 Explain the concept of smart grid

Suggested Student Activities

- 1 Student visits Library to refer to Electrical Manuals.
- 2 Student prepares the models of the power plants
- 3 Student visits Power generating stations familiarize with the equipment.
- 4 Visit Power nearby substations and gets familiar with the components.
- 5 Students may be asked to prepare model project of the power system.
- 6 Prepare charts on different Generating stations in our state mentioning their locations.
- 7 Gather information of HVDC transmission projects in India and prepare a report
- 8 Identify different insulators in your surroundings and prepare a report
- 9 Watch YouTube videos on SMART GRID and MICRO GRID and prepare a summary report
- 10 Group discussion.
- 11 Surprise tests and Quiz.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	3	3	1	3	3	3	PO1,2,3,4,5,7
CO2	3	3	3	1	3	3	3	PO1,2,3,4,5,7
CO3	3	3	2	2	3	3	3	PO1,2,3,4,5,7
CO4	3	3	2	2	3	3	3	PO1,2,3,4,5,7
CO5	3	3	2	3	3	3	3	PO1,2,3,4,5,7
CO6	3	3	3	3	3	3	3	PO1,2,3,4,5,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE			
	R		U	A
I	Q4	Q1		Q9(a)
II				
III		Q2		Q10(a)
IV				
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)
VI				Q13(b), Q15(a), Q15(b)
				Q10(b), Q12(a), Q12(b)
Total Questions	8		8	8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM -I EXAM MODEL PAPER

SUB CODE: EE-405
SUB NAME : ELECTRICAL POWER SYSTEMS

TIME: 1 HOUR
TOTAL MARKS: 20

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. List the various sources of Energy.
2. List the types of cooling towers used in Thermal power plant
3. Define Hydrograph
4. State the need of Spill gates

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5a) State the need of Non-conventional Energy Sources
OR

5b) What is Coal Pulverisation?

6 a) State the importance of nuclear energy
OR

6 b) Write the merits of Nuclear Energy.

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

7 a) Draw a single line diagram of a Thermal Power station
OR

7 b) State the relative merits and limitations of Conventional and Non-Conventional types of sources

8 a) Explain the principle of working of Hydro power station.

OR

8 b) Explain the working of High Head Power Station with layout diagram

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
MID SEM -II EXAM MODEL PAPER

SUB CODE: EE-405
SUB. NAME : ELECTRICAL POWER SYSTEMS

TIME: 1 HOUR
TOTAL MARKS: 20

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the need of transmission lines.
2. List the types of HVDC transmission
3. List various transmission line parameters
4. Define Medium transmission line

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5 a) State the advantages of Extra high voltage transmission systems.

OR

5 b) State Skin effect

6 a) State 'Ferranti' effect

OR

6 b) Define Percentage Regulation.

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

7a) Explain the different types of conductors used in transmission line.

OR

7 b) Explain the concept of HVDC transmission.

8 a) A 3-phase overhead line conductors are arranged in a horizontal plane and are 3 m apart. The diameter of each conductor is 1cm. Calculate the capacitance per km of each conductor

OR

8 b) A single phase transmission line has a resistance of 0.20 ohms and an inductive reactance of 0.40 ohm. Find the voltage at the sending end to give 500KVA at 2kV at the receiving end at load power factor of 0.707 lagging

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
END SEM EXAM MODEL PAPER

SUB CODE: EE-405
SUB. NAME : ELECTRICAL POWER SYSTEMS

TIME: 2 HOUR
TOTAL MARKS: 40

PART – A

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

Marks: 8 X 1 = 8

1. Define Hydrograph.
2. List the types of HVDC transmission.
3. Define 'sag'
4. List the transmission line parameters.
5. Define Flashover.
6. Define a Polymer insulator.
7. State the need for substations.
8. State the purpose of Feeder.

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.
12

Marks: 4 X 3 =

- 9a) State the relative merits and limitations of Conventional and Non-Conventional types of sources

OR

- 9 b) State the requirements of insulators

- 10a) State the expression for the inductance of 3 phase symmetrical round conductor.

OR

- 10b) State the purpose of the Lightning arrestors

- 11a) State the purpose of insulators in transmission and distribution lines

OR

- 11b) State the disadvantages of loose spans.

- 12 a) State the purpose of the Indicating and Metering equipment

OR

- 12 b) Distinguish between primary distribution and secondary distribution

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks.

Marks: 4 X 5 = 20

13a) Explain the principle of working of each component of thermal power station.

OR

13(b) State the requirements of insulators and give the list of insulators

14 a) A single phase transmission line has a resistance of 0.20 ohms and an inductive reactance of 0.40 ohm. Find the voltage at the sending end to give 500KVA at 2kV at the receiving end at load power factor of 0.707 lagging

OR

14 b) Explain the concept of smart GRID

15a) Derive an equation for the approximate method of calculating sag when the supports are at the same level with the effect of ice

OR

15 b) An insulator string consists of 3 units each having a safe working voltage of 15kV. The ratio of self-capacitive to shunt capacitive of each unit is 8 : 1. Find the maximum safe working voltage of the string and string efficiency

16 a) Explain Feeder, distributors and service mains

OR

16 b) A single phase a.c distributor AB 300 meters long is fed from end A and is loaded as under (i) 100 Amps at 0.707 p.f lagging 200 meters from point A (ii) 200 amps at 0.8 p.f lagging 300 meters from point A. The total resistance and the reactance of the distributor is 0.2 ohms and 0.1 ohms per km respectively. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end

EE-406-ELECTRICAL ENGINEERING DRAWING

Course Title	Electrical Engineering Drawing	Course Code	EE-406
Semester	IV	Course Group	Practical
Teaching Scheme in periods (L : T : P)	1:0:2	Credits	1.5
Methodology	Lecture + Tutorial	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

The student should have knowledge of Engineering Graphics.

Course Outcomes

CO1 :	Draw the views of symbols & fuses
CO2 :	Draw the sectional views of transformers
CO3 :	Draw the cross sectional view of underground cables
CO4 :	Develop DC & AC machine windings.
CO5 :	Draw the Single Line diagrams and layouts of industrial electrical installations
CO6 :	Draw Power system protection Equipment

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE		
			R	U/A	
1	Electrical symbols & fuses	06	Q1	Q5(a)	
2	Transformers	09			
3	Underground Cables	06	Q2		
4	D.C & A.C windings	09			
5	Line Supports and Industrial panel layouts	06	Q3	Q5(b)	Q6(a)
6	Power System Protection Equipments	09	Q4		Q6(b)
Total		45	4	4	

Course Content

1. Electrical symbols & fuses

Duration: 6 Periods (L:2 P:4)

Graphical Electrical symbols of different electrical devices - Views of fuses

2. Transformers

Duration: 9 Periods (L:3 - P:6)

Single- phase single stepped core type transformer - Core sections, sectional views, Three phase three stepped core type transformers- Core sections, sectional views.

3. Underground Cables

Duration: 6 Periods (L:2 - P:4)

Cross sectional views of single core, 2 core, 3 core, 3.5 core & 4 core cables, H ,SL& HSL type cables -Flat cable

4. DC &AC winding

Duration: 9 Periods (L:3 - P:6)

Simplex lap and wave winding for DC armature - Single layer lap and wave winding for 1-phase and 3- phase AC machines

5. Line Supports and Industrial panel layouts

Duration: 6 Periods (L:2 - P:4)

Supporting steel towers –Poles – Stays & Guys – single line diagrams of LT panels-General arrangement Diagrams of LT Panels- single line diagram of substations - Single line diagram of Grid connected Solar PV system

6. Power system Protection Equipment

Duration: 9 Periods (L:3 - P:6)

Lightning arrestors – Circuit breakers - Earthing

Recommended Books

1. “Electrical Engineering Drawing” by S.K.Bhattacharya, NewAge International Publishers
2. “Electrical Drafting” - S.F. DEVALAPUR EEPB
3. “Electrical Drawing” - K.L. NARANG

Suggested E-Learning references

1. www.nptel.ac.in
2. <https://www.academia.edu>
(https://www.academia.edu/26976158/ELECTRICAL_ENGINEERING_drawing_by_Dr._S_K_Bhattacharya.pdf)

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

1.0 Electrical symbols & fuses

- 1.1 Draw standard symbols of electrical components: Constant Resistor and variable Resistor, Constant Inductor and variable inductor, Constant capacitor and variable capacitor.
- 1.2 Draw standard symbols of electrical components: DC Voltage Source, DC current source, Battery, Single phase AC voltage source, three phase AC voltage source, transformer, Ammeter, Voltmeter, Power factor meter and Wattmeter.
- 1.3 Draw standard symbols of electrical fixtures: On way Switch and two ways Switch, Normally Open & Normally Close Push buttons, Fuse, Circuit breaker, Isolators, Ground and Electrical Switchbox.
- 1.4 Draw standard symbols of electrical fixtures: Wall mounted lamp fixture, Ceiling fan, Power vent fan, Fluorescent light fixture, Bell, Buzzer, Single and three phase Electric motors, Motor starter.
- 1.5 Draw Sectional end view of Rewirable fuse.
- 1.6 Draw Sectional Elevation of Rewirable fuse.
- 1.7 Draw Sectional end view of HRC fuse.

2.0 Transformers

- 2.1 Draw the cross section of single stepped core of one limb of transformer.
- 2.2 Draw the cross section of 2 stepped core of one limb of transformer.
- 2.3 Draw the cross section of 3 stepped core of one limb of transformer
- 2.4 Draw the plan of a single phase-single stepped core type transformer from the given data
- 2.5 Draw the sectional plan and Elevation of a single phase-single stepped core type transformer from the given data

2.6 Draw the sectional plan of a 3 phase 3 stepped core type transformer from the given data

2.7 Draw the sectional plan and elevation of a 3 phase 3 stepped core type transformer from the given data

3.0 Underground Cables

- 3.1 Draw the cross sectional view of single core cable.
- 3.2 Draw the cross sectional view of Two core cable.
- 3.3 Draw the cross sectional view of three core PVC insulated armoured cable.
- 3.4 Draw the cross sectional view of three core XLPE insulated armoured cable.
- 3.5 Draw the cross sectional view of 3.5 core PVC insulated armoured cable.
- 3.6 Draw the cross sectional view of 3.5 core XLPE insulated armoured cable.
- 3.7 Draw the cross sectional view of four core PVC insulated armoured cable.
- 3.8 Draw the cross sectional view of four core XLPE insulated armoured cable.
- 3.9 Draw the cross sectional view of H type cable.
- 3.10 Draw the cross sectional view of S.L type cable.
- 3.11 Draw the cross sectional view of H. S.L type cable.
- 3.12 Draw the cross sectional view of PVC insulated 3 core flat cable.

4.0 DC & AC winding

- 4.1 Develop winding diagram for a simplex Lap connected DC machine
- 4.2 Develop winding diagram for a simplex Wave connected DC machine
- 4.3 Develop winding diagram of a 1-phase single layer and double layer lap winding.
- 4.4 Develop winding diagram of a 1-phase single layer and double layer wave winding.
- 4.5 Develop winding diagram of a 3-phase single layer lap winding.
- 4.6 Develop winding diagram of a 3-phase single layer wave winding.

5.0 Line Supports and Industrial panel layouts

- 5.1 Draw the sketch of 132 KV steel tower of single circuit.
- 5.2 Draw the sketch of 132 KV steel tower of double circuit.
- 5.3 Draw the sketch of 220 KV steel towers of single circuit.
- 5.4 Draw the sketch of 220 KV steel towers of double circuit.
- 5.5 Draw the sketch of three phase 11KV pole.
- 5.6 Draw the view of stranded steel wire guy marking all the accessories.

- 5.7 Draw the Single Line Diagram of LT Panel with 400 A incomer, 1 No 200 A Outgoing feeder and 2 No's 100 A outgoing feeders
- 5.8 Draw the General arrangement Diagram (Layout) of LT Panel with 400 A incomer, 1 No 200 A Outgoing feeder and 2 No's 100 A outgoing feeders
- 5.9 Draw the single line diagram of 33kV / 11kV substation.
- 5.10 Draw the single line diagram of 220KV/132 KV substation
- 5.11 Draw single line diagram of Grid connected solar PV system.
- 5.12 Draw the elevation of Plinth mounted substation.
- 5.13 Draw the elevation of Pole mounted substation.

6.0 Power system Protection Equipment

- 6.1 Draw the dimensioned sketch of Pipe earthing.
- 6.2 Draw the dimensioned sketch of Plate earthing.
- 6.3 Draw the sketch of Expulsion type lightning arrestor.
- 6.4 Draw the sketch of thyrite type lightning arrestor.
- 6.5 Draw the sketch of metal oxide type lightning arrestor.
- 6.6 Draw the sketch of Minimum oil circuit breaker with neat labelling.
- 6.7 Draw the sketch of Vacuum circuit breaker with neat labelling.
- 6.8 Draw the sketch of SF6 circuit breaker with neat labelling.

Suggested Student Activities

- 1 Student visits Distribution Transformer i.e., Pole mount and Plinth mount, note down the ratings of transformer and draw the sketch of the substation mentioning the parts.
- 2 Student should identify voltage ratings of different electrical lines and supports including LA's, Guys etc running near their area and share the information on the same.
- 3 Group discussion
- 4 Surprise test

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	-	1	3	3	-	-	3	2,3,4,7
CO2	1	3	3	3	-	-	3	1,2,3,4,7
CO3	-	3	3	3	-	-	3	2,3,4,7
CO4	-	3	3	3	-	-	3	2,3,4,7
CO5	-	3	3	3	-	-	3	2,3,4,7
CO6	-	3	3	3	-	-	3	2,3,4,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)/ Understanding(U)	2	4	Nil	8 Marks
02	Part-B	Understanding(U)/ Application(A)	2	12	1	12 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R/U	U/A
1	Unit-I	Q1	Q3(a)
2	Unit-II	Q2	Q3(b)
Total Questions		2	2

MID SEM-II EXAM

S.No	Unit No	R/U	U/A
1	Unit-III	Q1	Q3(a)
2	Unit-IV	Q2	Q3(b)
Total Questions		2	2

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	4	Nil	16 Marks
02	Part-B	Understanding(U)/ Application(A)	4	12	2	24 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE		
	R/U	U/A	
I	Q1	Q5(a)	
II			
III	Q2		
IV			
V	Q3	Q5(b)	Q6(a)
VI	Q4		Q6(b)
Total	4	4	

STATE BOARD OF TECHNICAL EDUCATION & TRAINING , TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-406

ELECTRICAL ENGINEERING DRAWING

MID SEM -I EXAM MODEL PAPER

TIME: 1 HOUR

TOTAL MARKS: 20

PART – A

Marks: 2 X 4M = 8

Instructions: (1) Answer all questions
(2) Each question carries **Four** marks.

1. Draw the following electrical symbols
 - i) Battery
 - ii) Buzzer
 - iii) Capacitor
 - iv) Ammeter
 - v) fuse
2. Draw the cross section of 2 stepped core of one limb of transformer

PART - B

Marks: 1 x 12M = 12

Instructions: (1) Answer the following question.
(2) Each question carries **twelve** marks.

3. (a) Draw the following views of a single phase 220/110 V 10 KVA transformer
 - a) Front elevation
 - b) Plan in full section

Core: 1. Cross section of the core = one step core
2. Diameter of the circumscribed circle = 7.5 cm
3. Distance between core centres = 15 cm
Yoke height = 8 cm

LT winding: 1. Outside diameter of LT coil = 9 cm
2. Inside diameter of LT coil = 8 cm
3. Height of LT winding = 23 cm
4. Number of turns per limb = 50

HT winding: 1. Outside diameter of HT coil = 13.5 cm
2. Inside diameter of HT coil = 11 cm
3. Height of HT winding = 23 cm
4. Number of turns per limb = 100

Total height of the transformer = 40 cm

(OR)

- 3(b) Draw Sectional Plan and Elevation of Rewirable fuse.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING , TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-406

ELECTRICAL ENGINEERING DRAWING

MID SEM -II EXAM MODEL PAPER

TIME: 1 HOUR

TOTAL MARKS: 20

PART – A

Marks: 2 X 4M= 8

Instructions: (1) Answer all questions
(2) Each question carries **Four** marks.

1. Draw the cross sectional view of Two core cable.
2. Draw the table to develop winding diagram of a Single phase 4 pole induction motor with 24 slots, single layer full pitched lap winding.

PART - B

Marks: 1 x12M = 12

Instructions: (1) Answer the following question.
(2) Each question carries **twelve** marks.

- 3(a) Develop winding diagram for a DC machine with 4 Pole 24 slot simplex Wave progressive winding with table.

OR

- 3(b) Draw the cross sectional view of four-core XLPE insulated armoured cable.

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING , TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.**

SUB CODE: EE-406

ELECTRICAL ENGINEERING DRAWING

SEMESTER END EXAM MODEL PAPER

TIME: 2 HRS

TOTAL MARKS: 40

PART – A

Marks: 4 X 4M=

16

- Instructions:** (1) Answer all questions
(2) Each question carries **Four** marks.
1. Draw Sectional end view of HRC fuse.
 2. Draw the cross sectional view of 3 core armoured cable
 3. Draw the single line diagram of 33kV / 11kV substation
 4. Draw the free hand sketch of Thyrite type lightning arrester

PART - B

Marks: 2x12M = 24

- Instructions:** (1) Answer all questions.
(2) Each question carries **twelve** marks.

5(a) Draw the elevation of Plinth mounted substation.

OR

5(b) Draw the dimensioned sketch of Plate earthing.

6(a) Draw single line diagram of Grid connected solar PV system.

OR

6(b) Draw the sketch of Minimum oil circuit breaker with neat labeling.

EE-407-DC MACHINES LAB

Course Title	DC Machines Lab	Course Code	EE-407
Semester	IV	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the skills of handling electrical tools, accessories and performing wiring connections

Course Outcomes

At the end of the course the students will have the ability to:

Course Outcomes	
CO1	Identify the terminals of DC Motors and parts of Starters
CO2	Sketch the performance characteristics of DC Motors by conducting suitable Tests.
CO3	Apply various speed control methods on DC motors
CO4	Draw and interpret the performance characteristics of DC Generators by Conducting suitable experiments.

Suggested Learning Outcomes

1.0 Identify the terminals of DC Motors and parts of Starters.

- 1.1 Identify the terminals of DC Shunt Motors
- 1.2 Identify the terminals of DC Series Motors
- 1.3 Identify the terminals of DC Compound Motors
- 1.4 Identify the parts of DC 3 point starter
- 1.5 Identify the parts of DC 4 point starter

2.0 Sketch the performance characteristics of DC Motors by conducting suitable Tests.

- 2.1 Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
- 2.2 Obtain performance characteristics by conducting Brake Test on DC Series Motor.
- 2.3 Obtain performance characteristics by conducting Brake Test on DC Compound Motor.
- 2.4 Obtain performance of DC Shunt Motor by conducting Swinburne's Test.

3.0 Apply various speed control methods on DC motors

3.1 Speed control of DC Shunt Motor by Armature control method

3.2 Speed control of DC Shunt Motor by Field control method

4.0 Draw and interpret the performance characteristics of DC Generators by conducting suitable experiments.

4.1 Obtain OCC of a DC shunt Generator at rated speeds

4.2 Obtain Internal and External characteristics of DC Shunt Generator

4.3 Obtain Internal and External characteristics of DC Series Generator.

4.4 Obtain Internal and External characteristics of DC Compound Generator

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		3	3	1				3	2		2,3,4,8,9
CO2	2	3	3	3				3	2		1,2,3,4,8,9
CO3	2	3	3	3				3	2		1,2,3,4,8,9
CO4	2	3	3	3				3	2		1,2,3,4,8,9

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-407

Course Name: DC Machines Lab

Duration: 1 Hour

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals of DC Shunt motor
2. Identify the terminals of DC Series motor
3. Identify the terminals of DC Compound motor
4. Identify the parts of a 3 point starter
5. Identify the parts of a 4 point starter
6. Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
7. Obtain performance characteristics by conducting Brake Test on DC Series Motor

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MODEL QUESTION PAPER
DEEE IV SEMESTER
MID SEMESTER-II EXAMINATION

Course Code: EE-407

Course Name: DC Machines Lab

Duration: 1 Hour

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Obtain performance characteristics by conducting Brake Test on DC Compound Motor.
2. Obtain performance of DC Shunt Motor by conducting Swinburne's Test.
3. Speed control of DC Shunt Motor by Armature control method
4. Speed control of DC Shunt Motor by Field control method

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-407
Course Name: DC Machines Lab

Duration: 2 Hour
Max. Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment
(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals of DC Shunt motor
2. Identify the terminals of DC Series motor
3. Identify the terminals of DC Compound motor
4. Identify the parts of a 3 point starter
5. Identify the parts of a 4 point starter
6. Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
7. Obtain performance characteristics by conducting Brake Test on DC Series Motor.
8. Obtain performance characteristics by conducting Brake Test on DC Compound Motor.
9. Obtain performance of DC Shunt Motor by conducting Swinburne's Test.
10. Speed control of DC Shunt Motor by Armature control method
11. Speed control of DC Shunt Motor by Field control method
12. Obtain OCC of a DC shunt Generator at rated speeds
13. Obtain Internal and External characteristics of DC Shunt Generator
14. Obtain Internal and External characteristics of DC Series Generator.
15. Obtain Internal and External characteristics of DC Compound Generator

EE-408-ELECTRICAL CAD LAB

Course Title	Electrical CAD Lab	Course Code	EE-408
Semester	IV	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre-requisites

This course requires the knowledge of basic commands of CAD software.

Course Outcomes

CO1 :	Draw the symbols of Electrical components
CO2 :	Draw the wiring layouts
CO3 :	Draw the views of Electrical machines
CO4 :	Draw the single line diagram of the Substations
CO5 :	Draw the HV line supports
CO6 :	Draw the views of Earthing

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

1.0 Draw the symbols of Electrical components

- 1.1 Draw standard symbols of electrical components: Constant Resistor and variable Resistor, Constant Inductor and variable inductor, Constant capacitor and variable capacitor, transformer.
- 1.2 Draw standard symbols of electrical components: DC Voltage Source, DC current source, Battery, Single phase AC voltage source, three phase AC voltage source, Wall mounted lamp fixture, Ceiling fan.
- 1.3 Draw standard symbols of electrical fixtures: On way Switch and two ways Switch, Normally Open & Normally Close Push buttons, Fuse, Circuit breaker, Isolators and Ground.

2.0 Draw the wiring layouts

- 2.1 Draw the wiring layout for a given Single bedroom house.
- 2.2 Draw the Wiring diagram of 3 phase Induction motor with energy meter, 1-phase preventer, Y- Δ starter with control panel/switchboard.
- 2.3 Draw the wiring layout of Pump shed for given dimensions.
- 2.4 Draw the wiring layout of workshop(with 2 or 3 Induction motors)

3.0 Draw the views of Electrical machines

- 3.1 Draw the cross section of single stepped core of one limb of transformer.
- 3.2 Draw the cross section of 2 stepped core of one limb of transformer.
- 3.3 Draw the cross section of 3 stepped core of one limb of transformer.
- 3.4 Draw sectional Plan of a single-phase single stepped core type Transformer from the given data.
- 3.5 Draw sectional plan of a 3 phase three stepped core type transformers from the given data.
- 3.6 Draw Plan & Elevation of a 3 phase transformers with cooling tubes.
- 3.7 Draw Elevation & End view of a 3 Squirrel cage Induction motor.
- 3.8 Draw Elevation & End view of a 3 Slip ring Induction motor.

4.0 Draw the single line diagram of the Substations

- 4.1 Draw the single line diagram of 33kV / 11kV substation.
- 4.2 Draw single line diagram of Grid connected solar PV system.

5.0 Draw the HV line supports

- 5.1 Draw the sketch of 132 KV steel tower of single circuit.
- 5.2 Draw the sketch of 132 KV steel tower of double circuit.
- 5.3 Draw the sketch of 220 KV steel towers of single circuit.
- 5.4 Draw the sketch of 220 KV steel towers of double circuit.

6.0 Draw the views of Earthing

- 6.1 Draw the dimensioned sketch of Plate earthing.
- 6.2 Draw the dimensioned sketch of Pipe earthing

Recommended Books

1. Computer Aided Electrical Drawing - YOGESH, NAGARAJA, NANDAN PHI Publication
2. Electrical Drafting - S.F. DEVALAPUR EEPB
3. Electrical Drawing - K.L. NARANG
4. Electrical Engineering Drawing – S. K. BHATTACHARYA
5. QCAD - An Introduction to Computer-Aided Design - By Andrew Mustun

Suggested E-Learning references

1. http://www.faveodesign.co.uk/CAD_Drawings.html
2. http://cad.about.com/od/Learn_CAD/a/The-Fundamentals-Of-Drafting.htm
3. <http://transport.itu.edu.tr/PDF/impl332e/Fundamentals%20of%20CAD>.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7
CO5	3	2	3	3	2	2	3	1,2,3,4,6,7
CO6	3	2	3	3	2	2	3	1,2,3,4,6,7

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
MID SEM - I**

Course Code: EE-408

Duration: 1 hour

Course Name: Electrical CAD Lab

Max.Marks:20

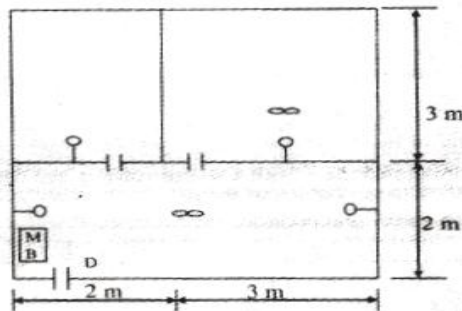
-----**Note: Answer allotted Question.**

Instructions to the Candidate:

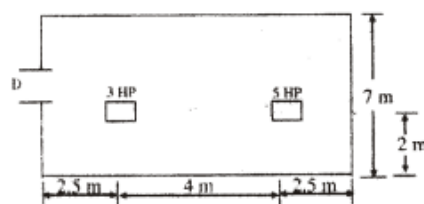
(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

- 1 Draw standard symbols of electrical components: Constant Resistor and variable Resistor, Constant Inductor and variable inductor, Constant capacitor and variable capacitor, transformer.
- 2 Draw standard symbols of electrical components: DC Voltage Source, DC current source, Battery, Single phase AC voltage source, three phase AC voltage source, Wall mounted lamp fixture, Ceiling fan.
- 3 Draw standard symbols of electrical fixtures: On way Switch and two way Switch, Normally Open & Normally Close Push buttons, Fuse, Circuit breaker, Isolators and Ground.
- 4 Draw the wiring layout for a given Single bedroom house



- 5 Draw the Wiring diagram of 3 phase Induction motor with energy meter, 1-phase preventer, Y- Δ starter with control panel/switchboard.
- 6 Draw the wiring layout of Pump shed for dimensions given as below:
The distance between the LT pole and pump set shed (5m x 3m x 3m) is 10m. Assume any missing data.
- 7 Draw the wiring layout of given workshop.



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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - II

Corse Code: EE-408

Duration: 1 hour

Course Name: Electrical CAD Lab

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

- 1 Draw the cross section of single stepped core of one limb of transformer.
- 2 Draw the cross section of 2 stepped core of one limb of transformer.
- 3 Draw the cross section of 3 stepped core of one limb of transformer.
4. Draw sectional Plan of a 1-phase, 220/660 V, 2 kVA core-type transformer with the following data : Cross-section of the core is One step, Diameter of the circle 6 cm, Distance between core centres 13cm.
LT Winding: Outer diameter of 1st layer 9cm Inner diameter of 1st layer 6.5 cm
HT Winding: Outer diameter of HT winding 11 cm Inner diameter of HT winding 9.5 cm.
5. Draw sectional plan of a 3-phase, 220/660 V, 10 kVA core-type transformer with the following data: Cross-section of the core is 3 stepped Diameter of the circle 6.5 cm Distance between core centres 18.5 cm.
LT Winding: Outer diameter of 1st layer 9.25 cm Inner diameter of 1st layer 7.0 cm Outer diameter of 2nd layer 12.1 cm Thickness of each layer 1.2 cm
HT Winding: Outer diameter of HT winding 17.0 cm Inner diameter of HT winding 12.5 cm
- 6 Draw Plan & Elevation of a 3 phase transformers with cooling tubes.
- 7 Draw Elevation & End view of a 3 Squirrel cage Induction motor.
- 8 Draw Elevation & End view of a 3 Slip ring Induction motor.
- 9 Draw the single line diagram of 33kV / 11kV substation.
- 10 Draw single line diagram of Grid connected solar PV system.

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SEMESTER END EXAMINATION

Corse Code: EE-408

Duration: 2 hours

Course Name: Electrical CAD Lab

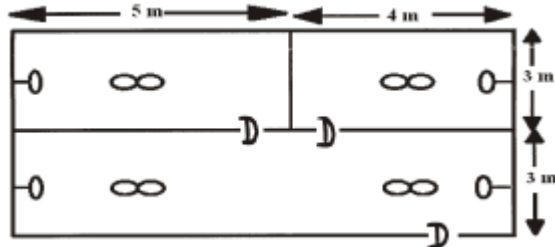
Max.Marks: 40

Note: Answer allotted Question.

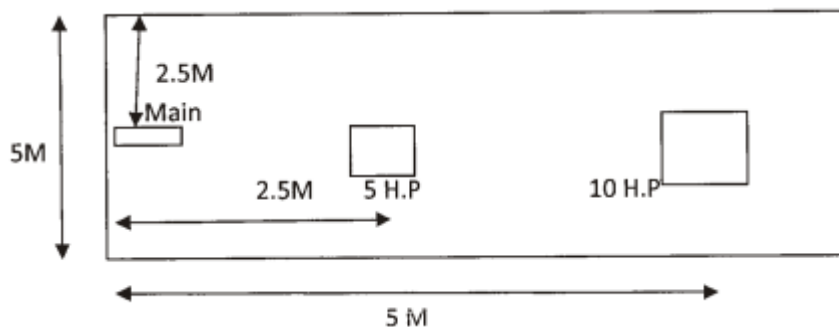
Instructions to the Candidate:

(i) Choose appropriate values when not mentioned in the question

- Draw standard symbols of electrical components: Constant Resistor and variable Resistor, Constant Inductor and variable inductor, Constant capacitor and variable capacitor, transformer.
- Draw standard symbols of electrical components: DC Voltage Source, DC current source, Battery, Single phase AC voltage source, three phase AC voltage source, Wall mounted lamp fixture, Ceiling fan.
- Draw standard symbols of electrical fixtures: On way Switch and two way Switch, Normally Open & Normally Close Push buttons, Fuse, Circuit breaker, Isolators and Ground.
- Draw the wiring layout for a given Single bedroom house.



- Draw the Wiring diagram of 3 phase Induction motor with energy meter, 1-phase preventer, Y- Δ starter with control panel/switchboard.
- Draw the wiring layout of an irrigation pump set of 7.5 kW is to be installed at a distance of 15 m from a 3-phase, 415 V, distribution line. The pump room dimensions are 3 m $\times$ 5 m, – 3.5 m height. Efficiency and power factors are 85% and 0.9 respectively. Assume any missing data.
- Draw the wiring layout of workshop



- h. Draw the cross section of single stepped core of one limb of transformer with diameter of circle as 6 cm.
- i. Draw the cross section of 2 stepped core of one limb of transformer with diameter of circle as 8 cm.
- j. Draw the cross section of 3 stepped core of one limb of transformer with diameter of circle as 7.5 cm.
- k. Draw sectional Plan of a 1-phase, 220/660 V, 2 kVA core-type transformer with the following data : Cross-section of the core is One step, Diameter of the circle 6 cm, Distance between core centres 13cm.
LT Winding: Outer diameter of 1st layer 9cm Inner diameter of 1st layer 6.5 cm
HT Winding: Outer diameter of HT winding 11 cm Inner diameter of HT winding 9.5 cm.
- l. Draw the sectional plan of a 3-phase, 220/660 V, 10 kVA core-type transformer with the following data: Cross-section of the core is 3 stepped Diameter of the circle 6.5 cm Distance between core centres 18.5 cm.
LT Winding: Outer diameter of 1st layer 9.25 cm Inner diameter of 1st layer 7.0 cm Outer diameter of 2nd layer 12.1 cm Thickness of each layer 1.2 cm
HT Winding: Outer diameter of HT winding 17.0 cm Inner diameter of HT winding 12.5 cm
- m. Draw Plan & Elevation of a 3 phase transformers with cooling tubes.
- n. Draw Elevation & End view of a 3 Squirrel cage Induction motor.
- o. Draw Elevation & End view of a 3 Slip ring Induction motor.
- p. Draw the single line diagram of 33kV / 11kV substation.
- q. Draw single line diagram of Grid connected solar PV system.
- r. Draw the sketch of 132 KV steel tower of single circuit.
- s. Draw the sketch of 132 KV steel tower of double circuit.
- t. Draw the sketch of 220 KV steel towers of single circuit.
- u. Draw the sketch of 220 KV steel towers of double circuit.
- v. Draw the dimensioned sketch of Plate earthing.
- w. Draw the dimensioned sketch of Pipe earthing

EE-409-AC MACHINES LAB

Course Title	AC Machines Lab	Course Code	EE-409
Semester	IV	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre-requisites

This course requires the knowledge of AC machines Transformers and Alternators.

Course Outcomes

CO1 :	Evaluate the performance of single phase transformer by conducting suitable tests.
CO2 :	Analyze the load sharing between two Single phase transformers when they are operated in parallel
CO3 :	Familiarize with Three phase Transformers
CO4 :	Determine the dielectric strength of transformer oil
CO5 :	Determine regulation of an Alternator by conducting suitable tests
CO6 :	Synchronise the given Alternator with Supply Mains

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

1.0 Evaluate the performance of single phase transformer by conducting suitable tests.

- 1.1 Identify the terminals on 1-phase transformer.
- 1.2 Conduct turns ratio test on given single phase transformer.
- 1.3 Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
 - a. Draw the equivalent circuit.
 - b. Calculate efficiency at various loads and power factors.
 - c. Find the load at which maximum efficiency occurs.
- 1.4 Obtain efficiency of 1-phase Transformer by conducting load test.
- 1.5 Obtain regulation of 1-phase Transformer by conducting load test.
- 1.6 Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.

2.0 Analyze the load sharing between two Single phase transformers when they are operated in parallel

- 2.1 Connect two identical 1-ph transformers in parallel and analyze the load sharing.

3.0 Familiarize with Three phase Transformers

- 3.1 Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
- 3.2 Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
- 3.3 Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
- 3.4 Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.

Note: Three single phase transformers may be used instead of a three phase transformer.

4.0 Determine the dielectric strength of transformer oil

- 4.1 Obtain the Dielectric Strength of transformer oil using oil testing kit.

5.0 Determine regulation of an Alternator by conducting suitable tests

- 5.1 Obtain voltage regulation by conducting (direct) load test on Alternator.
- 5.2 Obtain the regulation of Alternator by using synchronous impedance method.

6.0 Synchronise the given Alternator with Supply Mains

- 6.1. Synchronise the given Alternator with supply mains by using bright lamp method
- 6.2. Synchronise the given Alternator with supply mains by using bright lamp method

Recommended Books

1. B.L. Theraja-Electrical Technology - Vol -II S.Chand& Co.
2. M.G Say -AC machines
3. P.S. Bhimbra -Electrical machines - Khanna Publishers
4. A.E. Fitzgerald, C. Kingsley and S. Umans Electrical machinery-McGraw Hill
5. MV Deshpande-Electric machines - Wheeler publishing.
6. BR Gupta and VandanaSinghal - Fundamentals of Electric machines

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://www.siemens.com/content/dam/internet/siemens-com/global/products-services>

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
COP O	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7
CO5	3	2	3	3	2	2	3	1,2,3,4,6,7
CO6	3	2	3	3	2	2	3	1,2,3,4,6,7

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - I

Course Code: EE-409

Duration: 1 hours

Course Name: AC Machines Lab

Max.Marks:20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals on 1-phase transformer and determine the turn ratio on transformer
2. Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
 - a) Draw the equivalent circuit.
 - b) Calculate efficiency at various loads and power factors.
 - c) Find the load at which maximum efficiency occurs.
3. Obtain efficiency of 1-phase Transformer by conducting load test.
4. Obtain regulation of 1-phase Transformer by conducting load test.
5. Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.
6. Connect two identical 1-ph transformers in parallel and analyze the load sharing.

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MID SEM - II

Course Code: EE-409

Duration: 1 hours

Course Name: AC Machines Lab

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
2. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
3. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
4. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.
5. Obtain the Dielectric Strength of transformer oil using oil testing kit.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SEMESTER END EXAMINATION

Course Code: EE-409

Duration: 2 hours

Course Name: AC Machines Lab

Max. Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals on 1-phase transformer and determine the turn ratio on transformer
2. Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
 - a) Draw the equivalent circuit.
 - b) Calculate efficiency at various loads and power factors.
 - c) Find the load at which maximum efficiency occurs.
3. Obtain efficiency of 1-phase Transformer by conducting load test.
4. Obtain regulation of 1-phase Transformer by conducting load test.
5. Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.
6. Connect two identical 1-ph transformers in parallel and analyze the load sharing.
7. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
8. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology
9. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
10. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.
11. Obtain the Dielectric Strength of transformer oil using oil testing kit.
12. Obtain voltage regulation by conducting (direct) load test on Alternator.
13. Obtain the regulation of Alternator by using synchronous impedance method.
14. Synchronise the given Alternator with supply mains by using bright lamp method

HU -410 – Employability Skills Lab

Course Title	Employability Skills Lab	Course Code	HU-410
Semester	IV	Course Group	Core
Teaching Scheme in Hrs (L:T:P)	1:0:2	Credits	1.5
Methodology	Pair Work, Group Work, Activities, Lecture, Self-Learning	Total Contact Hours	45 (3 contact hours per week)
CIE	60 Marks	SEE	40 Marks

Rationale:

The course is designed to impart employability skills to make the students of diploma get the initial employment, maintain the employment and get better employment, if they wish.

Prerequisites:

The course requires the basic knowledge of vocabulary, grammar, four language learning skills, viz. listening, speaking, reading and writing and life skills.

Course Outcomes

CO1	Comprehend the importance of employability skills and strategies to survive in a job.
CO2	Converse fluently and accurately accordingly in JAM sessions. Group Discussions will enhance the willingness to take the Initiative, accept adaptability in turn developing leadership qualities and Communication Skills.
CO3	Understand purpose and process of interview in turn knowing how to prepare and succeed in interview.
CO4	Making effective presentation, Develop Public speaking skills and learn to make visually attractive PPTs.
CO5	Learn various writing formats useful at workplace and to develop an ability to apply technical information in documentation.
CO6	Build strong workplace relationships by learning workplace etiquette, professional ethics and importance of gender sensitization.

Course Contents

Module 1: Introduction to Employability Skills

Duration: 6 Periods (L 2 P 4)

- a. Filling the Curriculum gaps
 - i. Attributes and values
 - ii. Specific and general skills
 - iii. Academic Knowledge and Aptitude Skills
 - iv. Analytical skills / Data Analysis
- b. How to get into a job?
 - i. Good personal presentation and attitude
 - ii. Core generic skills
 - iii. Technical / Professional skills

- iv. Good Communication skills
- c. How to survive in a job?
 - i. Learning skills needed for self-advocacy and networking
 - ii. Adaptability to cope with the changing circumstances.
 - iii. Reliability and Integrity
 - iv. Continuous Learning and Consistency in performance.

Module 2: JAM & Group Discussion

Duration: 9 Periods (L 3 P- 6)

- i. What is JAM?
- ii. Significance of JAM
- iii. Enhancing Speaking skills, fluency, usage, coherence, spontaneity, voice modulation, eye contact, body language, Creativity, Sense of humor, Confidence and Time management.
- iv. Learn avoiding hesitation, deviation and repetition
- v. Purpose of Group Discussion
- vi. Types of Group Discussion
- vii. Different expressions and phases and their effective usage
 - a. Opinion expression agrees and disagrees, partially agree or disagree, interrupt politely, add new information and conclusion
- viii. Dos and Don'ts of a Group Discussion
- ix. Importance of body language, Etiquettes and awareness of group dynamics
- x. Practice.

Module 3: Interview Skills

Duration: 9 Periods (L 3 P 6)

- i. Importance of interview skills
- ii. Types of interviews
 - a) Face to Face / One to One, Telephonic / Video, Panel Interview.
- iii. Understanding the process of interview.
 - a) Before the interview
 - b) On the day of the interview
 - c) After the interview
- iv. FAQs, Common expressions of an interviewer and interviewee
- v. Acceptable and unacceptable gestures. Body language, and Attire,
- vi. Do's and Don'ts of an interview
- vii. Mock Interviews

Module 4: Presentation Skills:

Duration: 9 Periods (L-3 P-6)

- a) Significance of presentation
- b) Types of presentations.
 - i. Informative, Instructional, Arousing, Persuasive and Decision-Making
- c) . What makes a good presentation?
 - i. Understand, Collect, Organize, Use presentational aids and Practice

- d) Tips for an effective presentation
 - i. Good Beginning – Greeting, Confidence, Body Language, Opening Ideas (Funny Videos, Ridicule. Asking Questions, Quote someone/Proverb or telling a story/referring an historical event)
 - ii. Unveiling – Develop systematically, usage of appropriate linkers or discourse markers. Eye contact and Effective usage of PPTs
 - iii. Conclusion – Summarize - Giving time to the audience for queries and Time management
- e) Guidelines for PPTs
- f) Public Speaking Skills
 - i. Benefits – Personal and Professionals.
 - ii. Strategies to improve public speaking skills.
 - iii. Obstacles to effective public speaking.
 - iv. Overcoming the barriers of public speaking.
- g) Prepare presentation template.

Module 5: Writing Skills at Workplace:

Duration: 6 Periods (L – 2 P – 4)

- a) Various writing formats useful at workplace
- b) Skills involved in writing at workplace
- c) Different templates for different purposes
- d) Useful technical information in documentation

Module 6: Workplace Awareness

Duration 6 Periods (L – 2 P – 4)

- a) Workplace etiquette
- b) Knowledge, skills and attributes useful at workplace
- c) Workplace Relationships
- d) Professional ethics
- e) Importance of gender sensitization
- f) Sense of responsibility towards the society

Suggested Student Activities:

- Paper Presentations
- Seminars
- Mock Interviews
- Telephonic Interviews
- Group Discussions
- Role Plays
- Creating advertisements
- Five-minute activities
- Creating a model of workplace

Course Outcomes

CO1	Comprehend the importance of employability skills and strategies to survive in a job.
CO2	Converse fluently and accurately accordingly in JAM sessions. Group Discussions will enhance the willingness to take the Initiative, accept adaptability in turn developing leadership qualities and Communication Skills
CO3	Understand purpose and process of interview in turn knowing how to prepare and succeed in interview.
CO4	Making effective presentation, develop public speaking skills and learn to make visually attractive PPTs.
CO5	Learn various writing formats useful at workplace and to develop an ability to apply technical information in documentation.
CO6	Build strong workplace relationships by learning workplace etiquette, professional ethics and importance of gender sensitization.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
410.1	-	-	-	-	3		3	5,7
410.2	-	-	-	-	3	2	3	5,6,7
410.3	-	-	-	-	3	3	3	5,6,7
410.4	-	-	-	-	2	2	3	5,6,7
410.5	-	-	-	-	2	2	3	5,6,7
410.6		-	--	--	2		3	5,7

Evaluation Pattern:**I. Continuous Internal Examination: 60 Marks**

- a. **Mid Sem - I** 20 marks
 - Syllabus:
 - i. Introduction to Employability skills
 - ii. JAM & Group Discussion
- b. **Mid – II** 20 Marks
 - Syllabus:
 - i. Interview Skills
 - ii. Presentation skills
- c. **Internal assessment** 20 marks
 - i. Seminars: 10 marks
 - ii. Assignments: 5 marks
 - iii. Lab record submission: 5 marks

II. Semester End Examination: 40 Marks

- a. Write an essay on a given topic or participate in an activity: 15 Marks
- b. Interview or Group Discussion: 15 Marks
- c. *Viva Voce* 10 marks

References:

- Adair, John. *Effective Communication*. London: Pan Macmillan Ltd., 2003.
- Ajmani, J. C. *Good English: Getting it Right*. New Delhi: Rupa Publications, 2012.
- Amos, Julie-Ann. *Handling Tough Job Interviews*. Mumbai: Jaico Publishing, 2004.
- Collins, Patrick. *Speak with Power and Confidence*. New York: Sterling, 2009.
- Fensterheim, Herbert and Jean Baer. *Don't Say Yes When You Want To Say No*. New York: D
- Raman, Meenakshi & Sangeeta Sharma. *Technical Communication: Principles and Practice*. Second Edition. New Delhi: Oxford University Press, 2011

E-Learning Resources:

- <http://www.dailywritingtips.com/>
- <http://www.englishdaily626.com/c-errors.php>
- <http://www.owl.net.rice.edu/~cainproj/>
- <http://www.thehumorsource.com/>
- <http://www.indiabix.com/group-discussion/topics-with-answers/>
- <http://networketiquette.net/>
- <https://public.wsu.edu/~brians/errors>

Unit No	Unit name	Periods	Questions for SEE			Marks weightage	% Weightage
			R	U	A		
1.	Introduction to Employability Skills	6			2	2	
2	JAM/ Group Discussions	9			2	2	
3	Interview Skills	9			2	2	
4.	Presentation Skills	9			2	2	
5.	Writing skills at work place	6			1	1	
6.	Workplace awareness	6			1	1	
	Total	45			10		100

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION – I
HU-410- EMPLOYABILITY SKILLS LAB

Time: 1 Hour

Total Marks: 20

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. Write a paragraph on the importance of employability skills.
2. List out the important employability skills.
3. Mention the different strategies to enhance the employability skills.

Part – B

10 marks

Instruction: Answer any one of the following questions.

4. What are the rules to be implemented in a JAM session?
5. What are the do's and don'ts of a group discussion.
6. List out the steps involved in a group discussion and mention some phrases and expressions commonly used.

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION - II
HU-410- EMPLOYABILITY SKILLS LAB

Time : 1 Hour

Total Marks: 20

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. Write a list of frequently asked questions in an interview. Write the answers for the questions.
2. Mention the instructions to attend a telephonic interview.
3. What are the do's and don'ts for a formal interview?

Part – B

10 marks

Instruction: Answer any one of the following questions.

4. Write the various steps involved in making presentations effectively.
5. What are the do's don'ts of body language during a presentation?
6. List out a few audio-visual aids and explain their role in making an effective presentation.

BOARD DIPLOMA EXAMINATION (C-21)
SEMESTER END EXAMINATION
HU-410- EMPLOYABILITY SKILLS LAB

Time: 3 Hours

Total Marks:

40

Part – A

10 marks

Instruction: *Pick any one question from the given lot.*

1. How are employability skills helpful to secure a good job?
2. Describe the steps involved in JAM and group discussion.
3. Write the guidelines involved in making a good presentation.
4. List few professional ethics useful at workplace.
5. Mention few skills involved in writing at workplace.

Part – B

15 marks

6. Interview / Group Discussion

Part – C

15 marks

7. *Viva Voce*

EE-411-SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	EE-411
Semester	III	Course Group	Core
Teaching Scheme in periods (L : T :P)	0:0:8	Credits	2.5
Methodology	Activities	Total Contact Periods	120
CIE	Rubrics	SEE	Nil

Suggested Course Outcomes

CO.1 Address the identified needs of the community collaboratively to facilitate positive social change.

- Prepare a chart related to the topics covered in the present semester.
- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participate in Haritha Haram and submit a small report about the activities.
- Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- Seminar on problems with possible solutions in the campus or nearby places
- Group discussions or enacting a play on topics creating awareness about socio-economic problems
- Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- Participate in NCC

(PO5, 6, 7)

CO.2 Listen attentively to others and respond appropriately

- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participating in Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Participate in quiz on technical aspects or current affairs
- Participate in Mock Interview

(PO5, 7)

CO.3 Adapt your style to the occasion, task, and audience

- Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Seminar on problems with possible solutions in the campus or nearby places
- Participate in Mock Interview

(PO5, 6, 7)

CO.4 Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.

- a. Prepare a chart related to the topics covered in the present semester.
- b. Refer to an e-journal and submit a summary report on upcoming technologies.
- c. Visit factory / industry and submit a report/PPT on the observations made.
- d. Prepare a mini project and submit report.
- e. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- f. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- g. Seminar on problems with possible solutions in the campus or nearby places
- h. Participate in Mock Interview

(PO5, 6, 7)

CO.5 Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations

- a. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- b. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6, 7,)

CO.6 Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.

- a. Participate in Haritha Haram and submit a small report about the activities.
- b. Participate in Swatch Bharath and write an essay on the importance of the program
- c. Participate in NCC

(PO5, 6, 7)

CO.7 Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6, 7)

CO.8 Ability to recognize their strengths and those of others to work towards a shared vision.

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6, 7)

CO.9 Act in alignment with one's own values to contribute to one's life-long growth and learning.

- a. Physical activities such as sports, yoga, meditation and other relaxation techniques

(PO5, 6, 7, 8, 9, 10)

CO.10 Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.

- a. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- b. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- c. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- d. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6, 7)

CO	Outcome	CO/PO Mapping
CO1	Address the identified needs of the community collaboratively to facilitate positive social change.	5, 6, 7
CO2	Listen attentively to others and respond appropriately	5, 6, 7
CO3	Adapt your style to the occasion, task, and audience	5, 6, 7
CO4	Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.	5, 6, 7
CO5	Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations	5, 6, 7
CO6	Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.	5, 6, 7
CO7	Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others	5, 6, 7
CO8	Ability to recognize their strengths and those of others to work towards a shared vision	5, 6, 7
CO9	Act in alignment with one's own values to contribute to one's life-long growth and learning.	5, 6, 7
CO10	Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.	5, 6, 7

Note: The above COs may map to other POs from 1 to 4 apart from PO's 5 to 10 depending on the topic

Suggested Student Activities

1. Prepare a chart related to the topics covered in the present semester.
2. Refer to an e-journal and submit a summary report on upcoming technologies.
3. Visit factory / industry and submit a report/PPT on the observations made.
4. Prepare a mini project and submit report.
5. Listen to expert talk, guest lecture, youtube video and write a summary.
6. Participate in Haritha Haram and submit a small report about the activities.
7. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
8. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
9. Participate in Swatch Bharath and write an essay on the importance of the program
10. Group discussions or enacting a play on topics creating awareness about socio-economic problems
11. Physical activities such as sports, games, yoga, meditation and other relaxation techniques
12. Participate in quiz on technical aspects or current affairs
13. Seminar on problems with possible solutions in the campus or nearby places
14. Participate in NCC
15. Participate in Mock interviews

Note: The above student activities will be assessed using rubrics. A sample rubrics template is given below. The subject teacher can assess students using rubrics with atleast four relevant aspects.

RUBRICS MODEL (For assessing Presentation skills)

Aspects	Needs improvement	Satisfactory	Good	Exemplary
Collection of data	Collects very limited information	Collect much Information with very limited relevance to the topic	Collects some basic information with little bit of irrelevance	Collects a great deal of information with relevance
Presentation of data	Clumsy presentation of data	Presents data well; but presentation needs to be more meaningful	Presents data well but need to improve clarity	Presents data in an understandable yet concise manner
Fulfill team's roles & duties	Performs very little duties but Unreliable.	Performs very little duties and is inactive	Performs nearly all duties	Performs all duties of assigned team roles
Shares work equally	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded
Interaction with other team mates	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening to others	Listens, but sometimes talks too much	Listens and speaks a fair amount
Audibility and clarity in speech	Hardly audible and unclear	Very little audibility and clarity	Audible most of the time with clarity	Audible and clear
Understanding content	Lacks content understanding and is clearly a work in progress	Little depth of content understanding	Some depth of content understanding is evident but needs improvement	Insight and depth of content understanding are evident
Content Presentation	Content is inaccurate and information is not presented in a logical order making it difficult to follow	Content is accurate and information is not presented in a logical order making it difficult to follow	Content is accurate but some information is not presented in a logical order but is still generally easy to follow	Content is accurate and information is presented in a logical order

Suggested additional aspects for assessing Leadership Qualities:

1. Carrying self
2. Punctuality
3. Team work abilities
4. Moral values
5. Communication skills
6. Ensures the work is done in time

Suggested additional aspects for assessing “Participation in social task”

- 1 Interested to know the current situation of society.
- 2 Shows interest to participate in given social task.
- 3 Reliable
- 4 Helping nature
- 5 Inter personal skills
- 6 Ensures task is completed

Suggested additional aspects for assessing “Participation in Technical task”

1. Updated to new technologies
2. Identifies problems in society that can be solved using technology
3. Interested to participate in finding possible technical solutions to identified project
4. Reliable
5. Interpersonal skills

Suggested additional aspects for carrying Self:

- 1 Stand or sit straight.
- 2 Keep your head level.
- 3 Relax your shoulders.
- 4 Spread your weight evenly on both legs.
- 5 If sitting, keep your elbows on the arms of your chair, rather than tightly against your sides.
- 6 Make appropriate eye contact while communicating.
- 7 Lower the pitch of your voice.
- 8 Speak more clearly.

C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

V SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Credits	Examination Scheme						
			Instruction Periods per week			Total Period per semester		Continuous internal evaluation			Semester end examination			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal evaluation	Max Marks	Min Marks	Total Marks	Min marks for Passing including internal
1	ME-501	Industrial Management and Entrepreneurship	4	1	0	75	3	20	20	20	40	14	100	35
2	EE-502	AC Motors	4	1	0	75	3	20	20	20	40	14	100	35
3	EE-503	Power Electronics	4	1	0	75	3	20	20	20	40	14	100	35
4	EE-574	Electrical Traction and Automation	4	1	0	75	3	20	20	20	40	14	100	35
	EE-584	Electrical Estimation and Utilization	4	1	0	75	3	20	20	20	40	14	100	35
	EE-594	Electric Vehicles	4	1	0	75	3	20	20	20	40	14	100	35
5	EE-575	Switchgear and Protection	4	1	0	75	3	20	20	20	40	14	100	35
	EE-585	Advanced Protection of Power Systems	4	1	0	75	3	20	20	20	40	14	100	35
6	EE-506	AC Motors Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
7	EE-507	Power Electronics Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	EE-508	Programmable Logic Controllers Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	EE-509	Electrical Installation Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	EE-510	Project Work	1	0	2	45	1.5	20	20	20	40	20	100	50
11	EE-511	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics		--	-	
Activities: student performance is to be assessed through Rubrics														

ME-501 - INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Course title	Industrial Management and Entrepreneurship	Course code	ME-501
Semester	V	Course group	Core
Teaching scheme in periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture+ Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Prerequisites: Knowledge of Basic Sciences.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

Course Outcomes	
CO1	Understand the principles and functions of management and Outline Organization structure& organizational behavior
CO2	Understand the Functions of Production Management
CO3	Analyse the functions of Materials Management.
CO4	Compare Marketing, sales & Feasibility study.
CO5	Know the use of ISO 9000 & T.Q.M
CO6	Understand Industrial legislation & safety and role of entrepreneur and entrepreneurial development

Blue Print of Marks for SEE:

Units		No of periods	Questions to be set for SEE				Remarks	
			R		U	A		
Part-A	1.Principles and functions of management and organisation structure and behaviour	13	Q4	Q1	Q9(a)	Q13(a)		
	2.Production management	12						
Part-B	3.Materials management	13		Q2	Q10(a)	Q14(a)		
	4.Marketing, sales & feasibility study	12						
Part-C	5.Introduction to ISO 9000 & T.Q.M	13		Q3	Q5 Q6	Q9(b) Q11(a) Q11(b)	Q13(b) Q15(a) Q15(b)	
	6.Industrial legislation & safety and Entrepreneurial development	12						
TOTAL		75	08		08	08		

COURSE CONTENT**1. Principles and functions of management and organisation structure and behaviour**

Definitions of Industry, Commerce and Business, Evolution of management theories, Principles of Scientific Management, functions of management, Difference between administration and management, Role of industry, Types of ownership – Sole proprietorship, Partnership, Private limited, public limited company, Industrial Cooperatives, Philosophy, types of Organizations, Line and Staff and functional organizations, Advantages, limitations, departments in a large-scale industry, Effective organization, Motivation, different theories of motivation, leadership styles.

2. Production management

Production, planning and control, relation with other departments, need for planning and its advantages, Routing, scheduling, dispatching, PERT and CPM, simple problems.

3. Materials management

Materials in industry, inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores layout, stores equipment, Stores records, purchasing procedures, purchase records, Bin card, Cardex.

4. Marketing, sales & feasibility study

Sellers and Buyers markets, Marketing, Sales, Market conditions, monopoly, oligopoly, perfect competition, Cost -Elements of Cost, Contribution, Break even analysis, Market Survey, Product and production Analysis, Materials input, Manpower, Location, Economic and Technical Evaluation, preparation of Feasibility study reports.

5. Introduction to ISO 9000 & T.Q.M

Concept of quality, Definition of the terms quality policy, quality management, quality systems, quality control and quality assurance, Elements of quality systems: Management responsibility, Quality system, contract review, design control, document control, purchasing, purchaser– supplied product, product identification and traceability, process control, Inspection and testing. Definition and Principles of quality assurance, Know the necessity of International standards –ISO- Evolution, Meaning, importance, Various standards under ISO, ISO 9000 series of standards- Features, series, Constituents, Advantages, Draw backs and beneficiaries (Whom does ISO 9000 help). 5-S principles-concept of zero defects. TQM-Meaning, Characteristics.

6. Industrial legislation & safety and Entrepreneurial development

Employer – Employee relations, Trade, Union Settlement of disputes, collective bargaining, Welfare activities, Total Welfare concept, rights and responsibilities of Employers and employees, Salient features of Indian Factories Act, Importance of Safety at work places, Hazards, causes of accidents, Entrepreneur and entrepreneurship -Concept, definition, role, expectation, Entrepreneurship Vs Management, promotion of S.S.I. Self –employment schemes, Product selection, site selection, Institutional support needed, financial assistance programs. Start up Scheme- Importance, Features and Eligibility for startup registration, Benefits

REFERENCE BOOKS

1. Industrial engineering and management by O.P Khanna.
2. Production management by Buffa
3. Industrial Engineering & Management Science by TR Banga
4. Engineering Economics and management science by Banga & Sharma
5. Personnel management by Flippo
6. Entrepreneurship by NITTTR Chennai.

ELECTRONIC RESOURCES

1. <https://nptel.ac.in/courses/>
2. <https://www.slideshare.net/>
3. <https://en.wikipedia.org/wiki/>
4. <http://ndl.ethernet.edu.et/bitstream/>

SUGGESTED STUDENT ACTIVITIES

1. Identify any 5 industries with different types of ownerships.
2. Prepare an organizational structure of institution
3. Make a survey on marketing a product.
4. Prepare a list of ISO 9000 series as well as latest quality standards
5. Prepare sign boards representing safety measures.
6. Role play as an entrepreneur

SUGGESTED LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1. Understand the principles and functions of management and Outline Organization structure& organizational behavior

- 1.1 Define industry, commerce (Trade) and business.
- 1.2 Know the need for management.
- 1.3 Understand the evolution of management
- 1.4 Explain the principles of scientific management.
- 1.5 Understand functions of Management.
- 1.6 Differentiate between management and administration.
- 1.7 Understand types of ownerships
- 1.8 Differentiate types of ownerships.
- 1.9 Understand salient features of joint stock companies.
- 1.10 Understand the philosophy and need of organization structure of an industry.
- 1.11 Understand the line, staff and Functional organizations.
- 1.12 List the advantages and limitations of line, staff and functional organizations.
- 1.13 List different departments in a large scale industry.
- 1.14 Explain the factors of effective organization.
- 1.15 Understand organizational behaviour.
- 1.16 Explain job analysis.
- 1.17 State motivation theories.
- 1.18 State Maslow 's Hierarchy of needs.
- 1.19 List out different leadership models.
- 1.20 Explain the trait theory and behavior theory of leadership

2. Understand the Functions of Production Management

- 2.1 Differentiate production, planning and control.
- 2.2 Relate the production department with other departments.

- 2.3 State the need for planning and its advantages.
- 2.4 Explain the stages of Production, planning and control.
- 2.5 Explain routing methods.
- 2.6 Explain scheduling methods.
- 2.7 Explain dispatching.
- 2.8 Draw PERT/CPM networks.
- 2.9 Identify the critical path
- 2.10 Problems on PERT & CPM.

3 Analyze the functions of Materials Management

- 3.1 State the importance of material management.
- 3.2 Objectives and functions of material management.
- 3.3 Derive expression of EOQ for inventory control.
- 3.4 Explain ABC analysis.
- 3.5 Define safety stock, Buffer stock
- 3.6 Define reorder level.
- 3.7 Functions of stores department, duties of store keeper
- 3.8 Explain stores layout,
- 3.9 Explain the stores records.
- 3.10 Describe Cardex method.
- 3.11 Objectives and functions of purchasing department
- 3.12 Explain purchasing procedures.
- 3.13 List out purchase records.
- 3.14 Describe the stores equipments

4 Compare Marketing, sales & Feasibility study.

- 4.1 Explain marketing functions.
- 4.2 Explain Sales function.
- 4.3 List out marketing conditions.
- 4.4 Differentiate Sellers and Buyers 'market.
- 4.5 Differentiate monopoly, oligopoly, and perfect competition.
- 4.6 Steps in conducting market and demand surveys.
- 4.7 Advantages and disadvantages of market and demand surveys
- 4.8 Differentiate product and production analysis.
- 4.9 Identify the input materials, i.e. Bill of materials
- 4.10 Explain the concept of cost..
- 4.11 Explain break-even analysis..
- 4.12 Evaluate Economic and Technical factors.
- 4.13 Preparation of feasibility study.
- 4.14 List out different products currently in demand with market or industry.

5 Know the use of ISO 9000 & T.Q.M

- 5.1 Understand the concept of quality.
- 5.2 Know the quality systems and elements of quality systems.
- 5.3 Know the principles of quality Assurance.
- 5.4 Know the evolution of ISO standards.
- 5.5 Discuss ISO standards and ISO 9000 series of quality systems.
- 5.6 State the constituents of ISO 9000 series of standards for quality systems.
- 5.7 Benefits and Drawbacks of ISO 9000 series of standards.
- 5.8 List out the beneficiaries of ISO 9000.
- 5.9 Understand 5-S principles and ZERO DEFECT
- 5.10 Know TQM concept and elements.

6 Understand Industrial legislation & safety and role of entrepreneur and entrepreneurial development

- 6.1 Describe employer and employee relations.
- 6.2 Objectives, functions, advantages and disadvantages of Trade Unions.
- 6.3 Explain Causes and settlements of industrial disputes..
- 6.4 List out Welfare activities..
- 6.5 List out the rights and responsibilities of employees and employers.
- 6.6 List out the salient features of Indian Factories Act.
- 6.7 Explain the importance of safety at Work place.
- 6.8 List out the important provisions related to safety.
- 6.9 Explain hazard and accident.
- 6.10 Explain the causes of accidents..
- 6.11 Define the word entrepreneur..
- 6.12 Difference between entrepreneurship and management.
- 6.13 Explain, expectations, role and qualities of an entrepreneur..
- 6.14 Determine the role of entrepreneurs in promoting Small Scale Industries.
- 6.15 Describe the details of self-employment schemes.
- 6.16 Explain the method of product selection.
- 6.17 Explain the method of site selection.
- 6.18 List the financial assistance programs.
- 6.19 List out the organizations that help an entrepreneur
- 6.20 Importance of Start-ups
- 6.21 Different Start-up schemes
- 6.22 Features and Eligibility for startup registration
- 6.23 Benefits of Start-ups

COURSE OUTCOMES		CL	Linked POs	Teaching Periods
CO1	Understand the principles and functions of management and Outline Organization structure& organizational behavior	R, U, A	5,6,7	13
CO2	Understand the Functions of Production Management	R, U, A	2,5,6	12
CO3	Analyse the functions of Materials Management.	U, A	1,6,7	13
CO4	Compare Marketing, sales & Feasibility study.	U, A	1,6,7,	12
CO5	Know the use of ISO 9000 & T.Q.M	U, A	1,6,7	13
CO6	Understand Industrial legislation & safety and role of entrepreneur and entrepreneurial development	R, U, A	1,6,7	12
			Total Periods	75

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

CO-PO Attainment Matrix:

COURSE OUTCOMES	PROGRAM OUTCOMES						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1					2	3	1
CO2		2			1	3	
CO3	1					2	3
CO4	1					3	2
CO5	2					3	1
CO6	1					2	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Lowly Addressed.

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Principles and functions of management and organisation structure and behaviour	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Production management	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Materials management	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Marketing, sales & feasibility study	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Legend	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

MID SEM-I Model Paper

ME-501-INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Time: 1 hr

Max. Marks:20

PART-A

4x1=4Marks

NOTE: 1) Answer all questions and each carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceed three simple sentences.

1. Define Industry.
2. Write any two qualities of a leader.
3. What do you mean by Planning?
4. What does CPM Stand for.?

PART-B

2X3M=6 Marks

NOTE: 1) Answer all questions and each carries **three** mark.

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

5.(a) what is administration

OR

5.(b) List out theories of motivation.

6.(a) what is the need for planning.

OR

6.(b) what is routing?

PART-C

2X5M=10 Marks

NOTE: 1) Answer all questions and each carries **five** mark.

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

7.(a) Explain the principles of scientific management

OR

7.(b) a) Compare between PERT AND CPM.

b) Explain about Scheduling and Dispatching.

8.(a) Draw the project network of the given project and identify all paths through it. Find the critical path, TL and T_E on the network.

Activity	Optimistic Time(a)	Most likely Time (m)	Pessimistic Time (b)
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-5	2	6	10
5-6	3	6	15

OR

8.(b) State the ERG theory of motivation.

MID SEM-II
Model Paper:: ME-501

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Time: 1 hr

Max. Marks:20

PART-A

4x1=4Marks

NOTE: 1) Answer all questions and each carries **one** mark.

2) Answers should be brief and straight to the point and shall not be exceed three simple sentences.

1. Write the formula to calculate EOQ?
2. What is Buffer Stock?
3. What Is feasibility study?
4. What is Breakeven Point?

PART-B

2X3M=6 Marks

NOTE: 1) Answer all questions and each carries **three** mark.

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

5.(a) List the advantages of ABC analysis.

OR

5.(b) State the functions of Material Management.

6.(a) List out the element of cost ?

OR

6.(b) what is buyer's market and seller's market.

PART-C

2X5M=10 Marks

NOTE: 1) Answer all questions and each carries **five** mark.

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

7.(a) Explain the functions of Purchase management.

OR

7.(b) Explain various records used in stores.

8.(a) What is Break Even analysis? Illustrate graphically the concept of Break even point.

OR

8.(b) Differentiate product and product analysis.

BOARD DIPLOMA EXAMINATION, (C-21)
SEE-MODEL PAPER ME-501
DME– V SEMESTER EXAMINATION
INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Time: 2 Hours

Max. Marks: 40

PART-A

8 X 1 = 8

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark.

1. Define Trade.
2. What is a bin card
3. List two benefits of ISO 9000 certification.
4. Define a Network.
5. Define quality control.
6. What is ISO.
7. What is the purpose of Trade unions.
8. Define an entrepreneur.

PART-B

4 X 3 = 12

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

9. (a) State any three differences between share and debenture.
OR
9. (b) What are the 5-S principles.
10. (a) List any three advantages of ABC analysis.
OR
10. (b) Mention three qualities required for a good entrepreneur .
11. (a) List the beneficiaries of ISO 9000
OR
11. (b) State the features of ISO 9000.
12. (a) What are the expectations of an entrepreneur
OR
12. (b) Explain the significance of collective bargaining.

PART-C

4 X 5 = 20

Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

13. (a) Explain the principles of Scientific management stated by F.W. Taylor

OR

13(b) What is quality system? Explain various elements of quality systems.

14 (a) Explain ABC analysis in inventory control with graph.

OR

14(b) Explain the factors influencing the site selection for a plant location.

15 (a) What is TQM? Write the principles or elements of TQM.

OR

15(b) Explain the importance of certification of confirmation to ISO 9000 and the procedure of obtaining it ?

16(a) List out the three rights and responsibilities of Employees.

OR

16(b) State Indian electricity rules with regard to safety.

EE-502-AC MOTORS

Course Title	AC Motors	Course Code	EE-502
Semester	V	Course Group	Core
Teaching Scheme in Periods (L: T: P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE (Continuous Internal Evaluation)	60 Marks	SEE (Semester End Examination)	40 Marks

Pre requisites

This course requires the knowledge of Basic Principles of Electricity and Magnetism,

Course Outcomes

CO1 :	Describe the construction and working of Synchronous Motor
CO2 :	Apply different starting methods and select a suitable 3 phase induction motor for particular application.
CO3 :	Describe the construction & working of 3 Phase Induction Motors
CO4 :	Draw the Torque-Slip curves and evaluate the performance of 3 phase induction Motor.
CO5 :	Apply different starting and speed control methods of 3 phase Induction Motor
CO6 :	Describe the construction & working of Single-Phase Motors

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Synchronous Motors	15	Q4	Q1	Q9(a)	Q13(a)
2	Starters and Applications of Synchronous Motors	10				
3	3 phase Induction Motors	10		Q2	Q10(a)	Q14(a)
4	Characteristics of 3 phase Induction Motor	15				
5	Starters and Speed Control of 3 phase Induction Motor	10		Q3	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Single phase and Special purpose Motors	15			Q7,Q8	Q10(b), Q12(a), Q12(b)
Total		75	8		8	8

Course Content

UNIT - 1 Synchronous Motors

Duration: 15 Periods (L: 12 -T: 3)

Introduction - Rotating Magnetic field, synchronous speed, parts of synchronous Motor – Excitation of rotor -working Principle – Back EMF – Resistance and synchronous Reactance – Effects of Load, Phasor diagrams – Load Angle, power relation, Effects of change of Excitation at constant Load, Phasor diagrams for: (a) Normal, (b)Under and c)Over excitation conditions, Effects of Excitation on Armature current and power factor, Relation between Back EMF applied voltage, Simple problems - V – Curves and inverted V – curves ,constant power lines.

UNIT – 2 Starters and Applications of Synchronous Motors

Duration: 10 Periods (L: 8 -T: 2)

Starting Device necessity – Methods of starting, phenomenon of hunting and its undesirable effects – Methods to prevent hunting - State the different speed control methods synchronous motor Explain with block diagram Inverter Fed Open Loop Synchronous Motor Drive Explain With block diagram Closed Loop Synchronous (Self Synchronous) Motor Drive synchronous condenser- calculation of KVA / KVAR Rating – problems - Applications of synchronous motor.

UNIT – 3 Three phase Induction Motors

Duration: 10 Periods (L: 8 -T: 2)

Introduction – Constructional features – types of rotors - Principle of working & self starting features, actual rotor speed - synchronous speed – slip - Effect of loading on slip – frequency and magnitude of rotor EMF and reactance – Expression for rotor current on no load and On Load – problems - Induction motor as a generalized transformer - Losses and Power transfer stages from stator to rotor - efficiency – Relation between rotor copper losses , Rotor output and rotor input derivation and problems.

UNIT – 4- Characteristics of 3 phase Induction Motor

Duration: 15 Periods (L: 12 - T: 3)

Torque equation –Starting torque - condition for maximum torque – Relation Between full load torque, starting Torque and maximum torque – Torque slip curves – modes of operation of induction machine – braking of induction motor (no derivation and problems) - effects and variation of rotor resistance and reactance on starting, full load and maximum torque - Effect of supply voltage on torque and speed – problems

UNIT - 5 Circle diagram, Starters and Speed Control of 3-phase Induction Motor

Duration: 10 Periods (L: 8 -T: 2)

No load and blocked rotor tests - circle diagram from test data – Evaluation of torque – efficiency - problems-Starters for Induction motor – necessity of starters - Direct Switching - D.O.L starter - Star / Delta starter- Auto Transformer starter -rotor resistance starters- Block Diagram of soft starter –Advantages and Disadvantages- Double cage rotor motor – Improvement in performance features - Speed variation of induction motors - Application of induction motors - Comparison of Synchronous and induction motors.

UNIT - 6 Single phase and Special purpose Motors

Duration: 15 Periods (L: 12 - T: 3)

Essential parts and constructional features of single phase motors – self starting -split phase, capacitor start - capacitor run - shaded pole induction motor- Principle of working – Accessories like capacitors, centrifugal switch – function –reversal of rotation - Applications - relative merits - A.C series motor – principles of working – sparking elimination methods - applications - Universal motor- principle of working, speed control and applications- Stepper motor-principle of working and applications- Servo motor - principle of working and applications – linear induction motors – principle of working and applications – BLDC and PMDC motors – principle of working and applications

Recommended Books

1. Electrical Technology by B.L. Theraja
2. Electrical Technology by J.B. Gupta
3. Electrical Technology by H. Cotton
4. Performance and design of A.C. Machines by M.G, Say
5. Performance of A.C. Machines by Langsdorf
6. Electrical motors applications and control by M.V. Deshpande

Suggested E-Learning references

1. <http://electrical4u.com>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
3. www.nptel.ac.in

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 State the Principle of Production of Rotating Magnetic Field in 3-phase System.
- 1.2 Describe the construction of synchronous motor.
- 1.3 State the parts of synchronous motor and explain.
- 1.4 Explain the principle of working of synchronous motor.
- 1.5 Describe the performance of synchronous motor on Load with phasor diagrams.
- 1.6 Derive the expression for Back EMF in synchronous motor
- 1.7 Effects of change of Excitation at constant Load, Phasor diagrams for:
(a) Normal, (b) Under and c) Over excitation conditions
- 1.8 Effects of Excitation on Armature current and power factor
- 1.9 Relation between Back EMF applied voltage
- 1.10 Simple problems on Back EMF applied voltage

- 1.11 Describe the significance of 'V' curve.
- 1.12 Draw the 'V' curves for different loads.
- 1.13 Describe the significance of inverted 'V' curve.
- 1.14 Draw the inverted 'V' curve for different loads.
- 1.15 Draw the constant power lines of synchronous motor

- 2.1 Explain the starting method of synchronous motor by Auxiliary motor.
- 2.2 Explain the starting method of synchronous motor by Damper winding.
- 2.3 Describe the phenomenon of HUNTING.
- 2.4 State "How HUNTING is prevented"?
- 2.5 State the different speed control methods synchronous motor
- 2.6 Explain with block diagram Inverter Fed Open Loop Synchronous Motor Drive
- 2.7 Explain With block diagram Closed Loop Synchronous (Self Synchronous) Motor Drive
- 2.8 Explain how a Synchronous motor can be used as a Synchronous condenser.
- 2.9 Solve simple problems on power factor correction.
- 2.10 State the applications of synchronous motor.

- 3.1 Explain the advantages of Induction Motors.
- 3.2 Describe the construction of slip ring Induction motor.
- 3.3 Explain the construction of squirrel cage Induction motor.
- 3.4 State the working principle of 3 phase induction motor.
- 3.5 Explain working of 3 phase induction motor on no load.
- 3.6 Describe working of 3 phase induction motor on Load.
- 3.7 Describe a Slip, Effect of loading on slip
- 3.8 Frequency and magnitude of rotor EMF and reactance –
- 3.9 Expression for rotor current on no load and On Load – problems
- 3.10 Relation between rotor copper losses ,
- 3.11 Rotor output and rotor input derivation and problems.
- 3.12 Explain how an induction motor is treated as a generalized transformer.

- 3.13 Describe Power flow diagram and Efficiency.
- 3.14 Solve simple problems on Power and Efficiency.

- 4.1 Derive Torque Equation
- 4.2 Draw Torque – Slip characteristics of induction motor.
- 4.3 Explain effect of resistance on Torque slip characteristics.
- 4.4 List various modes of operation of induction machine.
- 4.5 Name different braking methods.
- 4.6 Describe the plugging of three phase induction motor.
- 4.7 Describe the Rheostatic braking of three phase induction motor.
- 4.8 Describe the regenerative braking of three phase induction motor.
- 4.9 Derive the expression for full load torque.
- 4.10 Explain the expression for starting torque.
- 4.11 Derive the expression for maximum torque.
- 4.12 Derive the relation between full load torque, starting Torque and maximum torque.
- 4.13 Solve simple problems on Torque.

- 5.1 Explain No-load test on induction motor
- 5.2 Describe blocked rotor test on induction motor
- 5.3 Draw circle diagram with the help of no-load and blocked rotor tests
- 5.4 Solve problems on circle diagram.
- 5.5 List different types of starters used for induction motors.
- 5.6 Sketch the circuit diagram and explain the working of D.O.L. starter.
- 5.7 Sketch the circuit diagram and explain the working of primary resistor starter
- 5.8 Sketch the circuit diagram and explain the working of Star/Delta Starter.
- 5.9 Sketch the circuit diagram and explain the working of Auto - Transformer starter.
- 5.10 Sketch the circuit diagram and explain the working of Rotor resistance starter.
- 5.11 Explain the working of Soft starter with block diagram
- 5.12 State the advantages of soft starter over conventional starters.
- 5.13 Explain construction features of double cage rotor motor.

- 5.14 Describe the speed control of inductor motors by Frequency changing.
- 5.15 Explain the speed control of inductor motors by Pole changing method.
- 5.16 Describe the speed control of inductor motors by Injecting voltage in rotor circuit.
- 5.17 Explain the speed control of inductor motors by Cascading method.
- 5.18 State the applications of inductor motors
- 5.19 Compare synchronous motors with induction motors.

- 6.1 State the types of single phase induction motors.
- 6.2 Describe the constructional features of single phase induction motor.
- 6.3 Explain the principle of working of single phase Induction motor by double field revolving theory.
- 6.4 Describe the principle of working of single phase Induction motor by cross field theory.
- 6.5 Why a Single-phase Induction motor is not Self starting?
- 6.6 Describe the working of split phase motor
- 6.7 Describe the working of capacitor start motor
- 6.8 Describe the working of capacitor run motor
- 6.9 Mention the differences between capacitor start and capacitor run induction motors
- 6.10 Describe the working of double value capacitor run motor.
- 6.11 Describe the working of shaded pole motor
- 6.12 State the applications of single phase induction motors
- 6.13 Compare single phase with three phase induction motors
- 6.14 Explain the working of linear induction motor.
- 6.15 State the applications of linear induction motor
- 6.16 Describe the working of single phase AC Series motor.
- 6.17 Explain the methods to eliminate sparking in AC series motor.
- 6.18 State the applications of single phase AC Series motor.
- 6.19 Explain the working of universal motor.
- 6.20 Explain the speed control of universal motor.
- 6.21 State the applications of single phase universal motor.

- 6.22 Explain the principle of working of Stepper motor.
- 6.23 State the applications of Stepper motor.
- 6.24 Describe the principle of working of Servo motor.
- 6.25 State the applications of Servo motor.
- 6.26 Describe the principle of working of PMDC motor.
- 6.27 State the applications of PMDC motor.
- 6.28 Describe the principle of working of BLDC motor.
- 6.29 State the applications of BLDC motor.

Suggested Student Activities

1. Student visits Library to refer to Electrical Manuals
2. Student visits the Lab to identify the available electrical equipments.
3. Each Student has to prepare and submit at least 3 pages of self hand written report on (Construction details, type of windings used, Insulating materials used, applications etc.,) Preferably by visiting a nearby Substation/ Power station/ Industry/ Factory etc., considering any one of the following topics.
 - a) 3-ph Induction motor- Squirrel-cage and Slip-ring type.
 - b) Speed control of Induction motor.
 - c) Types of Starters.
 - d) 3-ph Synchronous Motors.
 - e) 1-ph motors...
4. Quiz
5. Group Discussion
6. Surprise Test

CO-PO Mapping Matrix

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability and environment	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	2	2		3		3	1,2,3,5,7
CO2	3	3	3		3		3	1,2,3,5,7
CO3	3	3	3		3		3	1,2,3,5,7
CO4	3	3	3		3		3	1,2,3,5,7
CO5	3	3	3		3		3	1,2,3,5,7
CO6	3	3	3		3		3	1,2,3,5,7

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page side, 1 page side and 2page sides respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI					
Total Questions	8		8	8	

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

SUB CODE: EE-502

AC MOTORS

MID SEM -I EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1= 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define 'V' curve.
2. On which parameters inverted 'V' curve is drawn.
3. Why damper winding is used.
4. List any two applications of synchronous motor.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks.

5.(a) State the parts of synchronous motor

OR

5.(b) Describe the significance of inverted 'V' curve.

6.(a) Explain the phenomenon of HUNTING.

OR

6. (b) State "How HUNTING is prevented"?

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

7.(a). Explain the principle of working of synchronous motor.

OR

7.(b). Describe the construction of synchronous motor.

8.(a). Explain the starting method of synchronous motor by Auxiliary motor.

OR

8.(b). Explain how a Synchronous motor can be used as a Synchronous condenser.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

SUB CODE: EE-502

AC MOTORS

MID SEM -II EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1 = 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Write the types of three phase induction motors.
2. In which type of three phase induction motor adding of external resistance is not possible.
3. Write the expression for starting torque.
4. Write the tests on three phase induction motor.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

- 5.(a). Write the Power flow diagram of three phase induction motor.

OR

- 5.(b). Write the advantages of three phase induction motors.

- 6.(a). Draw the Torque - Slip characteristics of induction motor.

OR

- 6.(b). Derive the expression for maximum torque

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Explain the construction of slip ring Induction motor.

OR

- 7.(b). Explain the working principle of squirrel cage Induction motor

- 8.(a). Explain the procedure to conduct No-load test on induction motor.

OR

- 8.(b). Explain the procedure to conduct blocked rotor test on induction motor

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

SUB CODE: EE-502

AC MOTORS

SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks : 8 X 1= 8

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Draw inverted 'V' curves for different loads.
2. What are the types of three phase induction motors.
3. List any two starters used for three-phase induction motor.
4. Draw the graph between armature current and field current of three-phase synchronous motor.
5. List any two methods of speed control of three-phase squirrel cage induction motor.
6. Suggest suitable starter for a three-phase 10 HP induction motor.
7. Write the types of starting methods of single phase induction motor.
8. State any two applications of Stepper motor.

PART - B

Marks: 4 × 3= 12

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a) State the parts of synchronous motor

OR

9.(b) Draw the sketch of D.O.L. starter

10.(a) Write any six advantages of Induction Motors

OR

10.(b) State the types of single phase induction motors.

11.(a) Draw the sketch of Auto - Transformer starter

OR

11.(b) State the applications of three phase inductor motors.

12.(a) State the working principle of single phase universal motor

OR

12.(b) State the applications of Stepper motor.

PART – C

Marks: $4 \times 5 = 20$

Instructions: (1) Answer all questions.
(2) Each question carries **five** marks.

13.(a) Explain the performance of synchronous motor on Load with phasor diagrams

OR

13. (b) Sketch the circuit diagram and explain the working of Rotor resistance starter

14.(a) Derive the relation between full load torque, starting Torque and maximum torque.

OR

14.(b) Explain the working of capacitor start motor

15.(a) Explain the speed control of induction motor by change of frequency.

OR

15.(b) Compare synchronous motors with induction motors

16.(a) Explain the methods to eliminate sparking in single phase AC Series motor

OR

16.(b) Explain the working of PMDC motor.

EE-503-POWER ELECTRONICS

Course title	Power Electronics	Course code	EE-503
Semester	V	Course group	Core
Teaching scheme in periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + tutorial	Total contact periods	75
CIE (Continuous Internal Evaluation)	60 Marks	See (Semester End Examination)	40 Marks

Pre requisites

This course requires the knowledge of Electronics engineering (Semiconductor devices and circuits) and Electrical Machines (DC and AC).

Course Outcomes

CO1 :	Compare different power electronic devices and select the device based on the requirement
CO2 :	Use different Converters circuits as per requirement.
CO3 :	Acquire the knowledge to construct AC regulators and Choppers circuits.
CO4 :	Acquire the knowledge to construct and use Inverters and Cyclo-converters circuits.
CO5 :	Apply the power electronic drives for speed control of DC / AC Motors and compare specific power electronics drives.
CO6 :	Apply power electronic circuits for specific applications

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Power Electronic Devices	13	Q4	Q1		Q9(a)	Q13(a)
2	Converters	12					
3	A.C Voltage regulators and Choppers	13		Q2		Q10(a)	Q14(a)
4	Inverters & Cyclo-converters	12					
5	Speed Control of DC and AC Motors	12		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Applications of Power Electronic Circuits	13			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Content

UNIT 1 - Power Electronic Devices

Duration: 13 Periods (L: 10 - T: 3)

ISI circuit symbols for each device in thyristor family – Construction, Working principle and static VI characteristics of devices: SCR, GTO SCR- comparison between SCR and GTO SCR- Two transistor analogy of SCR , Gate characteristics of SCR, Ratings of SCR: Forward break over voltage, latching current, holding current, turn on time, turn off time – advantages of SCR as switch -static VI characteristics and working of DIAC, TRIAC, IGBT - applications of SCR, GTO SCR, DIAC, TRIAC, IGBT, LASCR - triggering of SCR using UJT - Necessity of Commutation- various methods of Thyristor Commutation techniques.

UNIT 2– Converters

Duration: 12 Periods (L: 9 – T: 3)

Classification of converters, Advantages and disadvantages of power electronic converters- single phase half wave controlled converter with R load, R-L load, Need of freewheeling diode- single phase half wave controlled converter with R-L load with freewheeling diode, single phase full wave full controlled converter with R load, R-L load - three phase half wave converter with R load.

UNIT 3 – A.C Voltage regulators and Choppers

Duration:13 Periods (L:10– T: 3)

Single phase half wave and full wave AC voltage regulator with R load - Applications of AC voltage regulators - Choppers- Classification of Choppers, Four quadrant operation of a chopper, different voltage control modes of operation, Applications of choppers.

UNIT 4 – Inverters & Cyclo-converters

Duration: 12 Periods (L: 9 –T: 3)

Classification of Inverters-basic series Inverter- parallel Inverter- single phase bridge Inverter – applications of inverters -Cyclo-converter – basic principle of operation- single-phase center tapped Cyclo-converter- applications of Cyclo-converters.

UNIT 5 - Speed Control of DC and AC Motors

Duration: 12 Periods (L: 9 –T: 3)

Advantages of power electronic drives - DC Motor control - Speed control of DC shunt Motor and DC Series motor by using single phase converters and choppers-Compare chopper controlled drives and converter controlled drives - AC Motor Controls- speed control of 3 phase induction Motor by using AC voltage controllers.

UNIT 6 - Applications of Power Electronic Circuits

Duration: 13Periods (L: 10 –T: 3)

Applications of power electronic circuits- Types of disturbances in commercial power supply - devices to suppress spikes in supply voltages – SMPS - On line and Off line UPS – advantages - applications – estimation of UPS rating and battery rating for a given load and backup time - Light dimmer Circuit- Burglar alarm Circuit- Emergency lamp Circuit using SCR—power control circuits using SCR – Protecting power devices.

Recommended Books

1. Power Electronics– JameelAsghar PHI, New Delhi.
2. Electronics In Industry – George M. Chute & Robert D. Chute
3. Industrial Electronics – G.K.Mithal
4. Power Electronics - P.C.Sen.
5. Industrial Electronics – M.S. Berde
6. Industrial & Power Electronics- Harish Rai.
7. Industrial Electronics and Control - S.K.Bhattacharya&S.Chatterjee
8. Article by R.K.Sugandhi& KK Sugandhi -Thyristor(theory& applications)
9. Power electronics by M.D. Singh &K.B.kanchandani

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <http://www.eng.uwi.tt/depts/elec/staff/rdefour/ee33d/index.html>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 List different devices of thyristor family.
- 1.2 Draw the ISI circuit symbols for each device in thyristor family.
- 1.3 Explain the constructional details of SCR
- 1.4 Explain the two transistor analogy of SCR.
- 1.5 Explain the static Volt – Ampere characteristics of SCR with the help of a diagram.
- 1.6 Draw the Gate characteristics of SCR
- 1.7 Explain SCR triggering by UJT.
- 1.8 Mention the ratings of SCR.

- 1.9 Give the advantages of SCR as a switch.
- 1.10 Explain the construction of GTO SCR and its static VI characteristics with the help of diagram.
- 1.11 Compare GTO SCR and SCR.
- 1.12 Explain the static Volt-ampere characteristics of DIAC with the help of diagram.
- 1.13 Explain the static Volt-ampere characteristics of TRIAC with the help of diagram.
- 1.14 Explain the working of Insulated gate Bipolar transistor (IGBT) by giving their static V-I Characteristics.
- 1.15 State the necessity of Commutation in SCR's
- 1.16 Explain various methods of Commutation methods for SCR.
- 1.17 List applications of SCR, GTO SCR, DIAC, TRIAC, IGBT, LASCR

- 2.1. Classify converters.
- 2.2. List the advantages and disadvantages of Power Electronic converters
- 2.3. Explain the working of single-phase half wave controlled converter with Resistive load..
- 2.4. Explain the working of single-phase half wave controlled converter with R-L load.
- 2.5. State the need of freewheeling diode
- 2.6. Explain the working of single-phase half wave controlled converter with R-L loads and freewheeling diode
- 2.7. Explain the working of single phase full wave fully controlled converter with resistive load.
- 2.8. Explain the working of single phase full wave fully controlled converter with R- L load.
- 2.9. Explain the working of three-phase half wave controlled converter with Resistive load
- 2.10. List the applications of Power Electronic converters

- 3.1 Define AC voltage regulator.
- 3.2 Explain the working of single phase half wave AC voltage regulator.
- 3.3 Explain the working of single phase full wave AC voltage regulator.
- 3.4 List the applications of AC voltage regulators.
- 3.5 Define Chopper.
- 3.6 Classify choppers.
- 3.7 Explain the working principle of chopper.
- 3.8 Describe the voltage control modes of chopper

- 3.9 Explain the working of step-down chopper.
- 3.10 Explain the operation of chopper in all four quadrants.
- 3.11 List the applications of choppers.

- 4.1 Define inverter.
- 4.2 Classify inverters.
- 4.3 Explain the working of series inverter.
- 4.4 Explain the working of parallel inverter
- 4.5 Explain the working of single-phase bridge inverter with R load.
- 4.6 List the applications of inverter.
- 4.7 Define Cyclo-converter.
- 4.8 Explain the basic principle of Cyclo-converter.
- 4.9 Explain the working of single-phase centre tapped Cyclo-converter.
- 4.10 List the applications of Cyclo-converter.

- 5.1 List the advantages of power electronic drives.
- 5.2 List the disadvantages of power electronic drives.
- 5.3 Mention the factors affecting the speed of DC Motors.
- 5.4 Explain the speed control for DC Shunt motor using single phase converters.
- 5.5 Explain the speed control for DC Series motor using single phase converters
- 5.6 Explain the speed control for DC Shunt motor and using chopper.
- 5.7 Explain the speed control for DC Series motor using chopper.
- 5.8 Compare chopper controlled drives and converter controlled drives
- 5.9 List the factors affecting speed of the AC Motors.
- 5.10 Explain the speed control of Induction Motor by using AC voltage controller.

- 6.1 List any six applications of power electronic circuits.
- 6.2 List the types of disturbances in commercial power supply.
- 6.3 List the devices used to suppress spikes in supply voltages.
- 6.4 Classify UPS
- 6.5 Draw and explain the block diagram of off-line UPS.
- 6.6 Draw and explain the block diagram of on-line UPS.
- 6.7 List the storage batteries used in UPS.
- 6.8 List the advantages of on-line and off-line UPS
- 6.9 List the applications of on-line and off-line UPS
- 6.10 Estimate the UPS rating and battery rating for a given load and backup time
- 6.11 Explain SMPS with block diagram.
- 6.12 List the advantages of SMPS.
- 6.13 Explain the Light dimmer circuit using DIAC/TRIAC with the help of a diagram.
- 6.14 Explain the power control circuits using SCRs.
- 6.15 Explain the mechanism of protecting power devices – overvoltage protection – crowbar circuit – Circuit breakers using SCRs.

- 6.16 Explain the Burglar alarm circuit using SCR with the help of a diagram.
- 6.17 Explain the Emergency lamp circuit using SCR with the help of a diagram.

Suggested Student Activities

1. Student visits Library to refer to Electrical Manuals and IEEE papers on related topic
2. Student visits the Lab to experiment with converters, inverters and view the models of different applications of Power Electronics circuits
3. Visit nearby Industry to familiarize with applications of different power electronic circuits & drives
4. Quiz
5. Group discussion
6. Surprise test

CO-PO Mapping Matrix

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability and environment	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	2	2		3		3	1,2,3,5,7
CO2	3	3	3		3		3	1,2,3,5,7
CO3	3	3	3		3		3	1,2,3,5,7
CO4	3	3	3		3		3	1,2,3,5,7
CO5	3	3	3		3		3	1,2,3,5,7
CO6	3	3	3		3		3	1,2,3,5,7

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI					
Total Questions	8		8	8	

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING ,TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.**

SUB CODE: EE-503
POWER ELECTRONICS
MID SEM -I MODEL PAPER

TIME: 1HOUR.

TOTAL MARKS: 20

PART – A

Marks: 4Q X 1= 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. List different devices of thyristor family
2. Draw the ISI symbols for a) SCR, b) GTO SCR
3. Classify converters in any two aspects.
4. What is the need of freewheeling diode in converter

PART - B

Marks: 2Q x 3 = 6

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks.

- 5.(a) Define latching current and holding current of SCR.

OR

- 5.(b) Draw the static Volt-ampere characteristics of DIAC with the help of a diagram.

- 6.(a) Draw the input and output waveforms of single-phase half wave controlled converter with resistive load.

OR

6. (b) Write the advantages of Power Electronic converters

PART - C

Marks: 2Q x 5= 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Explain the two-transistor analogy of SCR with equivalent circuit.

OR

- 7.(b). Explain the static Volt-ampere characteristics of TRIAC with the help of a diagram.

- 8.(a). Explain the working of single phase full wave bridge converter with R- L load.

OR

- 8.(b). Explain the working of three-phase half wave controlled converter with Resistive load

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-503
POWER ELECTRONICS
MID SEM –II MODEL PAPER

TIME: 1 HOUR.

TOTAL MARKS: 20

PART – A

Marks: 4Q X 1 = 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Give the classification of choppers.
2. List any two applications of AC voltage regulators.
3. Classify inverters in any one aspect.
4. List any two applications of Cyclo-converters

PART - B

Marks: 2Q x 3 = 6

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

- 5.(a). Explain the working of single phase half wave AC voltage regulators.

OR

- 5.(b). Explain the working principle of chopper.

- 6.(a). Draw the input and output waveforms of series inverter.

OR

- 6.(b). Draw the circuit of parallel inverter

PART - C

Marks: 2Q x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Explain the working of single phase full wave AC voltage regulator.

OR

- 7.(b). Describe the voltage control modes of chopper

- 8.(a). Explain the working of single-phase bridge inverter with R load.

OR

- 8.(b). Explain the basic principle of Cyclo-converter

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-503

POWER ELECTRONICS

SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks : 8Q X 1 = 8

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Draw the ISI symbols for a) TRIAC, b) LASCR
2. Define AC regulator
3. List any two applications of choppers.
4. Classify inverters based on any one aspects.
5. Draw the circuit of single phase full converter.
6. Write any two speed control methods of DC motor.
7. List any two types of UPS.
8. List any two advantages of SMPS.

PART - B

Marks: 4Q×3=12

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a). Draw the Gate characteristics of SCR.

OR

9.(b). List the factors affecting speed of the AC Motors.

10.(a). List the applications of AC voltage regulators

OR

10.(b). List any six applications of power electronic circuits

11.(a). List the advantages of power electronic drives.

OR

11.(b). Compare chopper controlled drives and converter controlled drives in any three aspects.

12.(a). List the types of disturbances in commercial power supply.

OR

12.(b). List the advantages of online UPS.

PART – C

Marks: 4Q × 5= 20

Instructions: (1) Answer all questions.
(2) Each question carries **five** marks.

13.(a). Explain the static Volt-ampere characteristics of DIAC with the help of a diagram.

OR

13.(b). Explain the speed control of Induction Motor by using AC voltage controller.

14.(a). Explain the operation of chopper in all four quadrants.

OR

14.(b). Draw the block diagram of an off-line UPS.

15.(a). Explain the speed control for DC Series motor using chopper.

OR

15.(b). Explain the speed control of Induction Motor by using AC voltage controller.

16.(a). Explain the Burglar alarm circuit using SCR with the help of a diagram.

OR

16.(b). Explain the power control circuit using SCR.

EE-574-ELECTRICAL TRACTION AND AUTOMATION

Course title	Electrical Traction and Automation	Course code	EE-574
Semester	V	Course group	Elective
Teaching scheme in periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + tutorial	Total contact periods	75
CIE (Continuous Internal Evaluation)	60 Marks	See (Semester End Examination)	40 Marks

Pre requisites

This course requires the knowledge of basic principles of electricity, Concept of motion, General mechanical engineering, AC and DC motors and their characteristics, Transducers, Sensors, Digital electronics.

Course Outcomes

CO1:	Describe the present scenario of Traction Systems and Latest Trends in Electric Traction.
CO2:	Analyze Speed time curves of various services and explain the Mechanics of train movement.
CO3:	Compare different traction motors explaining their speed control and braking methods.
CO4:	Describe power transmission from Traction substation to locomotive and auxiliary equipments.
CO5:	Explain the concept of Automation and control systems with Controllers, input and output devices.
CO6:	Apply PLC for different applications and compare DCS and SCADA.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Traction Systems and Latest Trends	12	Q4	Q1	Q9(a)	Q13(a)	
2	Mechanics of Train Movement	13					
3	Traction Motors and their Control	12		Q2	Q10(a)	Q14(a)	
4	Electric Locomotives, Auxiliary Equipment and Traction Substation	13					
5	Concept of Automation	13		Q3	Q5, Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	PLC & SCADA	12					
Total		75	8		8	8	

Course Content

UNIT 1 – Traction Systems and Latest Trends

Duration: 12Periods (L: 10 – T: 2)

Traction systems - Steam, Diesel, Diesel-electric, Battery - electric traction systems – Significance of Diesel- Electric and Electric Traction system – Choose Diesel-Electric - Battery operated traction systems - General arrangement of D.C., A.C. single phase, 3 phase, Composite systems - Present scenario of Indian Railways: High speed traction, Metro - Latest trends in traction - Metro, monorail, Magnetic levitation Vehicle.

UNIT 2 – Mechanics of Train Movement

Duration: 13Periods (L: 10 – T: 3)

Analysis of speed time curves for main line, suburban and urban services - Simplified speed time curves. - Relationship between principal quantities in speed time curves – Problems - Requirement of tractive effort – Problems – Mechanics of transfer of power from motor to driving wheel - Coefficient of Adhesion – Problems .

UNIT 3 - Traction Motors and their Control

Duration: 12Periods (L: 10 – T: 2)

Features of traction motors - Significance of D.C. series motor as traction motor - A. C. Traction motors-single phase, Three phase, Linear Induction Motor - Comparison between different traction motors – Starting & Control methods of traction motors - Series-parallel control - Open circuit, Shunt and bridge transition for Dc Motors - Pulse Width Modulation control of induction motors-- Types of electric braking system for traction motors.

UNIT 4 - Electric Locomotives, Auxiliary Equipment and Traction Substation

Duration: 13Periods (L: 10 – T: 3)

Classify electric locomotives – Block diagram of Electric locomotive – Function of Auxiliaries - Current collecting equipment –OHE - Neutral section – Section Insulator –Booster transformer – Constituents of supply system in Traction sub-station - Protection of traction equipment - Transformer – 25KV Centenary Protection - Coach lighting systems-Method of obtaining Unidirectional polarity and constant output - Requirements of railway coach air conditioning.

UNIT 5 – Concept of Automation

Duration: 13Periods (L: 10 – T: 3)

Automation – advantages of Automation- requirements for Automation - Control system - Significance of feedback - Block diagram of Open loop and closed loop control systems - Components of control systems – NO and NC contacts – Push buttons - Selector switches – Limit switches - Electrical Actuators and Controllers -AC and DC Solenoids – Output Devices - Electromagnetic Relay – Reed Relay – Potentiometers as an error detector- Synchros as error detector –Purpose of tachogenerator – Concept of Electrical, electronics and digital controllers .

UNIT 6 – PLC & SCADA

Duration: 12 Periods (L: 10 - T: 2)

PLC Definition-advantages-Block diagram-Ladder diagrams for AND, OR, NOT, NAND, NOR, XOR, XNOR – Timers - Counters -Ladder diagram for DOL starter, Star-Delta Starter, Stair case lighting, Temperature controller-Special control systems-DCS, SCADA- its components.

Recommended Books

1. Electrical motors applications and control by M.V.Deshpande.
2. Electric Traction by H.Partab.
3. Electric Traction A.T. Dover.
4. Electric Traction Hand Book Sir Isaac Pitman & sons ltd., London.
5. Nagarath & Gopal- Control Systems.
6. Industrial Motor Control 7th Edition by Stephen L. Herman.
7. S.K.Bhattacharya -Control of Electrical Machines.
8. J. Michael Jacob -Industrial control engineering.
9. Jon Stenerson-Industrial automation and process control.
10. John W.Webb -Programmable Logic controllers.

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://youtube.com>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 List different types of traction systems.
 - 1.2 Compare Diesel and Electric traction systems.
 - 1.3 List the types of Electric traction systems based on drive.
 - 1.4 Explain the Diesel-electric type of traction system with a block diagram.
 - 1.5 Explain the Battery - electric type of traction system with a block diagram.
 - 1.6 List the factors influencing the choice of an Electric traction drive - Diesel-Electric or Battery - Electric.
 - 1.7 State the advantages of electric traction.
 - 1.8 State the disadvantages of electric traction.
 - 1.9 List types of Track electrification systems.
 - 1.10 Describe arrangement of D.C., A.C. 1-phase, 3-phase, Composite systems for track electrification systems.
 - 1.11 Mention the Present scenario of Indian Railways: High speed traction & Metro.
 - 1.12 List the latest trends in Electric traction.
 - 1.13 State the difference between Metro and local train.
 - 1.14 Explain the Concept of Mono Rail.
 - 1.15 State the advantages of Monorail.
 - 1.16 List the drawbacks of Monorail.
 - 1.17 Explain the Concept of Magnetic levitation MAGLEV.
 - 1.18 State the advantages of MAGLEV.
 - 1.19 State the disadvantages of MAGLEV.
 - 1.20 State applications of MAGLEV.
-
- 2.1 List the types of services (main line, suburban and urban).
 - 2.2 Sketch the speed time curves for i) Main Line ii) sub urban services iii) Urban services.

- 2.3 State each stage of the speed time curve with appropriate speed used.
- 2.4 State the importance of speed time curves.
- 2.5 Define Maximum speed, Average speed and Scheduled speed.
- 2.6 List the factors affecting the Scheduled Speed.
- 2.7 Sketch the simplified Speed Time Curves.
- 2.8 Explain the practical importance of the simplified Speed Time Curves.
- 2.9 Write the expression for Maximum Speed, Acceleration and Retardation for Trapezoidal Speed - Time Curve.
- 2.10 Solve simple problems on Trapezoidal Speed Time Curve.
- 2.11 Explain the Tractive Effort.
- 2.12 Write the expression for Tractive Effort for Acceleration, to overcome gravity pull and train resistance.
- 2.13 Calculate the Tractive effort under given conditions.
- 2.14 Explain the mechanics of transfer of power from motor to driving wheel.
- 2.15 Define 'Coefficient of Adhesion'.
- 2.16 List the factors affecting the Coefficient of Adhesion.
- 2.17 Solve problems on calculation of number of axels required.
- 2.18 State the methods of improving the Coefficient of Adhesion.
- 2.19 Explain the term specific energy consumption.
- 2.20 Derive the formulae for energy output of drive
 - To Accelerate
 - To overcome friction
 - To overcome gradient.
- 2.21 List the factors affecting specific energy consumption.
- 2.22 Solve simple problems on Specific energy calculation under given conditions.

- 3.1 State the desirable features of traction motors.
- 3.2 Explain Significance of D.C. series motor as traction motor over D.C. Shunt motor.
- 3.3 List the AC motors that are suitable for Traction.
- 3.4 Explain the suitability of AC motors for Traction.
- 3.5 Compare different traction motors.
- 3.6 List different starting and control methods of DC traction motors.

- 3.7 Explain the working of Series-parallel starting method – Open Circuit applied to DC traction motors.
- 3.8 List advantages of Series parallel starting.
- 3.9 Mention the difficulties associated to Series parallel starting.
- 3.10 Explain Drum controller: Series-parallel with shunt transition methods applied to DC traction motors.
- 3.11 Explain Contactor type: Series-parallel with Bridge transition methods applied to DC traction motors.
- 3.12 List different starting and control methods of AC traction motors.
- 3.13 Explain with neat sketch the control of traction motor by autotransformer method in Single phase 25 kV systems.
- 3.14 List different types of electric braking system applicable to different DC traction motors.
- 3.15 List different types of electric braking system applicable to different AC traction motors.

- 4.1 Classify Electric locomotives.
- 4.2 Explain the block diagram of an Electric Locomotive.
- 4.3 State the function of auxiliaries in traction system.
- 4.4 State the function of different control and auxiliary equipments used in the locomotive.
- 4.5 List the various current-collecting methods in Electric locomotives.
- 4.6 List various Overhead-Equipments (OHE).
- 4.7 Mention the purpose and material used for
 - a) Catenary
 - b) Droppers
 - c) Trolley wires
 - d) Bow collector
 - e) Pantograph collector.
- 4.8 State the importance of Neutral Section.
- 4.9 State the importance of Section Insulator.
- 4.10 State the need of Polygonal system OHE.
- 4.11 List the types of Polygonal OHE.
- 4.12 State the need for Booster Transformer.
- 4.13 List the various constituents of Supply systems in traction Substations.

4.14 State the function of various constituents of Supply systems listed below:

- i) Feeding Posts.
- ii) Feeding and Sectioning Arrangements.
- iii) Sectioning and Paralleling Post.
- iv) Sub sectioning and Paralleling Post.
- v) Sub sectioning Post.
- vi) Elementary Section.
- vii) Miscellaneous Equipments at Control Post or Switching Stations.

4.15 State the function of various Major Equipment at traction Substation:

- i) Transformer
- ii) Circuit Breaker
- iii) Interrupter.

4.16 Describe the Protective System for AC Traction – Transformer Protection.

4.17 Describe the Protective System for AC Traction –25 KV Centenary protection.

4.18 State the importance of Location and Spacing of Substations.

4.19 State the requirements of Train lighting.

4.20 Describe the concept of single battery system.

4.21 Describe the concept of Double battery parallel block system.

4.22 Describe the concept of End on Generation.

4.23 Describe the concept of Mid-on Generation

4.24 Describe the method of obtaining Unidirectional polarity.

4.25 Describe the method of obtaining constant output.

4.26 Mention the requirements of railway coach air conditioning.

5.1 State the need of Automation.

5.2 List the advantages of Automation.

5.3 State the requirements for Automation.

5.4 Define a Control system.

5.5 State the need for feedback in a control system.

5.6 Explain the Open loop control systems with a neat block diagram.

5.7 Explain the Closed loop control systems with a neat block diagram.

5.8 Compare Open loop control system and Closed loop control system.

- 5.9 List the types of contacts.
- 5.10 Explain the working of different types of Push button – NO, NC.
- 5.11 Draw the NEMA standard symbol of Normally open push button and Normally closed push button.
- 5.12 State the function of Selector switch.
- 5.13 Draw the NEMA standard symbols of Two position and Three position selector switches.
- 5.14 State the function of different types of limit switches - a) Normally closed limit switch, b) Normally open limit switch, c) Normally closed held open and d) Normally open held closed limit switches.
- 5.15 Draw the NEMA standard symbol of a) Normally closed limit switch, b) Normally open limit switch, c) Normally closed held open and d) Normally open held closed limit switches.
- 5.16 State the function of different types of Flow switches.
- 5.17 Draw the NEMA standard Symbols of different types of flow switches.
- 5.18 State the function of different types of Pressure switches.
- 5.19 Draw the NEMA standard Symbols of different types of Pressure switches.
- 5.20 State the function of different types of Temperature switches.
- 5.21 Draw the NEMA standard Symbols of different types of Temperature switches.
- 5.22 State the purpose of sensors in a control system.
- 5.23 Describe the working DC Solenoids.
- 5.24 Describe the working AC Solenoids.
- 5.25 List various output devices in a control system.
- 5.26 Explain the working of Electromagnetic relay and Reed Relay with a neat diagram.
- 5.27 Explain the working of Potentiometers as an error detector.
- 5.28 State the purpose of servomotors in a control system
- 5.29 Explain the working of Synchros - transmitter, control transformer and their use as error detector.
- 5.30 State the concept and purpose of a Tacho – generators.
- 5.31 State the concept of Electrical and Electronic controller.
- 5.32 State the concept of Digital controller.

- 6.1 Define Programmable Logic Controller (PLC).
- 6.2 State the advantages of PLC.
- 6.3 Explain the different parts of PLC by drawing the Block diagram.
- 6.4 State the applications of PLC.
- 6.5 State the purpose of Ladder diagram.
- 6.6 Explain the variable states for the following contacts and coils:
i) Normally open ii) Normally closed iii) Energized output
iv) latched Output v) branching.
- 6.7 Draw ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
- 6.8 Draw ladder diagrams for i) NAND ii) NOR iii) Exclusive OR and iv) Exclusive NOR gates.
- 6.9 Explain the following Timers - i) T ON ii) T OFF and iii) Retentive timer.
- 6.10 Explain Counters-CTU, CTD.
- 6.11 Explain ladder diagrams for following applications
(i) DOL starter
(ii) STAR-DELTA starter
(iii) Stair case lighting
(iv) Temperature Controller.
- 6.12 Explain the hardware and software components of Distributed Control system (DCS) with a neat basic block diagram describing the function of each block.
- 6.13 Explain the hardware and software components of SCADA with a neat basic block diagram describing the function of each block.
- 6.14 Compare DCS and SCADA.
- 6.15 List the Applications of SCADA.

Suggested Student Activities

1. Group discussion.
2. Surprise test.
3. Student visits to the Industries, Malls and software companies, to shops which Use/provides automation.
4. Visit to Traction workshop of Railway and understand its operation.
5. Visit to nearby traction substation and prepare the observation report.
6. Quiz.

CO-PO Mapping Matrix

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	2	2		3		3	PO1,2,3,5,7
CO2	3	3	3		3		3	PO1,2,3,5,7
CO3	3	3	3		3		3	PO1,2,3,5,7
CO4	3	3	3		3		3	PO1,2,3,5,7
CO5	3	3	3		3		3	PO1,2,3,5,7
CO6	3	3	3		3		3	PO1,2,3,5,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-574

ELECTRICAL TRACTION AND AUTOMATION
MID SEM -I EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1 = 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. List different types of traction systems.
2. State any two advantages of Monorail.
3. List the types of services in traction.
4. Define 'Coefficient of Adhesion'.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks.

5.(a) Compare Diesel and Electric traction systems in any three aspects.

OR

5.(b) Describe arrangement of 3-phase systems for track electrification systems.

6.(a) Sketch the speed time curves for i) Main Line ii) sub urban services iii) Urban services.

OR

6. (b) List the factors affecting the Coefficient of Adhesion.

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

7.(a). Explain the Diesel-electric type of traction system with a block diagram.

OR

7.(b). Explain the Concept of Magnetic levitation MAGLEV.

8.(a). Derive the formulae for energy output of drive to accelerate, to overcome friction and to overcome gradient.

OR

8.(b). A train accelerates to a speed of 48km/hr in 24sec. Then it coasts for 69sec under a constant resistance of 58 Newton / tonne and brakes are applied at 3.3km/hr/sec in 11sec. calculate (i) the acceleration (ii) the coasting retardation (iii) the scheduled speed if station stoppage is 20secs.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-574

ELECTRICAL TRACTION & AUTOMATION
MID SEM -II EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1 = 4

Instructions: (1) Answer all questions

(2) Each question carries **one** mark.

1. List different types of electric braking system applicable to DC traction motors.
2. Name the AC motors that are suitable for Traction.
3. Mention the purpose and material used for Catenary.
4. State the importance of Neutral Section.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer all questions.

(2) Each question carries **three** marks.

5(a) Compare different traction motors.

OR

5.(b). List different starting and control methods of DC traction motors.

6.(a). List the various constituents of Supply systems in traction Substations

OR

6.(b). State the function of below Equipments that are used at traction Substation:

- i) Transformer
- ii) Circuit Breaker
- iii) Interrupter.

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.

(2) Each question carries **five** marks.

7.(a). Explain Drum controller: Series-parallel with shunt transition method applied to DC traction motors.

OR

7.(b). Explain with neat sketch the control of traction motor by autotransformer method in Single phase 25 kV systems.

8.(a). Explain the block diagram of an Electric Locomotive.

OR

8.(b). Describe the concept of Double battery parallel block system.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-574

ELECTRICAL TRACTION & AUTOMATION
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks: 8 X 1= 8

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. List the types of Electric traction systems based on drive.
2. List advantages of Series parallel starting.
3. State the need of Automation.
4. State the importance of speed time curves.
5. Define a Control system.
6. List any two examples of output devices in a control system.
7. State any two advantages of PLC.
8. Draw the ladder diagram of AND gate.

PART - B

Marks: 4 × 3= 12

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a) Explain the Tractive Effort.

OR

9.(b) Explain the working of Electromagnetic relay with a neat diagram.

10.(a) State the function of various constituents of Supply systems listed below:

- i) Feeding Posts.
- ii) Feeding and Sectioning Arrangements.
- iii) Sectioning and Paralleling Post.

OR

10.(b) Compare DCS and SCADA.

11.(a) Describe the working DC Solenoids.

OR

11.(b) State the concept and purpose of a Tacho – generator.

12.(a) List the Applications of SCADA.

OR

12.(b) Explain the Up Counters-CTU.

PART – C

Marks: $4 \times 5 = 20$

Instructions: (1) Answer all questions.
(2) Each question carries **five** marks.

13.(a) Explain the Diesel-electric type of traction system with a block diagram.

OR

13. (b) Explain the Closed loop control systems with a neat block diagram.

14.(a) Explain the block diagram of an Electric Locomotive.

OR

14.(b) Explain the hardware and software components of SCADA with a neat block diagram describing the function of each block.

15.(a) Explain the working of Synchros - transmitter, Control transformer and their use as error detector.

OR

15.(b) Explain the working of Reed Relay with a neat diagram.

16.(a) Explain different parts of PLC by drawing the Block diagram.

OR

16.(b) Explain ladder diagrams for Star delta starter.

EE-584-ELECTRICAL ESTIMATION AND UTILIZATION

Course Title	Electrical Estimation and Utilization	Course Code	EE-584
Semester	V	Course Group	Core
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Prerequisites

This course requires the knowledge of basic principles of electricity, electrical workshop, types of loads in domestic and industrial use. It also requires fundamental understanding of types of lamps, heating devices, welding meaning, various motors and their characteristics.

Course Outcomes

CO1 :	Infer various wiring systems and estimate the materials required for domestic wiring
CO2 :	Estimate the materials required for power loads, irrigation pumps and earthing system
CO3 :	Estimate materials required for over head line and distribution substations.
CO4 :	Perceive laws of illumination and requirements of good lighting
CO5 :	Analyze electric heating, methods of electric heating and welding
CO6 :	Analyze train electrification and speed time curves , tractive effort and various traction equipment used

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Wiring Systems and Estimation of Lighting / Domestic Load	12	Q4	Q1	Q9(a)	Q13(a)	
2	Estimation of Power Loads, Irrigation Pumps and Earthing system	13					
3	Estimation of OH Lines and Distribution Substations	13		Q2	Q10(a)	Q14(a)	
4	Electrical Lighting	12					
5	Electrical Heating and Welding	12		Q3	Q5, Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Electric Traction	13			Q7, Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Content

UNIT 1 – Wiring systems and Estimation of Lighting / Domestic Load

Duration: 12 Periods (L: 9 – T: 3)

Types of house wiring systems - Various types of cables – Various types of Main switches - Different types of fuses , fuse carriers, isolators and MCBs -Types of service mains - Estimation of domestic lighting installation and their specifications - quantity of materials required – Estimation and selection of interior wiring system suitable to a given building

UNIT 2 – Estimation of Power Loads, Irrigation Pumps and Earthing system

Duration: 13 Periods (L: 10 – T: 3)

Wiring layouts - Estimate for a small workshop - Estimate for the installation of Irrigation pump up to 10 HP - Estimate for the installation of submersible pump - estimation of materials required in electrical Earthing

UNIT 3 - Estimation of OH Lines and Distribution Substations

Duration: 13 Periods (L: 10– T: 3)

Distribution lines of 11 kV and 400Volt OH lines - estimation - Cross arms - clamps - insulators - Estimation of quantity of materials required for structures- pole mounted substation and plinth mounted substation –Indian Electricity act 2003.

UNIT 4 - Electrical Lighting

Duration: 12 Periods (L: 9 – T: 3)

Nature of light and its production, Terms and definitions plane and solid angle, luminous flux, Lumen, C.P. Illumination, brightness, polar curve, MHCP, MSCP, MHSCP, -Lux meter- types of lamps - Requirements of good lighting different types of lamp fittings- laws of illumination- Terms and factors used in design of lighting schemes for indoor –Illumination levels for indoor and outdoor applications- problems-LED lamps-Environmental aspects

UNIT 5 – Electrical Heating and Welding

Duration: 12 Periods (L: 9 – T: 3)

Advantages of electric heating - requirements of good heating material and materials generally employed, resistance heating - Principle and applications - Electric arc furnaces - direct and indirect types - applications - Induction heating core type and coreless type - Applications - Dielectric heating – principle and applications.

Types of welding - Principle and applications of Resistance welding - spot welding -seam welding - butt welding - Arc welding -Metal Arc welding- Carbon Arc welding - Welding generator - welding transformer - Sequence welding circuits

UNIT 6 - Electric Traction

Duration: 13 Periods (L:10 - T: 3)

Introduction-different systems of train electrification-speed time curves different types of train services, urban and sub-urban-factors affecting scheduled speed -problems -Coefficient of adhesion-factors affecting the coefficient of adhesion-Tractive effort - Traction motors A.C&D.C—over head equipment-Current collecting gears-Booster transformer– MAGLEV

Recommended Books

1. Electrical motors applications and control by M.V.Deshpande
2. Electrical power by S.L.Uppal
3. Electrical power by J.B.Gupta
4. Electrical Technology Vol III by B.L. Theraja
5. Electric Traction by H. Partab
6. Electric Traction A.T. Dover
7. Electric Traction Hand Book Sir Isquc Pitman & sons ltd., London
8. Utilisation of Electrical Energy.(in SI units) E.O. Taylor (Indian Edition)
9. A course in Electrical Power (in SI units) J.B. Gupta
10. S.L.Uppal-Electrical Wiring ,Estimating & costing Electrical wiring
11. Electrical Drawing – Balbir Singh
12. Electrical wiring – Aurora
13. J.B.Gupta -Estimating & costing

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://youtube.com>
4. <https://3.imimg.com/data3/JA/HU/MY-7591709/copper-earthing-electrodes.pdf>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 List the different types of wires used in House wiring.
- 1.2 List the different types of single phase and three phase cables
- 1.3 State the uses of standard wire gauge.
- 1.4 Specify the gauge of wire and number of strands in a multi strand by giving its current carrying capacity
- 1.5 List the different types of wiring systems
- 1.6 Explain Surface conduit wiring system
- 1.7 Explain Concealed wiring system.

- 1.8 List the various types of Main Switches
 - 1.9 State the specifications of MCB
 - 1.10 State the types of MCBs
 - 1.11 State the applications of MCCB, ELCB and RCCB.
 - 1.12 State the applications of Distribution board
 - 1.13 Specify the fuse carrier material used and the applications of Rewirable (Kit Kat) fuses
 - 1.14 Specify the fuse carrier material used and the applications of Open type fuse
 - 1.15 Specify the fuse carrier material used and the applications of Cartridge fuses
 - 1.16 Explain different types of service mains
 - 1.17 Select the service main suited to the given situation
 - 1.18 List the schedule of rates used in preparing estimate.
 - 1.19 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a Single Room
 - 1.20 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a 2-BHK House
 - 1.21 Describe the test procedure to conduct Polarity Test of wiring in an electrical installation.
 - 1.22 Explain the procedure for conducting Insulation test before energizing a new domestic installation.
-
- 2.1 Draw the wiring layout for an office building.
 - 2.2 Prepare layouts and draw single line wiring diagrams as per standard practice for a given set of machines in a workshop / electrical laboratory.(Upto 3 motors)
 - 2.3 Calculate the suitable wire sizes for various circuits
 - 2.4 Estimate the materials used for installation of 3 phase induction motor with DOL starter
 - 2.5 Estimate the materials used for installation of 3 phase induction motor with Y- Δ starter
 - 2.6 Select the type of wiring and service mains used for the irrigation pump set
 - 2.7 List the materials used in the installation of the irrigation pump set.
 - 2.8 Prepare an estimate for electrifying the irrigation pump set scheme
 - 2.9 Prepare estimation for submersible pump installation
 - 2.10 State the purpose of earthing
 - 2.11 State the types of earthing.
 - 2.12 Select the suitable type of earthing for a given installation as per IS3043.
 - 2.13 Prepare the estimate for pipe earthing.
 - 2.14 Prepare the estimate for plate earthing.
 - 2.15 State the concept of maintenance free chemical gel earthing.
 - 2.16 Explain the method of chemical gel earthing.

- 3.1 State the requirements of line supports used in overhead lines
- 3.2 List the factors influencing the selection of line supports
- 3.3 List the types of line supports
- 3.4 State the need for cross arms
- 3.5 State the types of cross arms
- 3.6 Calculate the total number of insulators required for the given scheme
- 3.7 Select the type of insulators to be used for overhead lines.
- 3.8 Select the type, size and number of cross arms required for the overhead line
- 3.9 Determine the size and total length of overhead conductor required for the line giving due consideration for the sag to be allowed
- 3.10 Estimate the quantity of all materials required for given 11 KV overhead lines as per standard practice followed by NEC
- 3.11 Estimate the quantity of all materials required for given 400V overhead lines as per standard practice followed by NEC
- 3.12 Estimate the quantity of material required for pole mounted transformer substations
- 3.13 Estimate the quantity of material required for plinth mounted transformer substation
- 3.14 State the salient features of Indian Electricity Act 2003
- 3.15 State the function of Central Electricity Authority.

- 4.1 Explain the nature of light and its propagation
- 4.2 Define the following terms.

a) Plane and solid angles	b) Luminous flux	c) Luminous intensity	d) Lumen
e) Candle power	f) Illumination	g) Brightness	
h) Polar curve	i) MHCP	j) MSCP	k) MHSCP
- 4.3 List the types of lamps used for illumination for different situations such as domestic, industrial, decoration, advertisement and street lighting schemes.
- 4.4 Define Glare.
- 4.5 State the requirements of good lighting
- 4.6 Explain different types of lamp fittings.
- 4.7 State the uses and advantages of each type of fitting
- 4.8 State and explain the laws of illumination
- 4.9 Solve problems on laws of illumination.
- 4.10 Define the terms:

a) Utilization factor	b) Depreciation factor	c) Waste light factor	d) Reflection factor
e) Reduction factor	f) Absorption factor	g) Luminous efficiency	
h) Specific energy consumption	i) Space -height ratio		
- 4.11 Calculate the number of lamps required for simple indoor lighting scheme
- 4.12 State the purpose of lux meter

- 4.13 Mention the illumination levels for indoor and outdoor applications
- 4.14 State the advantages of LED lighting over CFL lamps

- 5.1 State the advantages of electric heating
- 5.2 List the requirements of good heating material
- 5.3 State the materials employed for heating
- 5.4 Explain Resistance heating - direct and indirect
- 5.5 List the industrial applications of resistance heating.
- 5.6 Explain different methods of temperature control of resistance heating with diagrams.
- 5.7 Explain direct arc heating
- 5.8. Explain indirect arc heating
- 5.9 List the industrial applications of arc heating.
- 5.10 Explain induction heating – (core type and core less type)
- 5.11 Explain the principle of dielectric heating.
- 5.12 List the industrial applications of dielectric heating
- 5.13 State different types of electric welding.
- 5.14 Explain the principles of
 - i) Resistance Welding ii) Spot Welding iii) Seam Welding iv) Butt Welding
 - v) Arc Welding vi) Metal Arc Welding vii) Carbon Arc Welding
- 5.15 List the conditions for successful welding.
- 5.16 Explain the characteristics of a welding generator.
- 5.17 Explain with legible sketch the principle of operation of welding transformer with a reactance coil.
- 5.18 Explain the 'Sequence Weld' with a block diagram.

- 6.1 Describe Single phase A.C. and Composite systems.
- 6.2 State the advantages and disadvantages of electric traction.
- 6.3 List the types of services (main line, suburban and urban),
- 6.4 Sketch the speed time curves for i) Main Line ii) sub urban services iii) Urban services.
- 6.5 State each stage of the speed time curve with appropriate speed used.
- 6.6 State the importance of speed time curves.
- 6.7 Define Maximum speed, Average speed and Scheduled speed.
- 6.8 List the factors affecting the Scheduled Speed.
- 6.9 Sketch the simplified Speed Time Curves.
- 6.10 Explain the practical importance of the above curves.
- 6.11 Write the expression for Maximum Speed, Acceleration and Retardation for Trapezoidal Speed Time Curve
- 6.12 Solve simple problems on Trapezoidal Speed Time Curve.
- 6.13 Explain the Tractive Effort.

- 6.14 Write the expression for Tractive Effort for Acceleration, to overcome gravity pull and train resistance.
- 6.15 Define 'Coefficient of Adhesion'.
- 6.16 List the factors affecting the Coefficient of Adhesion.
- 6.17 State the methods of improving the Coefficient of Adhesion.
- 6.18 State the important requirements of traction motors(A.C and D.C)
- 6.19 State the purpose and material used for catenary
- 6.20 State the purpose and material used droppers
- 6.21 State the purpose and material used trolley wires
- 6.22 State the purpose and material used bow collector
- 6.23 State the purpose and material used pantograph collector
- 6.24 State the Need of Booster Transformer
- 6.25 Draw the Connection diagram of booster transformer
- 6.26 Explain the Concept of MAGLEV and its applications

Suggested Student Activities

1. Student visits to the houses which are under construction so as to visualize the pipe layout and accessories fixtures
2. Student visits Distribution Transformer i.e., Pole mount and Plinth mount
3. Visit to nearby field and understand the Irrigation pump estimation
4. Visit to small industry or workshop and estimate the load and rating of the accessories required
5. Group discussion
6. Surprise test
7. Student visits to the Industries, Malls and software companies which operate at night to understand the importance of Lighting , to shops which provide lighting solutions
8. Prepare a report on illumination required for both indoor and outdoor applications
9. Student visits Industries where Electrical heating methods are employed and their purpose of heating
10. Visit to nearby Welding shop and also to industries which make use of Electric welding process
11. Visit to Traction workshop of Railway and understand its operation
12. Quiz

CO-PO Mapping Matrix**CO-PO Mapping Matrix**

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	3	2	1	2		3	PO1,2,3,4,5,7
CO2	3	3	3	1	3		3	PO1,2,3,4,5,7
CO3	3	3	3	1	3		3	PO1,2,3,4,5,7
CO4	3	3	3		3		3	PO1,2,3,5,7
CO5	2	3	3		2		3	PO1,2,3,5,7
CO6	3	3	3		3		3	PO1,2,3,5,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8		8		8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-584
ELECTRICAL ESTIMATION AND UTILIZATION

MID SEM -I MODEL PAPER

TIME: 1 HOUR

TOTAL MARKS: 20

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the uses of standard wire gauge.
2. What is a service main?
3. What is the purpose of earthing?
4. List the materials that are to be used in the Earth pit surrounding the Earth electrode

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5a) List the different types of single phase and three phase cables

OR

- 5 b) State the types of MCBs

- 6 a) State the types of earthing.

OR

- 6 b) Specify the different materials used in pipe earthing

PART - C

Marks: 2 x 5= 10

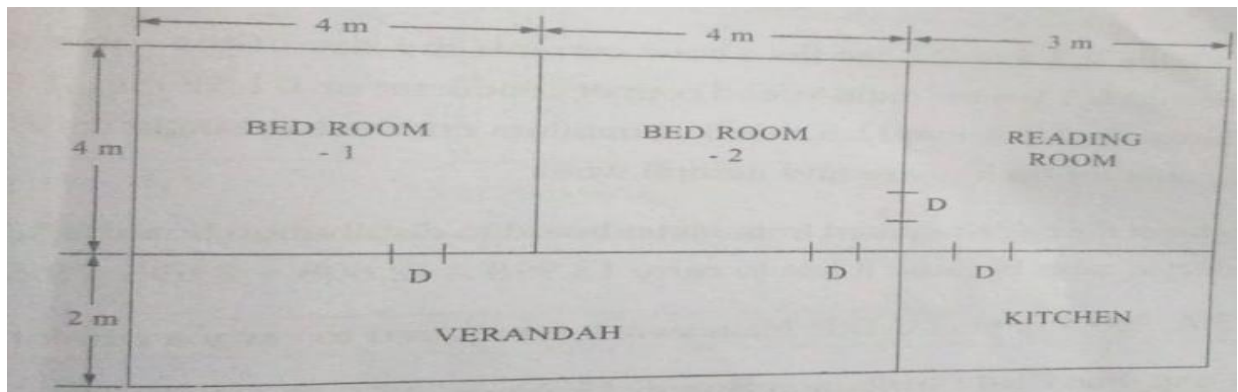
Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks

- 7 a) Explain Concealed wiring system

OR

- 6 b) Estimate the quantity of material required and the cost of materials for wiring a newly constructed residential building whose plan is shown in Fig below and details of load are given in table below. Assume any missing data

Location	Lamp(60W)	Tube light(40W)	Fan(80W)	5A socket outlet	15A socket outlet
Verandah	1	1	1	-	-
Reading room	1	1	1	1	1
Bed room-1	1	1	1	1	-
Bed room-2	1	1	1	1	-
Kitchen	1	1	-	1	1



Plan of the House

- 8 a) Prepare the Estimate of materials suitable for earthing for a 132/33KV substation
OR
8 b) Draw the wiring layout for a workshop

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-584
ELECTRICAL ESTIMATION AND UTILIZATION

MID SEM –II MODEL PAPER

TIME: 1 HOUR

TOTAL MARKS: 20

PART – A

Marks: 4 X 1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the need for cross arms
2. List the types of line supports
3. Define MHCP
4. Define illumination

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5a) List the factors influencing the selection of line supports

OR

- 5 b) State the types of cross arms required for overhead transmission lines
- 6 a) State the requirements of good lighting

OR

- 6 b) State the purpose of luxmeter.

PART - C

Marks: 2 x 5= 10

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

- 7 a) Estimate the quantity of material required for pole mounted substation

OR

- 7 b) Estimate the quantity of material required for plinth mounted substation

- 8 a) State and explain Lambert's cosine law of illumination

OR

- 8 b) State the uses and advantages of each type of fitting

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-584

ELECTRICAL ESTIMATION AND UTILIZATION
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

Marks: 8 X 1 = 8

1. List the different types of wires used in house wiring
2. Define glare
3. State the purpose of using droppers in electric traction
4. Define schedule speed of an electric locomotive
5. List any two applications of direct resistance heating
6. List any two requirements of good heating material
7. List the applications of magnetic levitation
8. Define coefficient of adhesion

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.

Marks: 4 X 3 = 12

- 9a) State the purpose of earthing in electrical installations

OR

- 9b) List the industrial applications of Dielectric Heating
10a) List the factors influencing the selection of line supports

OR

- 10b) State the methods of improving the Coefficient of Adhesion.
11a) List the Conditions for Successful Welding.

OR

- 11b) Draw the Sequence Weld block diagram

- 12a) State the Need of Booster Transformer

OR

- 12 b) State the purpose and material used for pantograph collector

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks.

Marks: 4 X 5 = 20

13a) Prepare the Estimate for Plate Earthing.

OR

13b) Prepare the quantity estimate and cost of wiring material required for an agriculture pump set of 3.7 KW 3-Phase, 400 V motor. The distance between the LT pole and the Pump set shed (5x3x3m) is 12m. Assume missing data where ever necessary

14 a) State and explain the Laws of Illumination

OR

14b) Explain Single phase A.C. and Composite systems of electric traction

15a) With the help of a neat diagram explain the construction and working of vertical core type induction furnace

OR

15b) Explain with legible sketch the principle of operation of Welding Transformer with a reactance coil.

16a) State the important requirements of traction motors

OR

16 b) Draw and explain the connection diagram of booster transformer.

EE-594-ELECTRIC VEHICLES

Course Title :	Electric Vehicles	Course Code	EE-594
Semester	V	Course Group	Core
Teaching Scheme in periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	75
CIE	60 Marks	SEE	40 Marks

Prerequisites

Basic knowledge of electrical machines, electric circuit analysis, power electronic converters
Battery technology, drive train, engines working principles of automobiles.

Course outcomes

On Successful completion of the course, the student will be able to

CO1 :	Analyze the architecture of electric vehicle
CO2 :	Explain the working concept of different components of EV and charging station
CO3 :	Design/size the drive train for EV, Battery, and charging station
CO4 :	Analyze and troubleshoot basic faults in different EV components and charging system
CO5 :	Repair and retrofit different components of EV and the charging station
CO6	Analyze the impact of EV integration on distribution system

Blue Print of Marks for SEE

Unit no	Unit name	Questions to be set for SEE (Q No)				Remarks	
		R		U	A		
1	Introduction to Electric Vehicles	4	1		9(a)	13(a)	
2	EV components						
3	Drive train in EV & HEV		2		10(a)	14(a)	
4	Battery charging Technologies and EV Charging Infrastructure						
5	Electric vehicle grid integration	3	5,6		9(b) 11(a) 11(b)	13(b) 15(a) 15(b)	
6	EVs and renewable energy (RE) integration, Troubleshooting		7,8		10(b) 12(a) 12(b)	14(b) 16(a) 16(b)	
Total questions		8		8	8		

Legend: R; Remembering, U: Understanding A: Applying

COURSE CONTENT

UNIT-1

Periods 10 (L: 08 – T: 02)

Introduction to Electric Vehicles

Introduction to Electric Vehicle(EV) – Hybrid Electric vehicle(HEV) – Plug-in Hybrid Electric vehicle (PHEV) - Types of Electric vehicles based on with and without differential – Types of HEV series, parallel, series-parallel and Complex - Fuel cell vehicles -Differences between EV and conventional vehicles - Differences between complete EV and Hybrid vehicles - Benefits of EV including environmental impacts – Single speed transmission - Government Schemes and Progress: FAME-1, FAME-2; Transformative -mobility and Energy Storage Mission, and other latest central level policies - State Policies, subsidies, and incentives - Global experiences and success stories on EV production

UNIT-2

Periods 15 (L: 12 – T: 03)

EV Components

Main components of EV sub-systems and configuration – an introduction - **Motor drive Technologies** - Electric Propulsion unit - Configuration and control of DC Motor drives -

Induction Motor drives - Permanent Magnet Motor drives - Switched reluctance motor - **Energy storage technologies** – speed variation in EV - Introduction to energy storage devices in EV and HEV- Definition of different battery parameters - Lead Acid Battery – Nickel based batteries – Lithium based batteries - Fuel Cell - Super Capacitor - Super Flywheel based energy storage and its analysis - Hybridization of different energy storage devices.

UNIT-3

Periods 10 (L: 08 – T: 02)

Drive train in EV and HEV:

Basic Architecture of Electric Drive Trains: General configuration of an electric vehicle, Alternatives Based on Drive train Configuration, Alternatives Based on Power Source Configuration, Single and Multi-motor Drives - In Wheel Drives.

Energy saving potential of Hybrid drive trains - Various HEV configurations and their operation modes - Power Flow in HEVs: Power Flow Control in Series Hybrid -Power Flow Control in Parallel Hybrid - Power Flow Control in Series-Parallel Hybrid - Power Flow Control in complex Hybrid - Torque Coupling and Analysis of Parallel Drive Train - Braking in EV – Regenerative braking – Hybrid braking.

UNIT-4

Periods 15 (L: 12 – T: 03)

Battery charging Technologies and EV Charging Infrastructure

Methods of charging - Domestic Charging Infrastructure - Public Charging Infrastructure – Fast Charging Station - Battery Swapping Station - Move-and-charge zone - Battery Management System - Power electronics related to power conversion related to charging, drive and control - Control systems for EV - Sizing the drive system - Sizing the propulsion motor, sizing the power electronics - Selecting the energy storage technology - Communications - supporting subsystems **EV Charging Infrastructure** - EV Charging Fundamentals - Onboard and off board charger - Electric Vehicle Supply Equipment (EVSE) Types Characteristics - EVSE Standards and Communication Protocols - Next Generation Technologies: Super Chargers - Wireless Chargers - EVSE Management and Settlement Solutions - Effect of EV charging on generation and load profile - Smart charging technologies - EV charging facility planning - Centralized charging schemes - Decentralized charging schemes - Energy storage integration into Microgrid

UNIT-5

Periods 10 (L: 08 – T: 02)

Electric vehicle grid integration

Introduction - Impact of EV charging on distribution system (congestion, power quality issues etc.) – Smart charging - Vehicle to anything (V2X) technology (V2G, V2V, V2H, V2B etc.) - Grid up gradation for fast charging stations - Cost estimate of an EV charging station - Demand response from EVs - Voltage/reactive power support from EVs - Frequency support (inertial, primary, and secondary) from EVs - Fleet aggregation approaches for grid support services

UNIT-6

Periods 15(L: 12 – T: 03)

EVs and renewable energy (RE) integration, Troubleshooting

Scheduling of EVs for increased RE generation uptake - RE based EV charging stations - Correlation between EV charging and RE integration - Coordinated operation of EVs and distributed generation - Cost comparison of RE based EV charging with other alternatives Maintenance, repairing and services Troubleshooting faults in different EV components (Motor, drive train, battery etc.) - Repairing and rectifying faults in EV motor and components - EV battery and battery management systems - EV charging device repairing - Battery disposal & recycling

REFERENCE BOOKS

- 1 ATB on Modern EV,HEV and Fuel cell vehicles by Mehرداد Eshani,Yimin Gao
- 2 Hand book on EV charging Infrastructure Implementation by NITI Ayog, Govt Of India
- 3 NEPTel Notes on Introduction to EV & HEV
- 4 [Electric Vehicle trends - Electrical Installation Guide \(electrical-installation.org\)](http://electrical-installation.org)
- 5 Electric Vehicles Integrated with Renewable Energy Sources for Sustainable Mobility <https://www.intechopen.com>
- 6 [\(PDF\) A REVIEW ON RENEWABLE ENERGY INTEGRATION FOR ELECTRIC VEHICLES \(researchgate.net\)](https://www.researchgate.net/publication/312111111)

Suggested E-Learning references

1. <https://nptel.ac.in/courses/108/106/108106170/>
2. https://en.wikipedia.org/wiki/Category:Heavy_equipment
3. How does an Electric Car work? | Tesla Model S <https://www.youtube.com/watch?v=3SAxXUIre28>
4. Tesla Model 3's motor - The Brilliant Engineering behind it <https://www.youtube.com/watch?v=esUb7Zy5Oio>
5. Toyota Hybrid System <https://www.youtube.com/watch?v=jNuixuVhc5E>
6. How Does It Work? Honda's 2 Motor Hybrid System Explained! https://www.youtube.com/watch?v=-P_VChMGK8
7. Understanding the Honda Hybrid E-Drive <https://www.youtube.com/watch?v=QLUIExAnNcE>

8. Electric Engine PRODUCTION - Audi e-tron MOTOR
<https://www.youtube.com/watch?v=uWBEPespbWI>
9. BMW Electric Drive HOW IT'S MADE - Interior BATTERY CELLS Production Assembly Line
<https://www.youtube.com/watch?v=xvaQMTcckSg>
10. How Tesla Builds Cars So Fast <https://www.youtube.com/watch?v=KqXi6EkCdpQ>

SUGGESTED LEARNING OUTCOMES

Up on completion of the course the student shall be able to

1. Introduction to Electric Vehicles

- 1.1 Introduce to Electric vehicle and latest technology.
- 1.2 Know BEV, HEV and PHEV
- 1.3 List the advantages of BEV, HEV and PHEV
- 1.4 List disadvantages and limitations
- 1.5 Classify an EV based on Drive train Configuration (In wheel drives)
- 1.6 Know the effect of EV on environment
- 1.7 Summarise the concept of 'In Wheel Drives' in EV
- 1.8 Compare BEV and ICE
- 1.9 Compare BEV and HEV

2. EV components

- 2.1 List the various components of EV like
 - 2.1.1 Traction battery pack.
 - 2.1.2 DC-DC Converter.
 - 2.1.3 Electric motor.
 - 2.1.4 Power inverter.
 - 2.1.5 Charge Port.
 - 2.1.6 Onboard charger.
 - 2.1.7 Controller.
- 2.2 Know the purpose of each component
- 2.3 Introduce Electric motor as Propulsion unit
- 2.4 Know the types of Electric motors AC/DC
- 2.5 List the advantages of DC motors over AC
- 2.6 Know the construction and working of Induction motor
- 2.7 Explain the construction and working of Permanent magnet motor
- 2.8 Understand the construction and working of Switched reluctance motor

- 2.9 Know the various energy storage devices like Battery, Fuel cell, Super capacitor and super fly wheel
- 2.10 Know battery terminology like
 - 2.10.1 Depth of Discharge
 - 2.10.2 Daily Depth of Discharge
 - 2.10.3 Battery State of Charge (BSOC)
 - 2.10.4 self discharge rate
 - 2.10.5 Charge equalization
- 2.11 Know the effect of Temperature on battery performance
- 2.12 Understand the C- Rate parameter
- 2.13 Understand the Chemistry of Lead acid battery
- 2.14 Explain the construction and chemistry of Nickel based Battery
- 2.15 Know the complete details about Lithium based battery like Li-P and Lithium ion battery
- 2.16 Know the advantages/ Merits of Lithium battery as a energy source for EV
- 2.17 Know the need and concept of Hybridisation of various energy sources

3. Drive train in EV and HEV.

- 3.1 Explain General configuration of an electric vehicle.
- 3.2 Classify an EV based on Drive train Configuration.
- 3.3 Contrast the Alternatives in EV Based on Power Source Configuration.
- 3.4 Explain the concepts of Single and Multi-motor Drives in EV.
- 3.5 Summarise the concept of 'In Wheel Drives' in EV.
- 3.6 List the conceptual advantages and limitations of HEV's in terms of overall energy efficiency.
- 3.7 Explain the conceptual advantages and limitations of HEV's in terms of overall energy efficiency.
- 3.8 List the various possible ways of combining the power flow to meet the driving requirements in HEV.
- 3.9 Name the various drivetrain configurations in HEVs.
- 3.10 Outline the various drivetrain configurations in HEVs.
- 3.11 Spell the goals in power flow control in HEV's.
- 3.12 Infer four operating modes of power flow control in a Series HEV.
- 3.13 Explain the operating modes of power flow control in a Parallel HEV.

- 3.14 Interpret the ICE dominated power flow control modes in a Series Parallel HEV.
- 3.15 Summarize the EM dominated power flow control modes in a Series Parallel HEV.
- 3.16 Explain the basic concepts of mechanical coupling in Parallel HEV.
- 3.17 Outline concept of torque coupling in Parallel HEV.
- 3.18 Summarize the concept of speed coupling in Parallel HEV.
- 3.19 Illustrate two-shaft configuration or Dual transmission of parallel HEV using torque coupler.
- 3.20 Rephrase the pre-transmission configuration of a parallel HEV with torque coupling
- 3.21 Summarise the pre-transmission configuration of a parallel HEV with speed coupling

4. Battery charging Technologies and EV Charging Infrastructure

- 4.1 Definition and purpose of charging station
- 4.2 Understand AC and DC Charging
- 4.3 Know methods of AC charging
- 4.4 Summarise the domestic and Public charging equipment
- 4.5 Understand Method-1, 2 & 3 charging techniques
- 4.6 Types of connectors to plug the charging cable to the vehicle inlet like Type-1, type-2 and type-3 connector
- 4.7 Understand CHAdeMO connector, Combined charging system(CCS) Combo-1 and combo-2 connectors
- 4.8 Know the DC Method-4 charging
- 4.9 List advantages of DC fast charging
- 4.10 Understand the draw backs of Method- 1 &2 charging
- 4.11 Know onboard and off board charging
- 4.12 Understand Manual and automated battery swapping
- 4.13 List merits and demerits of battery swapping
- 4.14 Know the Indian standards IS17017 for AC charging
- 4.15 Know the difference between charging station and charging point
- 4.16 Understand the Wireless charging
- 4.17 Identify the various parts and working of Electric Vehicle Supply Equipment (EVSE)

5. Electric Vehicle Grid Integration

- 5.1 Know AC and DC Charging station and their specificness

- 5.2 Know the load calculation of a charging station
- 5.3 Analyse the effect of charging station on the local grid
- 5.4 Understand the requirements for locating a charging station
- 5.5 Know the International Electro technical Commission (IEC) standards for establishing EV charging station
- 5.6 Understand charging station output, single and multiple output
- 5.7 Identify various modes of charging communication Like Ethernet, Wi-Fi, 3G/4G, Bluetooth, NFC and even dry contact.
- 5.8 Know wall and floor charging installation
- 5.9 Explain charging station with and without cable
- 5.10 Explain fast charging station along with advantages and disadvantages
- 5.11 Understand the functions of Residual current devices and Over current protective devices
- 5.12 Understand the impact of EV charging on maximum power demand
- 5.13 Explain different types of power management for EV charging station
- 5.14 Define smart charging and various options V2X tech (V1G ,V2G, V2V, V2H, V2B)
- 5.15 Identify various elements of a EV charging station

6. EVs and renewable energy (RE) integration, Troubleshooting

- 6.1 List and understand various types of renewable energy sources
- 6.2 Know the term smart grid
- 6.3 Know the need of EV integration with renewable energy
- 6.4 Know advantages of EV integration with renewable energy
- 6.5 Know the safety aspects of EV
- 6.6 Understand the service and maintenance schedules of EV
- 6.7 Identify the challenges in EV integration with renewable energy
- 6.8 Explain EV integration with Wind energy
- 6.9 Explain EV integration with Solar energy
- 6.10 Know EV coordination
- 6.11 Identification of battery faults like
 - 6.11.1 Over charge and Over discharge
 - 6.11.2 Overheating and under cooling
 - 6.11.3 Short circuit or open circuit of inner cell

- 6.12 Know how to identify dead battery
- 6.13 Understand dead battery disposal and recycling
- 6.14 Identification of Motor faults
- 6.15 Identification of software problems
- 6.16 Know using OBD (On-board diagnostics) scanning tools
- 6.17 Understand Remote diagnostics
- 6.18 Identify the Power electronics faults

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping Pos
CO1	3	2	1	-	-	-	2	1,2,3,7
CO2	2	1	-	-	-	-	2	1,2,7
CO3	3	2	-	-	1	1	2	1,2,5, 6,7
CO4	3	2	1	-	-	1	3	1,2,3,6,7
CO5	3	2	1	-	-	1	2	1,2,3,6,7
CO6	1	1	1	-	-	-	2	1,2,3,7

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No.of Questions	Marks for each question	Questions to be attempted	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

Question Paper Blue Print for CIE (MID I)

Unit no	Unit name	Questions to be set for MID-I			Remarks
		R	U	A	
1	Introduction to Electric Vehicles	1,2	5(a) 5(b)	7(a) 7(b)	
2	EV components	3,4	6(a) 6(b)	8(a) 8(b)	
Total questions		4	4	4	

Question Paper Blue Print for CIE (MID II)

Unit no	Unit name	Questions to be set for MID-II			Remarks
		R	U	A	
3	Drive trains in EV & HEV	1,2	5(a) 5(b)	7(a) 7(b)	
4	Battery charging Technologies and EV Charging Infrastructure	3,4	6(a) 6(b)	8(a) 8(b)	
Total questions		4	4	4	

EE-575-SWITCHGEAR AND PROTECTION

Course title	Switchgear and Protection	Course code	EE-575
Semester	V	Course group	Core
Teaching scheme in periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + tutorial	Total contact periods	75
CIE (Continuous Evaluation)	Internal 60 Marks	See (Semester End Examination)	40 Marks

Pre requisites

1. This course requires the basic knowledge of mathematics and science.
2. This course requires the knowledge of AC Machines, Transmission lines

Course Outcomes

CO1 :	Classify Switchgear and Fuses
CO2 :	Describe the function of High Voltage Circuit Breakers and Evaluate the Short Circuit KVA
CO3 :	Classify Protective Relays
CO4 :	Describe the Schemes of Protection for Alternators and Transformers
CO5 :	Explain Protection Schemes for Transmission Lines and Feeders
CO6 :	Explain the importance of Lightning Arresters and necessity of Neutral Earthing

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE					
			R		U	A		
1	Switches & Fuses	10	Q4	Q1		Q9(a)	Q13(a)	
2	Circuit Breakers & Reactors	15						
3	Protective Relaying	12		Q2		Q10(a)	Q14(a)	
4	Protection of Alternators and Transformers	13						
5	Protection of Transmission Lines and Feeders	12		Q3	Q5,Q6		Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Lighting Arresters and Neutral Grounding	13			Q7,Q8		Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8		

Course Content

UNIT 1 -Switches & Fuses

Duration: 10 Periods (L: 8 – T: 2)

Switch gear– Isolators, Load break switch, Air break switches, Earth Switches – Fuse -Important Terms used in the analysis of fuses - Fusing current, Fusing factor, cut-off characteristics- time current characteristics- Types of fuses based on fuse current rating--HRC cartridge fuse-Liquid power fuse- Current Carrying Capacity of Fuse Element -application of fuses

UNIT 2 – Circuit Breakers & Reactors

Duration: 15 Periods (L: 12 – T: 3)

Circuit breakers - phenomenon of arc – Principles of Arc Extinction – Methods of Arc Extinction- Important Terms used in the Circuit breaker analysis- Circuit breakers classification based on the medium of arc quenching– Working of M.O.C.B, A.B. C.B, SF6 C.B & VCB and their comparisons.- Reactors –their necessity - Types of reactors– Percentage Reactance and Base KVA-Equation for short circuit KVA .

UNIT 3 – Protective Relaying

Duration: 12 Periods (L: 9 – T: 3)

Relay Requirements - Features of relays – Classifications based on the Operating principles- Construction and working of solenoid plunger type relay- attracted armature relay- Induction type over current relay - Induction type Directional Over current relay Classifications based on the time of operation— Inverse Time relay –Important terms used in relays- Impedance distance relay- Differential Relays

UNIT 4 – Protection of Alternators and Transformers

Duration: 13 Periods (L: 10 – T: 3)

Protection of Alternators Schemes - Probable faults- Differential protection of Alternator. – Balanced Earth fault protection – Stator Inter-turn protection - Field suppression protection - Protection of Transformer - Possible faults in the transformer – Precautions required for protection – Differential protections - Protection against excessive heating of transformer oil - Buchholz relay.

UNIT 5 - Protection of Transmission Lines and Feeders

Duration: 12 Periods (L: 9 – T: 3)

Bus bar protection-Necessity-causes of faults-Transmission line and feeder protection- Pilot wires – Differential pilot wire protection, Translay scheme- Distance and impedance relays in Transmission lines - Combined protection using definite Time and Inverse time relays – Protection of radial feeders, parallel feeders, and ring main feeders- Merz price protection of the feeders

UNIT 6: Lighting Arresters and Neutral Grounding

Duration: 13 Periods (L: 10 – T: 3)

Lightning concepts-harmful effects of Lightning-Surge Protection- Need for Surge Protection - Surge types and causes of surges – Scheme of surge protection with diagram - Various types of Lightning arresters –Rod gap, Horn gap, Expulsion type, valve type, metal oxide type Lightning arresters – Necessity of Neutral grounding - Methods of neutral grounding- Comparison of various neutral grounding systems.

Recommended Books

1. Principle of Power systems - V.K. Mehta
2. Electrical power systems - S.L. Uppal
3. Text book of Electrical power systems - SONY, Gupta Bhatnagar
4. Electrical power systems- JB Gupta
5. Electrical power Systems - CL Wadhwa
6. Switch gear and Protection by Sunil S. Rao
7. Power System Protection And Switchgear by Buvanesh A Oza, Nirmalkumar C Nair, Rases P Mehta and Vijay H Makwana, McGraw HILL Education(India Pvt. Ltd) Newdelhi
8. J.B.Gupta “Switchgear & Protection”, (edition), Katson Publisher,2008
9. MadhavaRao T.S., 'Power System Protection - Static Relays', McGraw Hill, New Delhi, 2nd Edition, 21st reprinted, 2008.
10. Handbook of Switchgears by BHEL
11. Testing , commissioning , operation and maintenance of electrical equipment by Sunil S Rao ,Khanna Publications

Suggested E-Learning references

1. electrical4u.com
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <http://www.pdfdocuments.com/testing-commissioning-operation-maintenanceelectrical equipments.pdf>
5. youtube videos on circuit breakers
6. youtube videos on protective relays
7. nptel videos on switchgear protection

Suggested Learning Outcomes

- 1.1 Classify the types of faults in power system and their effects.
 - 1.2 Explain symmetrical and Unsymmetrical faults
 - 1.3 Explain different types of open and short circuit faults
 - 1.4 Define switch gear.
 - 1.5 Classify switch gear with respect to voltage level
 - 1.6 State the purpose of isolators, load break switches, air break switches and earth switches
 - 1.7 Explain the working of different types of Isolators.
 - 1.8 Explain the working of air break switch.
 - 1.9 Explain the working of earth switch
 - 1.10 List the uses and limitations of different types of switches.
 - 1.11 Explain fuse as protective device.
 - 1.12 Define the following important terms in analysis of fuses
 - i) current rating of fuse element ii) Fusing current iii) Fusing factor
 - iv) Prospective Current v) Cut-off current vi) Pre-arcing time vii) Arcing time
 - viii) Total operating time ix) Breaking Capacity
 - 1.13 Draw and explain cut- off characteristics of fuse
 - 1.14 Draw and explain Time-current characteristics of a fuse
 - 1.15 List types of fuses
 - 1.16 Explain the working principle of HRC cartridge fuse
 - 1.17 Explain the working principle of Liquid power fuse.
 - 1.18 State the current carrying capacity of fuse element
 - 1.19 Applications of fuses
-
- 2.1 Explain the phenomenon of Arc, Arc voltage, Arc current.
 - 2.2 State factors responsible for arc formation and principle of Arc Extinction
 - 2.3 Describe the methods of Arc Extinction.
 - 2.4 State the following important terms used in circuit breaker analysis
 - i) Arc Voltage ii) Restriking Voltage iii) Recovery Voltage
 - 2.5 Classify the circuit breakers based upon medium of arc quenching.
 - 2.6 Describe with neat diagram the working of Minimum oil circuit breaker(MOCB).
 - 2.7 List the different types of Air blast circuit breakers
 - 2.8 Explain with a legible sketch the principle of working of different Air blast circuit breakers.
 - 2.9 List the properties of SF₆ gas
 - 2.10 Explain with a legible sketch the principle of working of SF₆ circuit breaker.
 - 2.11 Explain with a legible sketch the principle of working of Vacuum circuit breaker.
 - 2.12 State the importance of current limiting reactors in power systems.
 - 2.13 State the functions of current limiting reactors
 - 2.14 List the types of reactors.

- 2.15 Describe the construction of the different types of reactors.
 - 2.16 Draw the schematic diagram of reactor connections.
 - 2.17 State the expressions of percentage reactance and Base KVA
 - 2.18 State the importance of short circuit KVA.
 - 2.19 Solve simple problems on short circuit KVA
-
- 3.1 State the basic requirements of relays
 - 3.2 State the important features of relays.
 - 3.3 Explain the working principle of a relay
 - 3.4 Classify the relays based on operating principles - i) Electromagnetic Attraction ii) Electromagnetic Induction.
 - 3.5 Describe the working of solenoid plunger type relay
 - 3.6 Describe the working of attracted armature relays.
 - 3.7 List the uses of attracted armature relays.
 - 3.8 Describe the construction and working of induction type over current relay.
 - 3.9 Explain the principle of obtaining directional property in induction relays.
 - 3.10 Describe the working of directional over current induction relay.
 - 3.11 List the applications of directional over current induction relay.
 - 3.12 Classify the relays based on the time of operation. i) Inverse Time relay ii) Instantaneous relay
 - 3.13 State the important terms used in relays i) pick-up current ii) Current setting iii) Plug setting multiplier -PSM iv) Time setting multiplier-TSM
 - 3.14 Explain with block diagram the working of numerical over current relay
 - 3.15 Explain the principle of working of impedance relay.
 - 3.16 List the applications of impedance relay.
 - 3.17 Describe the current differential protection.
 - 3.18 Describe the voltage differential protection
-
- 4.1 List the probable faults in Alternator Stator and rotor.
 - 4.2 State the effects of faults on Alternator Stator and rotor.
 - 4.3 Describe the scheme of protection against excessive heating of stator and rotor.
 - 4.4 Explain the differential protection for alternator stator.
 - 4.5 Explain the earth fault protection for rotor.
 - 4.6 Explain the split phase protection of alternator against inter turn short circuits.
 - 4.7 Explain the need and working of field suppression protection.
 - 4.8 List the possible faults in a transformer and mention their effects.
 - 4.9 List the precautions to be taken for applying differential protection to transformers.
 - 4.10 Explain differential protection of transformer.
 - 4.11 Explain the construction and working of Buchholz relay.

- 5.1 State the necessity of bus bar protection
- 5.2 State the causes of bus bar faults
- 5.3 Explain the different schemes of protection for bus bars
(i) Differential protection scheme (ii) Frame leakage protection scheme
- 5.4 Explain the different schematic arrangements for single and duplicate bus bars.
- 5.5 Describe the transmission line and feeder protection.
- 5.6 Explain pilot wires and their effects.
- 5.7 Explain the Differential Pilot wire protection
i) Merz-price voltage balanced scheme ii) Translay scheme
- 5.8 Explain the protection of transmission lines using impedance relays.
- 5.9 Explain combined protection of transmission line using definite distance and time distance relays
- 5.10 Explain protection of radial feeders using time graded relays.
- 5.11 Explain protection of parallel feeders using directional relays.
- 5.12 Explain protection of ring main feeder using directional relays.
- 5.13 Explain differential protection for parallel feeders using Merz price protection

- 6.1 Explain the phenomenon of lightning
- 6.2 State the harmful effects of lightning
- 6.3 Define surge
- 6.4 List the types of **Voltage** surges
- 6.5 Give reasons for the causes of **Voltage** surges.
- 6.6 State the necessity of Lightning arrester
- 6.7 List the Characteristics of good lightning arrester
- 6.8 Define the impulse ratio of Lightning Arrester
- 6.9 Explain the principle of surge protection using Lightning arrester .
- 6.10 List the six types of lightning arresters for outdoor applications
- 6.11 Describe the construction and working of following types of lightning arresters.
i) Rod gap ii) Horn gap iii) Expulsion type iv) valve type v) Metal oxide
- 6.12 List the applications of above lightning arresters.
- 6.13 Explain the necessity of neutral grounding .
- 6.14 Give the merits and demerits of neutral grounding.
- 6.15 Describe the following methods of neutral grounding
i) Solid grounding ii) Resistance grounding iii) Reactance grounding iv) Voltage transformer grounding v) Zig-zag transformer grounding .
- 6.16 Compare the different methods of neutral grounding systems

Suggested Student Activities

1. Student visits Library to refer to Switchgear and Protection subject related books
2. Visit nearby substation and prepare a report
3. Quiz
4. Group discussion
5. Surprise test
6. Register for MOOCS courses

CO-PO Mapping Matrix

Course outcomes	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	1	-	-	1	1,2,4,7
CO2	2	3	-	-	1	-	2	1,2,5,7
CO3	2	1	-	-	1	-	2	1,2,5,7
CO4	1	2	2	1	2	-	1	1,2,3,4,5,7
CO5	1	2	-	-	2	-	2	1,2,5,7
CO6	2	2	1	-	1	-	2	1,2,3,5,7

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8		8		8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-575

SWITCHGEAR AND PROTECTION

MID SEM -I MODEL PAPER

TIME: 60 MIN

TOTAL MARKS: 20

Important Note: Wherever any question has choice, marks will be allotted only to first attempted question. **No marks will be allotted for extra questions answered**

PART – A

Marks: 4Q X 1= 04

Instructions: (1) Answer all questions
(2) Each question carries **One** mark.

1. Define switchgear.
2. State the use of an isolator.
3. Define Arc.
4. State the use of a Reactor.

PART - B

Marks: 2Q x 3 = 06

Instructions: (1) Answer all questions
(2) Each question carries **Three** marks.

- 5(a) List the types of fuses .
or
5(b) Write the differences between isolator and earth switch
6(a) Classify circuit breakers based on arc quenching medium
Or
6(b) List the properties of SF₆ gas

PART - C

Marks: 2Q x 5= 10

Instructions: (1) Answer all questions
(2) Each question carries **Five** marks.

- 7(a) Explain the purpose of Isolators, Air break switches and Earth switches
or
7(b) Explain operation of HRC cartridge fuse with diagram.
8(a) An Vacuum circuit breaker is used on the HV side of the transformer in a substation
. Explain why it is preferred over air blast circuit breaker.
Or
8(b) Draw the schematic diagram of reactor connections.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-575

SWITCHGEAR AND PROTECTION

MID SEM -II MODEL PAPER

TIME: 60 MIN

TOTAL MARKS: 20

PART – A

Marks: 4Q X 1= 04

Instructions: (1) Answer all questions
(2) Each question carries **One** mark.

1. Define Over Current Relay.
2. Define PSM.
3. List the protection schemes of Alternator.
4. List the possible faults in a transformer.

PART - B

Marks: 2Q x 3 = 06

Instructions: (1) Answer all questions.
(2) Each question carries Three marks.

5(a) State the basic requirements of relays

or

5(b) List the applications of impedance relay

6(a) State the effects of faults on Alternator Stator

or

6(b) Describe the current differential protection of transformer

PART - C

Marks: 2Q x 5= 10

Instructions: (1) Answer all questions
(2) Each question carries **Five** marks.

7(a) Describe the working of induction type over current relay

or

7(b) Explain the working of Buchholz relay

8(a) Explain the working of field suppression protection of alternator

or

8(b) Describe the working of solenoid plunger type relay

STATE BOARD OF TECHNICAL EDUCATION & TRAINING , TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-575

SWITCHGEAR AND PROTECTION
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks: 8Q X 1= 8

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Distinguish between a fuse and a switch.
2. List the methods of arc quenching.
3. State the basic requirements of a relay.
4. List any four methods of Neutral grounding.
5. Mention the probable faults in alternator.
6. State the use of pilot wires in protection.
7. Draw the protection scheme for single bus bar arrangement.
8. Define surge.

PART - B

Marks: 4Qx3=12

Instructions: (1) Answer any Four Questions
(2) Each question carries Three marks.

- 9(a) State the use of Air break Switch.
Or
9(b) State the uses of Distance Relay
- 10(a) Describe the arcing phenomenon.
Or
10(b) State the need for Surge Protection
- 11(a) State the types of Feeders
Or
11(b) Draw the protection scheme of radial feeders using time graded relays.
- 12(a) State the causes of surges
Or
12(b) Write the necessity of neutral earthing

PART - C

Marks: 4Qx5=20

Instructions: (1) Answer any Four Questions
(2) Each question carries Five marks

- 13(a) Explain the working of minimum oil circuit breaker with a neat sketch.
Or
13(b) Explain protection of parallel feeders using directional relays.
- 14(a) Explain earth fault protection for stator of an alternator.
Or
14(b) Explain with a neat figure the working of Valve type Lightning Arrester.
- 15(a) Explain the protection of transmission lines by definite distance relay.
Or
15(b) Explain protection of ring main feeder using directional relays.
- 16(a) Explain reactance grounding
Or
16(b) Explain the working principle of expulsion type lightning arrester with diagram.

EE-585-ADVANCED PROTECTION OF POWER SYSTEMS

Course Title	Advanced Protection of Power Systems	Course Code	EE-585
Semester	V	Course Group	Elective
Teaching Scheme in periods (L : T : P)	4 : 1 : 0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of mathematics and science.

This course requires the knowledge of AC Machines, Transmission lines

Course Outcomes

CO1 :	Recall the fundamentals of protection
CO2 :	Describe the operation and application of various circuit breakers
CO3 :	Classify protective relays
CO4 :	Describe the protection schemes of alternator and transformers
CO5 :	Explain the protection schemes for transmission lines and feeders
CO6 :	Describe operation of basic elements needed for digital protection

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Fundamentals of Protection	12	Q4	Q1		Q9(a)	Q13(a)
2	Circuit Breakers	13					
3	Protective Relays	13		Q2		Q10(a)	Q14(a)
4	Protection of Alternators and transformers	12					
5	Protection of Transmission Lines and Feeders	12		Q3		Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Basic Elements of Digital Protection	13					
Total		75	8		8	8	

Course Contents

Unit 1 - Fundamentals of Protection

Duration: 12Periods (L:9– T:3)

Sources of Fault - Phenomena of Short Circuit - Types of faults & Harmful Effects of short circuit current - Calculation of Short Circuit Current - Percentage reactance and Base KVA – Current limiting of Reactor – arrangements

Unit 2 - Circuit Breakers

Duration: 13 Periods (L:10– T:3)

Switchgear -classify switchgear -Arc formation process - methods of arc extinction - working of Circuit Breaker by Trip Circuit Mechanism - Circuit Breaker rating– classification based on the medium of arc quenching – Working of O.C.B, A.B..B, SF6C.B & VCB - their comparison – live tank and dead tank circuit breaker – HVDC circuit breaker.

Unit 3 - Protective Relays

Duration: 13 Periods (L:10– T:3)

Requirements of relays - Necessity for Protection - Primary and Back up protection -Evolution of relays - Classification of protective Relaying - Important Terms: Pickup current, current setting, PSM, TSM - Construction and working of Induction type Non-directional over current relay– directional over current relay – impedance relay - Introduction of Static relay, merits and Limitations, Static Type Over Current Relay, Comparison of Static Relays with Electro-Magnetic Relays

UNIT 4 - Protection of Alternators and transformers Duration: 12 Periods(L:9– T: 3)

Protection of Alternators - Scheme of protection - probable faults in alternators - Differential protection - Earth fault protection for stator and rotor – Split phase protection - Field suppression protection -Protection of Transformer - Possible faults in the transformer – Precautions required for protection – Differential protections and Buchholz relay

UNIT 5 - Protection of Transmission Lines and Feeders

Duration: 12 Periods (L: 9 – T: 3)

Transmission line and feeder protection- Pilot wires, protection of transmission lines - Combined protection using definite distance and time distance relays – Protection of radial feeders, parallel feeders, and ring main feeders - Bus bar protection-Single bus bar, duplicate bus bars- Causes of over voltages - Lighting phenomena - over voltage due to lightning - Types of lightning arresters and surge absorbers- Construction and principle of operation

UNIT 6: Basic Elements of Digital Protection

Duration: 13 Periods (L:10 -T:3)

Application of Numerical relays for Interconnected power system – networks - Basic Components of a Digital Relay - Signal Conditioning – Subsystems – Transducers - Surge

Protection Circuits - Analog Filtering - Analog Multiplexers - Conversion Subsystem - Signal Aliasing Error - Sample and Hold Circuit - Digital Multiplexing - Digital-to-Analog Conversion -Analog-to-Digital Conversion -Digital Relay Subsystem - Benefits of digital relays-numerical relay applications

Recommended Books

1. Principles of power systems- V.K. Mehta
2. Electrical power systems - S.L. Uppal
3. Text book of electrical power systems - SONY, Gupta Bhatnagar
4. Electrical power systems- JB Gupta
5. Electrical power Systems - CL Wadhwa
6. Switch gear and Protection - Sunil S. Rao
7. J.B.Gupta "Switchgear & Protection", (edition), Katson Publisher,2008
8. Power system protection and switchgear – Badriram, Vishwakarma – 2nd edition , McGraw Hill
9. Digital protection for power systems – A T Johns and S K Salman – IEE Power Series 15

Suggested E-Learning references

1. electrical4u.com
2. www.nptel.ac.in
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/>
4. <http://www.pdfdocuments.com/testing-commissioning-operation-maintenanceelectrical-equipments.pdf>

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

- 1.1 List various sources of faults in power systems
 - 1.2 State the phenomenon of short circuit in a power system
 - 1.3 State the types of faults in power system and their effects.
 - 1.4 Mention the effects of short circuit currents
 - 1.5 Simple problems on short circuit current calculation
 - 1.6 Define percentage reactance
 - 1.7 Define base kVA
 - 1.8 Define current limiting reactor
 - 1.9 Mention various arrangements of current limiting reactors
 - 1.10 Explain various arrangements of current limiting reactors
-
- 2.1 Define switch gear.
 - 2.2 Classify switch gear with respect to voltage level
 - 2.3 State the purpose of isolators, load break switches, air break switches and earthing switches
 - 2.4 Explain the phenomenon of arc, arc voltage, arc current and its effects.
 - 2.5 State factors responsible for arc formation.

- 2.6 Describe the methods of arc quenching.
- 2.7 Classify the circuit breakers based upon medium of arc quenching.
- 2.8 State the principle of oil circuit breaker
- 2.9 Explain with legible sketch the working principle of Air blast circuit breaker
- 2.10 Explain with legible sketch working principle of SF₆ circuit breaker
- 2.11 Explain with legible sketch working principle of vacuum circuit breaker
- 2.12 Define live tank circuit breaker
- 2.13 Define dead tank circuit breaker
- 2.14 Explain the operation of HVDC circuit breaker

- 3.1 State the basic requirements of relays
- 3.2 State the important features of relays.
- 3.3 Classify the relays based upon
 - i) Principle of Operation ii) Time of operation.
- 3.4 Describe the working of solenoid plunger type relay
- 3.5 Describe the working of attracted armature relays.
- 3.6 List the uses of attracted armature relays.
- 3.7 Describe the construction and working of induction type over current relay.
- 3.8 Describe the current setting, time setting and application of above relays.
- 3.9 Explain the principle of obtaining directional property in induction relays.
- 3.10 Describe the working of directional over current induction relay.
- 3.11 List the applications of directional over current induction relay.
- 3.12 Explain the principle of working of definite time distance impedance relay.
- 3.13 List the applications of impedance relay.
- 3.14 Describe the current differential protection.
- 3.15 Describe the voltage differential protection
- 3.16 State the advantages of static relays over electromagnetic relays
- 3.17 Explain with block diagram the construction of static protective relays
- 3.18 List the advantages of static relays
- 3.19 List the limitations of static relays

- 4.1 State the probable faults in Alternator Stator and rotor.
- 4.2 State the effects of faults on Alternator Stator and rotor.
- 4.3 Describe the scheme of protection against excessive heating of stator and rotor.
- 4.4 Explain the differential protection for alternator stator.
- 4.5 Explain the earth fault protection for rotor.
- 4.6 Explain the split phase protection of alternator against inter turn short circuits.
- 4.7 Explain the need and working of field suppression protection.
- 4.8 List the possible faults in a transformer and mention their effects.
- 4.9 List the precautions to be taken for applying differential protection to transformers.

- 4.10 Explain differential protection of transformer.
- 4.11 Explain the working of Buchholz relay and its protection scheme for transformer.

- 5.1 Explain the different schemes of protection for single and duplicate bus bars.
- 5.2 Describe the transmission line and feeder protection.
- 5.3 Explain pilot wires and their effects.
- 5.4 Describe the protection of transmission lines using distance and impedance relays.
- 5.5 Explain the combined protection by using definite distance and time distance relays.
- 5.6 Describe about protection of radial feeders using time graded relays.
- 5.7 Explain protection of parallel feeders using directional relays.
- 5.8 Explain protection of ring main feeder using directional relays.
- 5.9 Explain differential protection for parallel feeders of transmission lines.
- 5.10 Define surge
- 5.11 List the types of surges
- 5.12 Give reasons for the causes of surges
- 5.13 Explain the working principle of Lightning arrester with diagram.
- 5.14 List the types of lightning arrestors for outdoor applications
- 5.15 Describe the construction and working of following types of lightning arrestors.
 - i) Rod gap ii) Horn gap iii) Expulsion type iv) valve type v) Metal oxide
- 5.16 List the applications of above lightning arrestors.

- 6.1 List the basic components of a digital relay
- 6.2 Explain with block diagram the working of numerical over current relay
- 6.3 Explain with block diagram the working of transformer numerical differential relay
- 6.4 List the applications of numerical relay for interconnected power system
- 6.5 List various signal conditioning subsystems
- 6.6 Explain the working of transducers
- 6.7 Explain the working of surge protection circuits
- 6.8 Explain analogue filtering
- 6.9 Explain analogue multiplexers
- 6.10 State sampling theorem
- 6.11 Define signal aliasing error
- 6.12 State the purpose of sample and hold circuit
- 6.13 With the help of a block diagram explain sample and hold circuit
- 6.14 Define digital multiplexing
- 6.15 Explain digital to analogue conversion
- 6.16 Explain analogue to digital conversion
- 6.17 Explain the working of digital relay as a unit
- 6.18 State the advantages of digital relay
- 6.19 State the limitations of digital relay

Suggested Student Activities

1. Student visits Library to refer to Electrical Manuals
2. Visit nearby substation and prepare a report
3. Quiz
4. Group discussion
5. Surprise test

CO-PO Mapping Matrix

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	2	2		3		3	PO1,2,3,5,7
CO2	2	3	3		3		3	PO1,2,3,5,7
CO3	3	3	2		3		3	PO1,2,3,5,7
CO4	3	3	2		3		3	PO1,2,3,5,7
CO5	3	3	2		3		3	PO1,2,3,5,7
CO6	3	3	3		3		3	PO1,2,3,5,7

Continuous Internal Evaluation (CIE)

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively.

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-585

ADVANCED PROTECTION OF POWER SYSTEMS

MID SEM -I EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1 = 4

Instructions: (1) Answer all questions

(2) Each question carries **one** mark.

1. List various sources of faults in power systems
2. Define base kVA
3. State the purpose of isolators
4. Define switch gear

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks.

- 5.(a) State the phenomenon of short circuit in a power system.

OR

- 5.(b) Define percentage reactance

- 6.(a) Classify the circuit breakers based upon medium of arc quenching.

OR

6. (b) Define dead tank circuit breaker.

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.

(2) Each question carries **five** marks.

- 7.(a). Draw various arrangements of current limiting reactors.

OR

- 7.(b). Mention the effects of short circuit currents

- 8.(a). Explain with legible sketch working principle of SF₆ circuit breaker.

OR

- 8.(b). Explain the operation of HVDC circuit breaker.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-585
ADVANCED PROTECTION OF POWER SYSTEMS
MID SEM -II EXAM MODEL PAPER

TIME: 60 MIN.

TOTAL MARKS: 20

PART – A

Marks: 4 X 1 = 4

Instructions: (1) Answer all questions

(2) Each question carries **one** mark.

1. List the uses of attracted armature relays.
2. State the advantages of static relays over electromagnetic relays.
3. State the probable faults in Alternator Stator.
4. List the possible faults in a transformer.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer all questions.

(2) Each question carries **three** marks.

5(a) Classify the relays based upon principle of operation.

OR

5(b). List the limitations of static relays.

6(a). List the precautions to be taken for applying differential protection to transformers

OR

6(b). State the effects of faults on Alternator Stator

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.

(2) Each question carries **five** marks.

7.(a). Describe the construction and working of induction type over current relay.

OR

7.(b). Explain with block diagram the construction of static protective relays

8.(a). Explain the earth fault protection for rotor.

OR

8.(b). Explain the working of Buchholz relay and its protection scheme for transformer.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-585
ADVANCED PROTECTION OF POWER SYSTEMS
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks : 8 X 1 = 8

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define current limiting reactor
2. List the applications of impedance relay.
3. Define surge.
4. Define signal aliasing error.
5. List the types of lightning arrestors for outdoor applications.
6. List the applications of rod gap lightning arrestor.
7. Define digital multiplexing.
8. State the advantages of digital relay.

PART - B

Marks: 4 × 3 = 12

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a) State factors responsible for arc formation..

OR

9.(b) List the types of surges.

10.(a) List the possible faults in a transformer and mention their effects..

OR

10.(b) List various signal conditioning subsystems.

11.(a) List the types of surges.

OR

11.(b) Give reasons for the causes of surges.

12.(a) State sampling theorem.

OR

12.(b) State the limitations of digital relay.

PART – C

Marks: $4 \times 5 = 20$

Instructions: (1) Answer all questions.

(2) Each question carries **five** marks.

13.(a) Explain with legible sketch the working principle of Air blast circuit breaker.

OR

13. (b) Explain protection of ring main feeder using directional relays.

14.(a) Describe the construction and working of induction type over current relay.

OR

14.(b) Explain with block diagram the working of transformer numerical differential relay

15.(a) Describe the construction and working of expulsion type lightning arrestor.

OR

15.(b) Describe about protection of radial feeders using time graded relays.

16.(a) Explain the working of digital relay as a unit

OR

16.(b) With the help of a block diagram explain sample and hold circuit.

EE-506-AC MOTORS LAB

Course Title	AC Motors Lab	Course Code	EE-506
Semester	V	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the skills of handling electrical tools, accessories and performing wiring connections

Course Outcomes

Course Outcome	
CO1	Identify the parts of A.C motor starters
CO2	Draw and interpret the performance characteristics of single phase and three phase AC Motors by Conducting load test.
CO3	Draw the circle diagram on AC Motors by conducting suitable experiments.
CO4	Identify and rectify faults in AC motors
CO5	Prepare estimation for a given load by using Government SSR as per BIS norms.

Suggested Learning Outcomes

1.0. Identify the parts of A.C motor starters

- 1.1 Identify the parts of a DOL starter, test its parts locate faults if any. Suggest remedies.
- 1.2 Identify the parts of a manual star-delta starter, test its parts and locate faults if any. Suggest remedies.
- 1.3 Identify the parts of automatic star-delta starter, test its parts and locate faults if any. Suggest remedies.
- 1.4 Identify the parts of autotransformer starters, test its parts locate faults if any. Suggest remedies.

2.0 Draw and interpret the performance characteristics of single phase and three phase AC Motors by Conducting load test.

- 2.1. Conduct brake test on 3-phase squirrel cage induction motor.
- 2.2. Conduct brake test on 3-phase slip ring induction motor
- 2.3. Perform load test on single phase split phase induction motor.
- 2.4. Perform load test on single phase universal motor
- 2.5 Conduct load test on synchronous motor and draw V and inverted V curves

3.0 Draw the circle diagram on AC Motors by conducting suitable experiments.

3.1. Conduct suitable tests and draw circle diagram of squirrel cage induction motor.

3.2. Conduct suitable tests and draw circle diagram of slip ring induction motor

4.0. Identify and Rectify faults in AC motors.

4.1 Identify the part of a given AC Motors.

4.2 Identify and rectify faults in AC Motors.

5.0 Prepare Estimation for a given load by using Government SSR as per BIS norms.

5.1 (A list of Items and soft copy of SSR may be provided to student)

5.2 Wiring estimate for a Residential / Commercial building.

5.3 Prepare an estimate for wiring Irrigation pump set

Note:- The staff can give suitable problems.

CO-PO MAPPING MATRIX

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7
CO5	3	2	3	3	2	2	3	1,2,3,4,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER
MID SEM I MODEL QUESTION PAPER

Course Code: EE-506

Duration: 1 Hour

Course Name: AC Motors Lab

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Identify the parts of a DOL starter, test its parts locate faults if any. Suggest remedies.
2. Identify the parts of a manual star-delta starter, test its parts and locate faults if any. Suggest remedies.
3. Identify the parts of automatic star-delta starter, test its parts and locate faults if any. Suggest remedies.
4. Identify the parts of autotransformer starters, test its parts locate faults if any. Suggest remedies.
5. Conduct brake test on 3-phase squirrel cage induction motor.
6. Conduct brake test on 3-phase slip ring induction motor

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER
MID SEM II MODEL QUESTION PAPER

Course Code: EE-506

Duration: 1 Hour

Course Name: AC Motors Lab

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Perform Load test on Single phase split phase induction motor.
2. Perform Load test on Single phase universal motor
3. Conduct load test on Synchronous motor and draw V and inverted V curves.
4. Conduct suitable tests and draw circle diagram of squirrel cage induction motor.
5. Conduct suitable tests and draw circle diagram of slip ring induction motor

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-506

Duration: 2 Hour

Course Name: AC Motors Lab

Max. Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Conduct brake test on 3-phase squirrel cage induction motor.
2. Conduct brake test on 3-phase slip ring induction motor
3. Perform load test on single phase split phase induction motor.
4. Perform load test on single phase universal motor
5. Conduct load test on synchronous motor and draw V and inverted V curves.
6. Conduct suitable tests and draw circle diagram of squirrel cage induction motor.
7. Conduct suitable tests and draw circle diagram of slip ring induction motor
8. Identify the part of a given AC Motors.
9. Identify and rectify faults in AC Motors.
10. Identify the parts of a DOL starter, test its parts locate faults if any. Suggest remedies.
11. Identify the parts of a manual star-delta starter, test its parts and locate faults if any suggest remedies.
12. Identify the parts of automatic star-delta starter, test its parts and locate faults if any suggest remedies.
13. Identify the parts of autotransformer starters, test its parts locate faults if any. Suggest remedies.

EE-507-POWER ELECTRONICS LAB

Course Title:	Power Electronics Lab	Course Code	EE-507
Semester	V	Course Group	Core
Teaching Scheme in Periods (L: T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact /Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Power electronics

Course Outcomes

Course Outcome	
CO1	Acquire knowledge on specified Power electronic devices and use them
CO2	Use Single phase Half wave and full wave converters for R loads
CO3	Control the speed of DC motors using converters and choppers
CO4	Control the speed of AC motors using AC voltage controller & V/F controller
CO5	Acquire knowledge on inverters

Suggested Learning Outcomes

1.0 Characteristics of different Power electronic devices

- 1.1 Draw the Static VI characteristics of SCR
- 1.2 Draw the Static VI characteristics of IGBT
- 1.3 Draw the Static VI characteristics of DIAC
- 1.4 Draw the Static VI characteristics of TRIAC

2.0 Single phase Half wave and full wave converters for R loads

- 2.1 Verify the working of Single phase half wave controlled converter with R-load.
- 2.2 Verify the working of Single phase Full wave fully controlled converter with R-load

3.0 Speed Control of DC motors using converters and choppers

3.1 Control the speed of DC shunt motor using single phase fully controlled full wave converter

3.2 Control the speed of DC shunt motor using Chopper

4.0 Speed control of AC motors

4.1 Control the speed of 1 Φ induction motor using AC Voltage controller

4.2 Control the speed of 3 Φ induction motor using V/F controller

5.0 Inverters

5.1 Invert DC supply to AC supply using Series Inverter

5.2 Invert DC supply to AC supply using Parallel Inverter

CO-PO MAPPING MATRIX

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO/P O	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7
CO5	3	2	3	3	2	2	3	1,2,3,4,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER
MID SEM I MODEL QUESTION PAPER

Course Code: EE-507

Course Name: Power Electronics Lab

Duration: 1 Hour

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Draw the Static VI characteristics of SCR
2. Draw the Static VI characteristics of IGBT
3. Draw the Static VI characteristics of DIAC
4. Draw the Static VI characteristics of TRIAC

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER
MID SEM II MODEL QUESTION PAPER

Course Code: EE-507

Course Name: Power Electronics Lab

Duration: 1 Hour

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

- 1 Verify the working of Single phase half wave controlled converter with R-load.
- 2 Verify the working of Single phase Full wave fully controlled converter with R-load
- 3 Control the speed of DC shunt motor using single phase fully controlled full wave converter
- 4 Control the speed of DC shunt motor using Chopper

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-507

Course Name: Power Electronics Lab

Duration: 2 Hour

Max. Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

- 1 Draw the Static VI characteristics of SCR
- 2 Draw the Static VI characteristics of IGBT
- 3 Draw the Static VI characteristics of DIAC
- 4 Draw the Static VI characteristics of TRIAC

- 5 Verify the working of Single phase half wave controlled converter with R-load.
- 6 Verify the working of Single phase Full wave fully controlled converter with R-load

- 7 Control the speed of DC shunt motor using single phase fully controlled full wave converter
- 8 Control the speed of DC shunt motor using Chopper

- 9 Control the speed of 1 Φ induction motor using AC Voltage controller
- 10 Control the speed of 3 Φ induction motor using V/F controller

- 11 Invert DC supply to AC supply using Series Inverter
- 12 Invert DC supply to AC supply using Parallel Inverter

EE-508-PROGRAMMABLE LOGIC CONTROLLERS LAB

Course Title	Programmable Logic Controllers Lab	Course Code	EE-508
Semester	V	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Digital Electronics

Course Outcomes

Course Outcome	
CO1	Identify the main components of the PLC module, configure the drivers and perform ON/OFF control logic task using PLC
CO2	Build the ladder logic program for logic gates, download it to the PLC and run the program
CO3	Develop the ladder logic program for timer & counter functions, download it to the PLC and run the program
CO4	Execute the ladder programs for PLC based model applications

Suggested Learning Outcomes

1.0 Identify the main components of the PLC module, configure the drivers and switching task using PLC

- 1.1 Identify the main components of the PLC module
- 1.2 Identify different input devices and output field devices used in Industrial automation
- 1.3 Perform the simple ON/OFF control task using the PLC.
- 1.4 Perform a relay switching logic task through a PLC unit
- 1.5 Develop a ladder logic program for Seal-In-circuit (Latch logic) using PLC, download and run the program.
- 1.6 Implement latch(Set) and unlatch(Reset) instructions

2.0 Build the ladder logic program for logic gates, download it to the PLC and run the program

- 2.1 Develop a ladder logic program for AND,OR and NOT gates, download the program and run it
- 2.2 Develop a ladder logic program for NAND,NOR, EX-OR and EX-NOR gates PLC, download the program and run it

3.0 Develop the ladder logic program for timer & counter functions, download it to the PLC and run the program

- 3.1 Execute the ladder logic program for T-ON(ON-Delay Timer)
- 3.2 Execute the ladder logic program for T-OFF(OFF-Delay Timer)
- 3.3 Execute the ladder logic program for RTON(Retentive on)
- 3.4 Execute the ladder logic program forCTU(count-Up counter)
- 3.5 Execute the ladder logic program for CTD(count-down Counter)

4.0 Execute the ladder programs for PLC based model applications

- 4.1 Execute the ladder logic program for stair case lighting
- 4.2 Execute the ladder logic program for DOL starter
- 4.3 Execute the ladder logic program for star delta starter
- 4.4 Execute the ladder logic program for PLC Real time application for Speed control of DC motor
- 4.5 Execute the ladder logic program for Temperature Control
- 4.6 Execute the ladder logic program for Level control

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	-	2	2	3	1,2,5,6,7
CO2	3	-	2	3	2	2	3	1,3,4,6,7
CO3	-	1	3	2	2	2	3	2,3,4,5,6,7
CO4	-	3	3	3	2	2	3	2,3,4,5,6,7

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER**

MID SEM I MODEL QUESTION PAPER

Course Code: EE-508

Duration: 1 Hour

Course Name: Programmable Logic Controllers Lab

Max.Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Identify the main components of the PLC module
2. Identify different input devices and output field devices used in Industrial automation
3. Perform the simple ON/OFF control task using the PLC.
4. Perform a relay switching logic task through a PLC unit
5. Develop a ladder logic program for Seal-In-circuit (Latch logic) using PLC, download and run the program.
6. Implement latch(Set) and unlatch(Reset) instructions
7. Develop a ladder logic program for AND,OR and NOT gates, download the program and run it
8. Develop a ladder logic program for NAND,NOR, EX-OR and EX-NOR gates PLC, download the program and run it

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
DEEE V SEMESTER**

MID SEM II MODEL QUESTION PAPER

Course Code: EE-508

Duration: 1 Hour

Course Name: Programmable Logic Controllers Lab

Max. Marks: 20

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

- 1 Execute the ladder logic program for T-ON(ON-Delay Timer)
- 2 Execute the ladder logic program for T-OFF(OFF-Delay Timer)
- 3 Execute the ladder logic program for RTON(Retentive on)
- 4 Execute the ladder logic program for CTU(count-Up counter)
- 5 Execute the ladder logic program for CTD(count-down Counter)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-508

Duration: 2 Hour

Course Name: Programmable Logic Controllers Lab

Max. Marks: 40

Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment.

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question.

1. Identify the main components of the PLC module
2. Identify different input devices and output field devices used in Industrial automation
3. Perform the simple ON/OFF control task using the PLC.
4. Perform a relay switching logic task through a PLC unit
5. Develop a ladder logic program for Seal-In-circuit (Latch logic) using PLC, download and run the program.
6. Implement latch(Set) and unlatch(Reset) instructions
7. Develop a ladder logic program for AND,OR and NOT gates, download the program and run it
8. Develop a ladder logic program for NAND,NOR, EX-OR and EX-NOR gates PLC, download the program and run it
9. Execute the ladder logic program for T-ON(ON-Delay Timer)
10. Execute the ladder logic program for T-OFF(OFF-Delay Timer)
11. Execute the ladder logic program for RTON(Retentive on)
12. Execute the ladder logic program for CTU(count-Up counter)
13. Execute the ladder logic program for CTD(count-down Counter)
14. Execute the ladder logic program for stair case lighting
15. Execute the ladder logic program for DOL starter
16. Execute the ladder logic program for star delta starter
17. PLC Real time application for Speed control of DC motor
18. Temperature Control
19. Level control
20. Star - Delta convertor

EE-509-ELECTRICAL INSTALLATION LAB

Course Title	Electrical Installations Lab	Course Code	EE-509
Semester	V	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact /Periods	45
CIE	60 Marks	SEE	40 Marks

Prerequisites

This course requires the skills of handling electrical tools, accessories and performing wiring connections

Course Outcomes

CO1 :	Identify, select necessary materials and perform electrical wiring for power circuits
CO2 :	Perform earthing and measure earth resistance
CO3 :	Identify and select the components, sensors and perform smart control of home electrical appliances.
CO4 :	Design and make calculations for establishing solar panels for lighting purpose and submersible pumps.

Suggested Learning Outcomes

After completion of the subject, the student shall be able to

1.0 Wiring power loads

- 1.1 Control two sub-circuits through Energy meter, MCB's and two 1way switches.
- 1.2 Control 1.5 ton capacity A/C equipment by MCB and stabilizer.
- 1.3 Connect the Inverter to power supply through 3 pin socket and 1way switch (Back up)
- 1.4 Prepare a board which supports the following devices and also connect the devices
 - a) The connection of 600VA UPS through which CPU and Monitor of a Computer System would be connected.
 - b) Connect a Printer also.
- 1.4 Connect Computer by main switch board with a Miniature Circuit Breaker (MCB)
- 1.5 Connect and test the given Public Address System
- 1.6 Prepare a meter board for lighting and power installation using MCB, energy meter, fuse unit, DP switch, indicators and bus bars.
- 1.8 Make necessary calculations for installing a Submersible pump supporting a requirement

- a) Consider the Size(dia) of Bore
- b) Height to be pumped
- c) Distance to be pumped.
- d) Cable requirement.
- e) No. of phases to be used (i..e either 1-phase or 3-phases motor)

1.9 Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.

2.0 Earthing

2.1 Demonstrate Pipe Earthing.

2.2 Demonstrate Plate Earthing.

2.6 Demonstrate the method to measure the value of Earth Resistance.

3. Smart Home Control

3.1 Installation of Video Doorbell

3.2 Design an application using Motion Sensing switch.

3.3 Design an application using Touch sensitive switch

3.4 Installation of Wi-Fi enabled camera and viewing through mobile phone.

3.5 Remote controlled switching of lamps.

3.6 Remote controlled switching and speed control of fans.

3.6 Switching of various electrical devices using Mobile.

3.7 Switching of various electrical devices using IOT.

4. Solar Panels.

4.1 Understand Solar Panels types, Specifications, Companies, Prices

4.2 Design and make calculations for establishing Solar panels for lighting purpose using Inverters and Batteries.

4.3 Design and make calculations for establishing Solar panels to provide a supply to a 5 H.P Submersible

pump and VFD drive and other accessories.

4.4 Understand the Pay back Calculation by using a Solar Scheme for any Installation.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	-	-	3	2	-	3	1,4,5,7
CO2	3	-	2	3	3	-	3	1,3,4,5,7
CO3	-	-	3	2	2	-	3	3,4,5,7
CO4	-	-	3	3	2	-	3	3,4,5,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-509

Course Name: Electrical Installations Lab

Duration: 1 Hour

Max.Marks: 20

Note: Answer allotted Question.

1. Control 1.5 ton capacity A/C equipment by MCB and stabilizer.
2. Connect the Inverter to power supply through 3 pin socket and 1way switch (Back up)
3. Control two sub-circuits through Energy meter, MCB's and two 1way switches.
4. Demonstrate Plate Earthing.
5. Prepare a meter board for lighting and power installation using MCB, energy meter, fuse unit, DP switch, indicators and bus bars.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-II EXAMINATION

Course Code: EE-509

Course Name: Electrical Installations Lab

Duration: 1 Hour

Max.Marks: 20

Note: Answer allotted Question.

1. Connect and test the given Public Address System.
2. Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.
3. Perform installation of Wi-Fi enabled camera and viewing through mobile.
4. Perform remote controlled switching and speed control of fans.
5. Design and make calculations for establishing Solar panels to provide a supply to a 5 H.P Submersible pump and VFD drive and other accessories.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-509

Course Name: Electrical Installations Lab

Duration: 2 Hour

Max. Marks: 40

Note: Answer allotted Question.

1. Make Control two sub-circuits through Energy meter, MCB's and two 1way switches.
2. Prepare a Board which supports the following devices and connect the devices
 - a) The connection of 600VA UPS through which CPU and Monitor of a Computer System would be connected.
 - b) Connect a Printer also.
3. Connect Computer by main switch board with a Miniature Circuit Breaker (MCB).
4. Prepare a meter board for lighting and power installation using MCB, energy meter, fuse unit, DP switch, indicators and bus bars.
5. Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.
6. Demonstrate the method to measure Earth Resistance.
7. Perform switching of various electrical devices using IOT.
8. Perform switching of various electrical devices using Mobile Phone.
9. Design and make calculations for establishing Solar panels for lighting purpose using Inverters and Batteries.
10. Design and make calculations for establishing Solar panels to provide a supply to a 5 H.P Submersible pump and VFD drive and other accessories.

EE-510-PROJECT WORK

Course Title	Project Work	Course Code	EE-510
Semester	V	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Course out comes:

The student should be able to

1. Apply principles of Electrical engineering to solve real world problems
2. Demonstrate the knowledge and skills to assess safety, legal issues and consequent responsibilities.
3. To function effectively as an individual and as a member in a team
4. To communicate and collaborate effectively with the team
5. To engage in lifelong learning in the context of technological changes

Sl. No	Subject	Items	Max Marks
1	Project work	CIE	
		1. Mid - I: Abstract submission – (Marks awarded by the Guide)	20
		2. Mid – II: Content development/ literature survey, data collection/prototype etc. - (Marks awarded by the Guide)	20
		3.Internal evaluation - (Marks awarded by the Guide)	20
		SEE	
		4.a) Final report Submission b) Seminar /Viva Voce (Marks awarded by the External Examiner, Head of Section (i.e. Internal Examiner) and Guide).	20 20
Total			100

Note: The Project work carries 100 marks and pass marks are 50% and a minimum of 50% in SEE. Internal assessment is done by guide and external assessment is conducted by guide, head of section and external examiner.

A candidate failing to secure the minimum marks has to reappear for the project.

EE-511- SKILL UPGRADATION

Course title	Skill Upgradation	Course code	EE-511
Semester	V	Course group	Practical
Teaching scheme in periods (L:T:P)	1:0:2	Credits	2.5
Methodology	Lecture + tutorial	Total contact periods	120

Suggested Course Outcomes

CO.1 Address the identified needs of the community collaboratively to facilitate positive social change.

- Prepare a chart related to the topics covered in the present semester.
- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participate in Haritha Haram and submit a small report about the activities.
- Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- Seminar on problems with possible solutions in the campus or nearby places
- Group discussions or enacting a play on topics creating awareness about socio-economic problems
- Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- Participate in NCC

(PO5, 6, 7)

CO.2 Listen attentively to others and respond appropriately

- Listen to expert talk, guest lecture, youtube video and write a summary.
- Participating in Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Participate in quiz on technical aspects or current affairs
- Participate in Mock Interview

(PO5, 7)

CO.3 Adapt your style to the occasion, task, and audience

- Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- Seminar on problems with possible solutions in the campus or nearby places
- Participate in Mock Interview

(PO5, 6, 7)

CO.4 Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.

- a. Prepare a chart related to the topics covered in the present semester.
- b. Refer to an e-journal and submit a summary report on upcoming technologies.
- c. Visit factory / industry and submit a report/PPT on the observations made.
- d. Prepare a mini project and submit report.
- e. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- f. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- g. Seminar on problems with possible solutions in the campus or nearby places
- h. Participate in Mock Interview

(PO5, 6, 7)

CO.5 Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations

- a. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- b. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6, 7)

CO.6 Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.

- a. Participate in Haritha Haram and submit a small report about the activities.
- b. Participate in Swatch Bharath and write an essay on the importance of the program
- c. Participate in NCC

(PO5, 6, 7)

CO.7 Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6, 7)

CO.8 Ability to recognize their strengths and those of others to work towards a shared vision.

- a. Prepare a mini project and submit report.
- b. Participate in Haritha Haram and submit a small report about the activities.
- c. Participate in Swatch Bharath and write an essay on the importance of the program
- d. Participate in NCC

(PO5, 6, 7)

CO.9 Act in alignment with one's own values to contribute to one's life-long growth and learning.

- a. Physical activities such as sports, yoga, meditation and other relaxation techniques

(PO5, 6, 7)

CO.10 Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.

- a. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- b. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- c. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- d. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6, 7)

CO	Outcome	CO/PO Mapping
CO1	Address the identified needs of the community collaboratively to facilitate positive social change.	5, 6, 7
CO2	Listen attentively to others and respond appropriately	5, 6, 7
CO3	Adapt your style to the occasion, task, and audience	5, 6, 7
CO4	Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.	5, 6, 7
CO5	Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations	5, 6, 7
CO6	Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.	5, 6, 7
CO7	Utilize others' ideas, strengths, knowledge, and abilities to foster an inclusive environment & Develop and sustain healthy and meaningful relationships with others	5, 6, 7
CO8	Ability to recognize their strengths and those of others to work towards a shared vision	5, 6, 7
CO9	Act in alignment with one's own values to contribute to one's life-long growth and learning.	5, 6, 7
CO10	Gain, process, and act upon knowledge regarding the effects of individual, community, national, and international level choices on ecosystems and people.	5, 6, 7

Note: The above COs may map to other POs from 1 to 4 apart from PO's 5 to 7 depending on the topic

Suggested Student Activities

1. Prepare a chart related to the topics covered in the present semester.
2. Refer to an e-journal and submit a summary report on upcoming technologies.
3. Visit factory / industry and submit a report/PPT on the observations made.
4. Prepare a mini project and submit report.
5. Listen to expert talk, guest lecture, youtube video and write a summary.
6. Participate in Haritha Haram and submit a small report about the activities.
7. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
8. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
9. Participate in Swatch Bharath and write an essay on the importance of the program
10. Group discussions or enacting a play on topics creating awareness about socio-economic problems

11. Physical activities such as sports, games, yoga, meditation and other relaxation techniques
12. Participate in quiz on technical aspects or current affairs
13. Seminar on problems with possible solutions in the campus or nearby places
14. Participate in NCC
15. Participate in Mock interviews

Note: The above student activities will be assessed using rubrics. A sample rubrics template is given below. The subject teacher can assess students using rubrics with atleast four relevant aspects.

RUBRICS MODEL (For assessing Presentation skills)

Aspects	Needs improvement	Satisfactory	Good	Exemplary
Collection of data	Collects very limited information	Collect much Information with very limited relevance to the topic	Collects some basic information with little bit of irrelevance	Collects a great deal of information with relevance
Presentation of data	Clumsy presentation of data	Presents data well; but presentation needs to be more meaningful	Presents data well but need to improve clarity	Presents data in an understandable yet concise manner
Fulfill team's roles & duties	Performs very little duties but Unreliable.	Performs very little duties and is inactive	Performs nearly all duties	Performs all duties of assigned team roles
Shares work equally	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded
Interaction with other team mates	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening to others	Listens, but sometimes talks too much	Listens and speaks a fair amount
Audibility and clarity in speech	Hardly audible and unclear	Very little audibility and clarity	Audible most of the time with clarity	Audible and clear

Understanding content	Lacks content understanding and is clearly a work in progress	Little depth of content understanding	Some depth of content understanding is evident but needs improvement	Insight and depth of content understanding are evident
Content Presentation	Content is inaccurate and information is not presented in a logical order making it difficult to follow	Content is accurate and information is not presented in a logical order making it difficult to follow	Content is accurate but some information is not presented in a logical order but is still generally easy to follow	Content is accurate and information is presented in a logical order

Suggested additional aspects for assessing Leadership Qualities:

1. Carrying self
2. Punctuality
3. Team work abilities
4. Moral values
5. Communication skills
6. Ensures the work is done in time

Suggested additional aspects for assessing “Participation in social task”

- 1 Interested to know the current situation of society.
- 2 Shows interest to participate in given social task.
- 3 Reliable
- 4 Helping nature
- 5 Inter personal skills
- 6 Ensures task is completed

Suggested additional aspects for assessing “Participation in Technical task”

1. Updated to new technologies
2. Identifies problems in society that can be solved using technology
3. Interested to participate in finding possible technical solutions to identified project
4. Reliable
5. Interpersonal skills

Suggested additional aspects for Carrying Self:

- 1 Stand or sit straight.
- 2 Keep your head level.
- 3 Relax your shoulders.
- 4 Spread your weight evenly on both legs.

- 5 If sitting, keep your elbows on the arms of your chair, rather than tightly against your sides.
- 6 Make appropriate eye contact while communicating.
- 7 Lower the pitch of your voice.
- 8 Speak more clearly.

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2. Punctuality
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C21_ Curriculum

**DIPLOMA IN ELECTRICAL AND ELECTRONICS
ENGINEERING**



OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

EE-601-INDUSTRIAL TRAINING

Course Title:	Industrial Training	Course Code	EE-601
Semester:	VI	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	---	Credits	25
Methodology	Practical	Total Training Period	6 Months

Rationale: Industrial training is introduced in the VI semester for the students as a part of the program to make the passed out students industry ready thus saving the training and apprenticeship needs in the industry and also help in capacity building of the Telangana state and the country.

Course Objective:

To enable the students to

1. Acquaint with Industry environment and culture.
2. Develop professional skills
3. Enhance the usage skills of modern tools
4. Develop Communication and leadership skills.
5. Encourage entrepreneurship

Course Outcomes:

CO	Outcome
CO1	Appreciate the organizational setup and hierarchy
CO2	Practice the use of Resource optimization techniques
CO3	Develop core engineering skills
CO4	Develop an understanding of solutions for Environmental issues in the industry
CO5	Get acquainted to industry culture and professionalism

- **Evaluation and assessment of Industrial Training**, shall be done and marks be awarded in the following manner, provided the candidates concerned have put up minimum 90% attendance of Industrial Training.

Mid-I Industrial assessment at Industry : 300 marks
 Mid-II Industrial assessment at Industry : 300 marks
 Institutional Internal Evaluation : 300 marks
 Semester End Examination : 100 marks
 (Seminar/viva-voce at Institution)

TOTAL 1000 marks

Mid – I & II Industrial Assessment parameters at Industry:

Sl No	Learning Parameter	Assessment I (First Quarter)	Assessment II (Second Quarter)
1	Attendance and punctuality	20	20
2	Familiarity of tools and material	30	30
3	Engineering skills	50	50
4	Application of knowledge & Problem solving skills	50	50
5	Comprehension and observation	10	10
6	Professionalism/Professional ethics	20	20
7	Safety and environmental consciousness	10	10
8	Communication skills	20	20
9	Supervisory skills	50	50
10	General conduct during the period	40	40
Total marks for Industry Evaluation		300	300
		600 marks	

Institutional internal Assessment parameters

Institution Level Evaluation Scheme			
Sl No	Criteria	Marks	Time
1	1 st Report Submission	50	After 8 Weeks
2	Seminar-I	50	9 th to 10 th week
3	2 nd Report Submission	50	After 18 weeks
4	Log book	100	Before Viva-Voce
5	Seminar-II	50	Before Viva-Voce
	Institute Evaluation Total	300	
Semester End Examination			
1	Viva-Voce	50	After 24 weeks
2	Presentation/Demonstration of skills	50	
	Total	100	

- The assessment at the institute level will be done by a minimum of three members i.e. Internal Faculty, Industrial Experts/External Examiner and H.O.D. and the same shall be averaged.

Learning Outcomes

1.0 Observe Safety Precautions and rules of the industry

- 1.1. Know the importance of safety in industries
- 1.2. Understand the safety about personnel protection, equipment protection
- 1.3. Know the usage of various safety devices
- 1.4. Precautionary measures to be taken.

2.0 Appreciate organizational set up from top executive to workmen level

- 2.1. Acquaint with the function of each department/section
- 2.2. Comprehend the inter relationship among various department/sections.

3.0 Observe the end product, various Components/ materials used in the production and identify their source.

- 3.1. Identify the various stages involved in the assembly and production of end product.
- 3.2. List the final products, their composition and its commercial importance, uses and Applications.

4.0. Develop an Understanding of various stages involved in processing, sequential arrangement of different equipment.

- 4.1. Represent the whole process and each sub processes with a flow diagram
- 4.2. Observe and appreciate the resource optimization of space (the arrangement of various equipment and machinery in systematic manner in a less possible area of site), Electricity, Men machinery, money and Time.

5.0 Explain various analytical methods used in the quality control department

- 5.1. Practice the Testing methods for quality assurance and bench mark standards
- 5.2. Practice use of various tools, instruments used for quality checking.

6.0 Observe trouble shooting /servicing /maintenance techniques used during the production

- 6.1. Observe preventive precautions and maintenance of each equipment in the unit
- 6.2. Follow Starting and shutting down procedures for the equipment in the unit.

7.0 Identify the various pollutants emitted from the plant/Industry

- 7.1 State effects of pollutants.
- 7.2 Explain handling methods of E waste and pollutants disposal