

DEEE C-24 COURSE STRUCTURE

I Semester			II semester		III semester		IV Semester		V Semester		VI Semester	
Sub_	Sub_Name	Cred	Sub_	Sub_Name	Sub_	Sub_Name	Sub_	Sub_Name	Sub_	Sub_Name	Sub_	Sub_N
HU-101	Basic English	2.5	HU-201	Advanced English	SC-301	Applied Engineering Mathematics	SC-401	Advanced Engineering Mathematics	EC-501	Entrepreneurship & Startups	EE - 601	Industrial Training (20 credits)
SC-102	Basic Engineering Mathematics	2.5	SC-202	Engineering Mathematics	EC-302	Digital Electronics	EC-402	Microprocessors & Microcontrollers	EE-502	Power Electronics		
SC-103	Basic Physics	2.5	SC-203	Applied Physics	EE-303	DC Machines and Batteries	EE-403	AC Machines	EE-503	AC Motors		
SC-104	General Engineering Chemistry	2.5	SC-204	Applied Engineering Chemistry	EE-304	Electrical Circuits	EE-404	Electrical Estimation & Installation	EE-504	Electrical Utilization and Traction		
EE-105	Electrical Engineering Materials	2.5	CS-205	Programming In C	EE-305	Electrical Power Systems - Generation	EE-405	Electrical Power Systems - T & D	EE-505 A/B	Industrial Motor Controls / Electric Vehicles		
EE-106	Basic Electrical Engineering	2.5	EE-206	Electronic Devices	EE-306	Electrical and Electronic Measuring Instruments	ME-416	Basic Mechanical Engineering	EE-506 A/B	Switchgear and Protection / Advanced Protection of Power Systems		
ME-107	Engineering Drawing-I	1.25	ME-207	Engineering Drawing-II	EC-307	Digital Electronics Lab	EE-407	Electrical Wiring and Installation Lab	EE-507	Power Electronics LAB & P.S LAB		
EE-108	Electrical Workshop Practice	1.25	EE-208	Electronics Devices Lab	EE-308	DC Machines Lab	EE-408	AC Machines Lab	EE-508	A.C Motors LAB		
SC-109	Basic Science Lab	1.25	SC-209	Applied Science Lab	EE-309	Circuits & Measurements Lab	EE-409	CAD Lab	EE-509	Programmable Logic Controllers Lab & Matlab		
CS-110	Computer Fundamentals Lab	1.25	CS-210	Programming In C Lab	HU-310	Communication Skills & Life Skills Lab	HU-410	Employability Skills Lab	EE-510	Project Work		

C24_CURRICULUM

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING



OFFEREDBY

**STATE BOARD OF
TECHNICAL EDUCATION & TRAINING,
TELANGANA: HYDERABAD**

I SEMESTER

S. NO	Course		Teaching Scheme					Examination Scheme						
	Code	Course Name	Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
			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	2.5	20	20	20	40	14	100	35
2	SC-102	Basic Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	35
3	SC-103	Basic Physics	4	1	0	75	2.5	20	20	20	40	14	100	35
4	SC-104	General Engineering Chemistry	4	1	0	75	2.5	20	20	20	40	14	100	35
5	EE-105	Electrical Engineering Materials	4	1	0	75	2.5	20	20	20	40	14	100	35
6	EE-106	Basic Electrical Engineering	4	1	0	75	2.5	20	20	20	40	14	100	35
7	ME-107	Engineering Drawing-I	1	0	2	45	1.25	20	20	20	40	20	100	50
8	EE-108	Electrical Workshop Practice	1	0	2	45	1.25	20	20	20	40	20	100	50
9	SC-109	Basic Science Lab	1	0	2	45	1.25	20	20	20	40	20	100	50
10	CS-110	Computer Fundamentals Lab	1	0	2	45	1.25	20	20	20	40	20	100	50

HU -101-BASIC ENGLISH

Course Title	Basic English	Course Code	HU-101
Semester	I	Course Group	Foundation
Teaching Scheme in Minutes (L:T)	3: 2	Credits	2.5
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 THROUGH READING - I

Duration: 15 Periods (L 9 P 6)

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, phrasal verbs, idiomatic expressions and context for using the word
 - c. Compound words, etymology, synonyms, antonyms and collocations.
2. Synonyms, Antonyms and One-Word Substitutes
3. Reading – I
 - a. Purpose of Reading
 - b. Types of Reading
 - c. Types of Paragraphs and Questions (Factual, Inferential, Vocabulary-based and Experiential)
4. Reading – II

Passages on Innovation, Science and Technology, History, Biography, Travel Writing, Nature Writing, Journal, Story, Process, Cause and Effect, Problem Solution, Evaluation of ideas, Reasons and Conclusion, etc.

MODULE 2: SPEAKING - 1

Duration: 10 Periods (L 6 P 4)

1. Need for English
2. Classroom English
3. Expressing Likes and Dislikes
4. Expressing Feelings

MODULE 3: GRAMMAR - I

Duration: 15 Periods (L 9 P 6)

1. Basic Sentence Structures
2. Tenses-I
3. Tenses-II
4. Voice

MODULE 4: SPEAKING – II

Duration: 10 Periods (L 6 P 4)

1. Introducing Oneself
2. Talking about daily routine
3. Fixing, Cancelling and Rescheduling Appointments
4. Extending, Accepting and Declining Invitations

MODULE 5: GRAMMAR - II

Duration: 15 Periods (L 9 P 6)

1. Adjectives
2. Prepositions
3. Asking Questions –I
4. Asking Questions - II

MODULE 6: WRITING - I

Duration: 10 Periods (L 6 P 4)

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

COURSE OUTCOMES

COs	At the end of the course, the students will have the ability to:
CO 1	Apply newly acquired vocabulary in contextually relevant scenarios, analyze provided passages for comprehension and formulate responses accordingly.
CO 2	Recall the uses of English, construct the frequently used sentences in classroom and express their likes, dislikes and feelings in different contexts.
CO 3	Construct various forms of sentence structures correctly and use different forms of tenses and suitable voice in various contexts.
CO 4	Introduce oneself, discuss one's daily routine, fix appointments and extend invitations.
CO 5	Describe objects using suitable adjectives, select the appropriate prepositions for different contexts and ask dichotomous and informative questions.
CO 6	Convey ideas in the form of paragraphs and compose formal and informal letters.

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
CO 1	-	-	-	-	2	2	2	5, 6 and 7
CO 2	-	-	-	-	2	2	2	5, 6 and 7
CO 3	-	-	-	-	1	3	2	5, 6 and 7
CO 4	-	-	-	-	2	2	3	5, 6 and 7
CO 5	-	-	-	-	1	2	3	5, 6 and 7
CO 6	-	-	-	-	2	2	3	5, 6 and 7

CONTINUOUS INTERNAL EVALUATION (CIE)

Test	Modules	Marks	Pattern
Mid - I	1. Vocabulary Through Reading - I 2. Speaking- I	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 - II	1. Grammar – I 2. Speaking- II	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 - I	1. Vocabulary Through Reading - I 2. Speaking- I	5	2 questions out of 3 questions
Slip Test - II	1. Grammar – I 2. Speaking- II	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	

SEMESTER END EXAMINATION

SEMESTER END EXAM						
Sl. NO.	Module	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			7ssssss, 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.
- Seminars.
- Review a movie.
- Narrate a story.
- Prepare chain stories.
- Vocabulary building games.
- Speak about incidents /events /memories /dreams/role model.
- Interviews of famous personalities.
- Collect the biographies of unsung heroes.
- Reading for main ideas and specific details.
- Describe pictures.
- Collect the letters written by famous persons and analyze them.
- Describing a process.
- Give directions using maps.

REFERENCES:

1. High School English Grammar & Composition by Wren & Martin
2. Practical English Grammar by A.J Thomson and A.V. Martinet
3. A Course in Phonetics and Spoken English by J. Sethi and P.V Dhamija
4. Word Power Made Easy by Norman Lewis.
5. Essential English Grammar by Raymond Murphy.
6. Spoken English-A Self Learning Guide to Conversation Practice by V. Sasi Kumar.

BOARD DIPLOMA EXAMINATION (C-24)
MID SEMESTER EXAMINATION -I
HU-101 BASIC ENGLISH

Time: One Hour

Total Marks: 20

PART - A

1 X 4 = 4 Marks

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

1. Write a sentence each using the following words.
 - a. Report
 - b. Illustrate
2. Find one-word substitute for the following one.

A person who always looks at the brighter side of life.
3. Describe two qualities you dislike in your neighbour.
4. Write how you feel if you get selected for your college cricket team.

PART – B

2 X 3 = 6 Marks

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

5. a) Read the following passage and answer the questions given below:
A dictionary serves as an efficient tool and forms the important reference material as a part of language learning. It provides spelling, pronunciation, stress and different connotations of the words in different contexts. Some dictionaries give etymology and word formation. A dictionary can be general or specialized, translating or giving lexical meanings within a single language. Dictionaries can assist the learning of vocabulary and is especially of great help to students who are learning a language.

- a) What do dictionaries generally provide?
- b) Find a synonym for 'origin of a word' from the passage.
- c) How do dictionaries assist in learning a language?

(OR)

b) Discuss any six ways of learning new vocabulary.

6. a) Explain any three problems one might face while learning English and suggest solutions to each of them.

(OR)

- b) Express any three features you like and three features you dislike in your hostel.

PART – C

2 X 5 = 10 Marks

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

7. a) Read the following passage and answer the questions given below it.

Dreams have always held a universal fascination. Some primitive societies believe that the soul leaves the body and visits the scene of the dream. Generally, dreams are accepted to be illusions, having much in common with day-dreams, the fantasies of our waking life. When dreaming, one tends to believe fully in the reality of the dream world, however inconsistent, illogical, and odd it may be. Although most dreams apparently happen spontaneously, dream activity may be provoked by external influences.

‘Suffocation’ dreams are connected with the breathing difficulties of a heavy cold, for instance. Internal disorders such as indigestion can cause vivid dreams, and dreams of racing fire-engines may be caused by the ringing of an alarm bell. Experiments have been carried out to investigate the connection between deliberately inflicted pain and dreaming. For example, a sleeper pricked with a pin perhaps dreams of fighting a battle and receiving a severe sword wound. Although the dream is stimulated by physical discomfort, the actual events of the dream depend on the associations of the discomfort in the mind of the sleeper.

- a). What may be the cause for the dream of racing fire-engines?
- b). What was the belief of primitive societies about the dreams?
- c). What happens when one is dreaming?
- d). Find a suitable word in the passage for the following phrases. “inability to breathe or feeling uncomfortable due to less air”
- e). What could be the actual reasons for getting dreams?

(OR)

- b) Explain any five features of a new word that you wish to learn with the help of a dictionary. Give an example of each of those features.

8. a) Identify any ten problems that you face while learning English.

(OR)

- b) Express any ten common sentences used by the teacher in the classroom.

BOARD DIPLOMA EXAMINATION (C-24)
MID SEMESTER EXAMINATION -II
HU-101 BASIC ENGLISH

Time: One Hour

Total Marks: 20

PART - A

1 X 4 = 4 Marks

Instructions: a) Answer all the questions.

b) Each question carries one mark.

1. Write a sentence for the following sentence structure.
a) S + V
2. Change the following sentence into passive voice.
a) Pranav ate a mango.
3. Write a sentence for fixing an appointment with a general physician.
4. How do you invite your friend to play cricket with your team.

PART-B

2 X 3 = 6 Marks

Instructions: a) Answer all the questions.

b) Each question carries three marks.

5. a) Fill in the blanks with the suitable verb forms:
i) My father _____(watch) TV when I entered house.
ii) Jahnavi _____ (go) to railway station before I went home.
iii) My brother _____(be) a good cricket player.
(OR)
5. b) Change the following sentences into passive voice.
a) He plays cricket
b) Ramya has bought vegetables.
c) Balu is singing songs.
6. a) You have recently joined the cricket academy. Introduce yourself to your new friends.
(OR)
6. b) You have an appointment with a general surgeon. Cancel the appointment with the doctor as you are suffering from fever.

PART-C

2 X 3 = 6 Marks

Instructions: *a) Answer all the questions.*

b) Each question carries five marks.

7. a) Fill in the blanks with the suitable verb forms:

- i) My father _____(go) for a walk every day.
- ii) My sister _____ (buy) a book yesterday.
- iii) My brother _____(play) cricket for three hours.
- iv) The stars _____(be) bright.
- v) I _____(finish) my homework just now.

(OR)

7. b) Write a sentence each for the following sentence structures.

- a) S + V + SC
- b) S + V + O
- c) S + V + O + O C
- d) S + V
- e) S + V + D O + I O

8. a) Write about your daily routine in 10 sentences.

(OR)

8. b) Your brother's wedding is fixed. Extend the invitation to your favorite teacher.

Write a conversation between you and your teacher.

BOARD DIPLOMA END EXAMINATION (C-24)
SEMESTER END EXAMINATION
HU-101 BASIC ENGLISH

Time: Two Hours

Total Marks: 40

PART-A

1 X 8 = 8 Marks

Instructions: a) *Answer all the questions.*

b) *Each question carries one mark.*

1. Write an antonym for the underlined word in the following sentence.
a) Ramya is a generous person who supported many charities for over 20 years.
2. Write a sentence using the following sentence structure.
a) S + V + O
3. Make 'Yes/No' question using the following statement.
a) He has come to college today.
4. A student does not know the meaning of a difficult word. How does he / she ask the teacher?
5. Fill in the blank with a suitable preposition.
a) He came to college _____ foot.
6. Identify the adjectives in the following sentences.
a) Srinivas has a costly watch.
b) Pavani sold a small bag to Radha.
7. Write any two salutations generally used in the formal letter.
8. Identify the central idea of the following paragraph.

An anecdote is a quick story about something of interest, usually with a singular theme or lesson. Anecdotes are no different than the stories told among friends, but when they're used in literature, they can accomplish more than merely passing the time.

PART-B

3 X 4 = 12 Marks

Instructions: a) Answer all the questions.

b) Each question carries three marks.

9. a) How do you feel in the following situations?

- i. India won the cricket world cup.
- ii. Your friend's grandmother passed away yesterday
- iii. Your sister did not return from college until late evening.

(OR)

b) Describe your friend using six suitable adjectives.

10. a) Change the following sentences into passive voice.

- i. Bees make honey.
- ii. Prasad stole my calculator.
- iii. I will complete my assignment tomorrow.

(OR)

b) Write a paragraph on your polytechnic in 50 words.

11. a) Change the following sentences into 'Wh' questions using the hints given in brackets

- i. I bought a camera yesterday. (Use 'what')
- ii. He was born in Sircilla on 28th December, 2002 (Use 'when')
- iii. He went to Hyderabad to buy books. (Use 'why').

(OR)

b) Fill in the blanks with suitable prepositions.

- i. He is suffering _____ fever.
- ii. His grandmother died _____ Covid-19.
- iii. He is good _____ mathematics.

12. a) Write a letter to your Principal requesting him / her to permit you to participate in the National seminar to be conducted in New Delhi.

(OR)

b) Write a paragraph in 50 words about your fresher's day party.

PART-C

4 X 5 = 20 Marks

Instructions: a) Answer all the questions. b) Each question FIVE mark.

13. a) Write any of the five aspects of learning a new word.

(OR)

b) Read the following passage and answer the questions given below.

I just returned from the greatest summer vacation. It was so fantastic. I never wanted it to end. I spent eight days in Paris. My best friends, Harish and Umesh came with me. We had a beautiful hotel room in the Latin Quarter, and it wasn't even expensive. We had a balcony with a wonderful view.

We visited many famous tourist places. My favorite was the Louvre, a well-known museum. I was always interested in art, so that was a special treat for me. The museum is so huge; you could spend weeks there. Harish got tired walking around the museum and said "Enough! I need to take a break and rest."

We took lots of breaks and sat in cafes along the river Seine. The French food we ate was delicious. The fruits were tasty too. Umesh's favorite part of the vacation was the hotel breakfast. He said he would be happy if he could eat tartines like those forever. We had so much fun that we're already talking about our next vacation!

- a) Which city did they visit for summer vacation?
- b) How long was the summer vacation?
- c) What did their hotel room have?
- d) Who got tired walking in the Louvre Museum?
- e) What did Umesh enjoy the most?

14. a) Write your mother's daily routine in 100 words.

(OR)

b) Write a letter to the newspaper editor about the problem of street dogs in your colony.

15. a) Frame two 'Yes/No' questions and three 'Wh' questions from the following passage.

For a year Gopal Krishna Gokhale studied in the Deccan College, Poona. Then he went to Elphinstone College, Bombay, for his final B.A. There he took mathematics as an optional subject and eventually became interested in it. He came under the influence of a distinguished English professor who further quickened his interest in his studies. Under this professor's guidance he made so much progress that he gained a scholarship of twenty rupees a month. It was not a small sum for him who had always been poor. The scholarship was a veritable boon to him made him very happy.

In 1884 he took his B.A. in the second division. He then joined the College of Science and Engineering at Poona. A short time after doing so, he learnt that he could study law in the Deccan College. But he did not know how to do it, because he wanted to earn his living while he was a student. Soon an opening offered itself to him. He was appointed a teacher in the New English School, Poona, on thirty-five rupees a month. He made up his mind to take the law course while working as a teacher.

(OR)

- b) Describe your mobile phone using at least ten adjectives in 100 words.

16. a) Write a paragraph on different types of pollution in 100 words.

(OR)

- b) Write a letter to your school friend sharing your experiences at your polytechnic.

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	2.5
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 the problems using concepts of Logarithms and Partial fractions.
CO 2	Determine the Inverse of a square matrix using Algebra of Matrices and Determinants.
CO 3	Solve the problems using the concept of Trigonometric ratios of Allied and Compound angles
CO 4	Solve the problems using the concepts of Multiple and sub-multiple angles; and Transform sum or difference of Trigonometric ratios into products and vice versa.
CO 5	Solve the engineering problems involving Inverse Trigonometric functions and understand the Properties of Triangles.
CO 6	Solve the triangle ABC to Apply the Properties of triangles; and solve the system of linear equations that arise in various engineering problems using the concept of Matrices and Determinant

Course Content:

Unit – I Algebra:

Duration: 10 Periods (L: 08– T: 02)

Logarithms: Definition of Logarithm and its properties - Natural and Common Logarithms - Meaning of e - Exponential functions - Logarithm as a function and its graphical representation – Solve simple Problems related to Logarithms.

Partial Fractions: Rational, Proper and Improper fractions of polynomials- Reduction of Improper fractions into Proper fractions of polynomials - Resolving Rational fractions into their Partial fractions covering the types mentioned below:

- (i) $\frac{f(x)}{(x \pm a)(x \pm b)}, a \neq b$; (ii) $\frac{f(x)}{(x \pm a)(x \pm b)(x \pm c)}, a \neq b \neq c$;
 (iii) $\frac{f(x)}{(x \pm a)^2}$; (iv) $\frac{f(x)}{(x \pm a)^2(x \pm b)}, a \neq b$;
 (v) $\frac{f(x)}{(x \pm a)(x^2 \pm bx \pm c)}$, where a, b , and c , are constants and $(x^2 \pm bx \pm c)$ cannot be factorised.

Unit – II Matrices and Determinants:

Duration: 15Periods (L: 12 – T:03)

Matrices: Definition of Matrix-order Of Matrix-Type of Matrices with examples - Algebra of matrices: sum, difference, scalar multiplication and product of Matrices - Equality of two matrices- Properties of Algebra of Matrices - Transpose of a Matrix-Symmetric and Skew-Symmetric Matrices.

Determinants: Determinant of a square Matrix of order 2×2 - Determinant of a square Matrix of order 3×3 by using Laplace's expansion -Properties of Determinants -Singular and non-singular Matrices- Minor and cofactor of an element of a square matrix - Adjoint of a square matrix- Multiplicative inverse of a square matrix.

Unit-III Trigonometry – I

Duration: 12Periods (L: 10 – T: 02)

Trigonometric Ratios of Allied Angles: Angle measurement- Relation between Degree and Radian-Notational conversions- Trigonometric Ratios-Trigonometric identities (statements only)-Signs of Trigonometric Ratios in different quadrants - Trigonometric Ratios of standard Allied angles- Related problems.

Compound Angles: Definition of Compound angles -Trigonometric Ratios of Compound angles (without proof) and identities - Related problems.

Unit-IV Trigonometry – II

Duration:13 Periods (L: 10 – T: 03)

Multiple and sub-multiple angles: Trigonometric Ratios of Multiple angles $2A$ and $3A$ - Trigonometric Ratios of Sub-multiple angle $(\frac{A}{2})$ - Related identities and problems.

Transformations: Transformation of products into sums or differences and vice versa - Trigonometric identities under the conditions $(A + B + C) = 90^\circ$ and $(A + B + C) = 180^\circ$ -Related problems only

Unit – V Trigonometry – III**Duration: 12Periods (L: 10– T: 02)**

Inverse Trigonometric Functions: Basic concepts of Inverse Trigonometric functions along with their domains and ranges -Properties of inverse Trigonometric functions and identities - Related problems.

Properties of Triangles: Elements of a Triangle -Sine rule -Cosine rule - Projection rule - The law of tangents -Related problems.

Unit - VI Applications of Trigonometry and Matrices:**Duration: 13Periods (L: 10– T:03)**

Solutions of Triangles: Solutions of triangles in the following cases: (i) when three sides (SSS) (ii) when two sides and an included angle (SAS) and (iii) when one side and two angles (SAA) are given..-Simple problems

Solutions of system of Simultaneous Linear Equations using Matrices and Determinants:

Solutions of system of simultaneous two linear equations in two unknown variables and three linear equations in three unknown variables by using Cramer's rule and Matrix Inversion Method -Elementary Row operations - Solutions of system of three simultaneous linear equations in three unknown variables by using Gauss-Jordan Method.

Reference Books:

1. Text Book of Matrices – by Shanti Narayan and Dr. P. K. Mittal.
2. Plane Trigonometry - by S.L.Loney.
3. NCERT Mathematics Text Books of Class XI, XII (Part – I).
4. Intermediate Mathematics Text Book I A (Telugu Academy).

Suggested E-Learning references:

- 1.<https://www.khanacademy.org/>
2. <https://www.wolframalpha.com/>
3. <https://onlinecourses.nptel.ac.in/>
4. <http://tutorial.math.lamar.edu/>

Suggested Learning Outcomes:

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

CO1: Solve the problems using concepts of Logarithms and Partial fractions.

- 1.1 Define Logarithm.
- 1.2 Distinguish Natural Logarithms and Common Logarithms.
- 1.3 State Properties of Logarithms.
- 1.4 Explain the meaning of e and Exponential functions.
- 1.5 Define Logarithm as a function and explain its graphical representation.
- 1.6 Simplify Logarithmic expressions in engineering problems by using Properties of Logarithms.
- 1.7 Solve Logarithmic Equations by using Properties of Logarithms.
- 1.8 Define the Rational fraction of polynomials with examples.
- 1.9 Classify Rational fractions of polynomials
- 1.10 Define Proper rational fraction of polynomials with examples.
- 1.11 Define Improper rational fraction of polynomials with examples.
- 1.12 Reduce Improper rational fractions into the Proper rational fractions by using division method.
- 1.13 Resolve Rational fractions of the type: $\frac{f(x)}{(x \pm a)(x \pm b)}$ into Partial fractions, where a and b are Constants with $a \neq b$.
- 1.14 Resolve Rational fractions of the type: $\frac{f(x)}{(x \pm a)(x \pm b)(x \pm c)}$ into Partial fractions, where a , b and c are constants with $a \neq b \neq c$.
- 1.15 Resolve Rational fractions of the type: $\frac{f(x)}{(x \pm a)^2}$ into Partial fractions, where a is constant
- 1.16 Resolve Rational fractions of the type: $\frac{f(x)}{(x - a)^2(x - b)}$ into Partial fractions, where a and b are constants with $a \neq b$.
- 1.17 Resolve Rational fractions of the type: $\frac{f(x)}{(x \pm a)(x^2 \pm bx \pm c)}$ into Partial fractions, where a , b And c are constants and $(x^2 \pm bx \pm c)$ cannot be factorised further.

CO2: Determine the Inverse of a square matrix using Algebra of Matrices and Determinants.

- 2.1 Define Matrix.
- 2.2 Classify the types of Matrices with examples.
- 2.3 Define Equality of two Matrices
- 2.4 Compute the sum of two Matrices.
- 2.5 Compute the difference of two Matrices.
- 2.6 Compute the scalar multiplication of a Matrix.
- 2.7 Compute the product of two Matrices.
- 2.8 State the properties of Algebra of Matrices such as Commutative, Associative, Identity and Distributive properties with examples and counter examples.
- 2.9 Define Transpose of a Matrix and write its properties.
- 2.10 Define Symmetric and Skew-symmetric Matrices with examples.
- 2.11 Resolve a Square Matrix into a sum of Symmetric and Skew-symmetric Matrices with examples.
- 2.12 Expand the Determinant of a square of order 2×2 .
- 2.13 Expand the Determinant of a square of order 3×3 using Laplace's expansion.
- 2.14 State the Properties of Determinants.
- 2.15 Apply the Properties of Determinants to solve the problems.
- 2.16 Distinguish Singular and Non-singular Matrices.
- 2.17 Define minor and co-factor of an element of square Matrices of orders 2×2 and 3×3 with examples.
- 2.18 Compute Adjoint of a square Matrices of orders 2×2 and 3×3 .
- 2.19 Compute multiplicative inverse of non-singular square matrices of orders 2×2 and 3×3 .

CO3: Solve the problems using the concept of Trigonometric ratios of Allied and Compound angles

- 3.1 Define Trigonometric ratios.
- 3.2 State Trigonometric identities.
- 3.3 Define Degree measure and Radian measure.
- 3.4 State the relation between Degree and Radian.
- 3.5 Convert Degree into Radian and vice-versa and related problems.
- 3.6 State signs of the Trigonometric ratios in different quadrants.
- 3.7 Formulate Trigonometric ratios of standard Allied angles i.e. $(90^\circ \pm \theta)$, $(180^\circ \pm \theta)$, $(270^\circ \pm \theta)$, $(360^\circ \pm \theta)$ and $(-\theta)$.
- 3.8 Solve the problems on Trigonometric ratios of Allied angles.
- 3.9 State the Trigonometric ratios of compound angles i.e. $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ And $\cot(A \pm B)$.
- 3.10 Derive the identities i.e., $\sin(A+B) \cdot \sin(A-B) = \sin^2 A - \sin^2 B$, etc.,).
- 3.11 Calculate the values of $\sin 15^\circ$, $\cos 15^\circ$, $\tan 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 75^\circ$ etc., by using 3.9
- 3.12 Solve the problems by applying 3.9 and 3.10.

CO4: Solve the problems using the concepts of Multiple and sub-multiple angles; and Transform sum or difference of Trigonometric ratios into products and vice versa.

- 4.1 Derive the formulae for Trigonometric ratios of multiple angles $2A$ and $3A$.
- 4.2 Derive the formulae for Trigonometric ratios of sub multiple angle $\frac{A}{2}$.
- 4.3 Derive useful identities i.e. $\sin^2 A = \left(\frac{1-\cos 2A}{2}\right)$, $\cos^2 A = \left(\frac{1+\cos 2A}{2}\right)$ etc..
- 4.4 Solve the problems by using 4.1, 4.2 and 4.3
- 4.5 Derive the formulae on transforming sum or difference of two Trigonometric ratios into a product and vice versa.
- 4.6 Solve the problems by applying 4.5.
- 4.7 Prove the Trigonometric identities under the conditions $(A + B + C) = 90^\circ$ and $(A + B + C) = 180^\circ$. only

CO5: Solve the engineering problems involving Inverse Trigonometric functions and understand the Properties of Triangles.

- 5.1 Explain the concept of the inverse Trigonometric function by selecting their domains and ranges
- 5.2 List the Inverse Trigonometric functions along with domain and range.
- 5.3 State the properties of Inverse Trigonometric functions.
- 5.4 Derive the Inverse Trigonometric identities i.e. $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ etc
- 5.6 Derive formulae like $\tan^{-1}(x) + \tan^{-1}(y) = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ where $x \geq 0, y \geq 0, xy < 1$ etc.,
- 5.5 Solve the simple problems
- 5.6 List the elements of a triangle.
- 5.7 Explain the Sine rule, Cosine rule, Projection rule and the law of tangents.
- 5.8 Solve the problems using 5.7

CO6: Solve the triangle ABC to Apply the Properties of triangles; and solve the system of linear equations that arise in various engineering problems using the concept of Matrices and Determinant.

- 6.1 Solve the Triangle ABC, when three sides are given.
- 6.2 Solve the Triangle ABC, when two sides and an included angles are given.
- 6.3 Solve the Triangle ABC, when one side and two angles are given.
- 6.4 Solve the system of two linear equations in two unknown variables using Cramer's rule.
- 6.5 Solve the system of three linear equations in three unknown variables using Cramer's rule.
- 6.6 Solve the system of two linear equations in two unknown variables using Matrix Inversion Method
- 6.7 Solve the system of three linear equations in three unknown variables using Matrix Inversion Method.
- 6.8 State elementary row operations.
- 6.9 Solve the system of three linear equations in three unknowns by Gauss- Jordan Method.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Group Tests
5. Formulae Tests
6. Surprise tests
7. Seminars
8. Home Assignments.
9. 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	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	2				3	1, 2 ,3,7
CO6	3	2	2				3	1, 2, 3, 7

Semester End Examination

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 & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-102

SEMESTER I, MID – I EXAM, MODEL PAPER
BASIC ENGINEERING MATHEMATICS

Duration: 1: 00 Hour

Max. Marks: 20

PART-A

04 × 01 = 04

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

1. Write $\log 21 + \log 5$ as a single Logarithm.
2. Define Proper fraction.
3. If $I = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$ then find I^2 .
4. If $A = \begin{pmatrix} \sin \theta & \cos \theta \\ -\cos \theta & \sin \theta \end{pmatrix}$, then find the value of $|A|$.

PART-B

02 × 03 = 06

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

5(a) Find the value of $\log_{\frac{1}{3}} \left(\frac{1}{9} \right)$.

OR

5(b) If $\frac{3x-1}{(x-2)(x-3)} = \frac{-5}{(x-2)} + \frac{A}{(x-3)}$, then find the value of A.

6(a) If $A = \begin{pmatrix} 2 & 3 \\ 4 & 1 \end{pmatrix}$, then find AA^T .

OR

6(b) If $\begin{vmatrix} 4 & 3 & P \\ 5 & 3 & 1 \\ 2 & 1 & 6 \end{vmatrix} = 0$, then find the value of “P”.

PART C

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

$$02 \times 05 = 10$$

7(a) Resolve $\frac{2x}{(x+1)(x^2+1)}$ into Partial fractions.

OR

7(b) Find the value of x , if $\log_4(x) + \log_4(x - 12) = 3$.

8(a) If $A = \begin{pmatrix} 1 & 2 & -1 \\ 3 & 0 & 2 \\ 4 & 5 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix}$, then verify that $(AB)^T = B^T A^T$.

OR

8(b) Find the inverse matrix of $A = \begin{pmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{pmatrix}$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-102

SEMESTER I, MID – II EXAM, MODEL PAPER
BASIC ENGINEERING MATHEMATICS

Duration: 1: 00 Hour

Max. Marks: 20

PART-A

04 × 01 = 04

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

1. Find the value of $\sin\left(\frac{3\pi}{2}\right)$.
2. If $\tan \theta = \frac{-3}{4}$, θ lies in the second quadrant then find the value of $\cos 2\theta$.
3. Write the formula for $\sin 3A$.
4. Express $2 \sin 7\theta \sin 3\theta$ as a sum/difference.

PART-B

02 × 03 = 06

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

- 5(a) If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then find $\tan (A - B)$.

OR

- 5(b) Show that $\frac{\cos 19^\circ - \sin 19^\circ}{\cos 19^\circ + \sin 19^\circ} = \tan 26^\circ$.

- 6(a) Prove that $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$.

OR

- 6(b) Prove that $\frac{1 + \cos 2\theta}{\sin 2\theta} = \cot \theta$.

PART C

02 × 05 = 10

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

- 7(a) Prove that $\cos A + \cos(120^\circ + A) + \cos(120^\circ - A) = 0$.

OR

- 7(b) Evaluate $\sum \frac{\sin(A+B) \sin(A-B)}{\cos^2 A \cos^2 B}$.

- 8(a) If $A + B + C = \frac{\pi}{2}$, then prove that $\cot A + \cot B + \cot C = \cot A \cot B \cot C$.

OR

- 8(b) Prove that $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-102

SEMESTER I, END SEMESTER EXAM, MODEL PAPER

BASIC ENGINEERING MATHEMATICS

Duration: 2:00 Hours

Max. Marks: 40

PART-A

Instructions: 1. Answer **ALL** questions.

08 × 01 = 08

2. Each question carries **ONE** mark.

1. Define Natural Logarithm.
2. Find the value of $\cos(-510^\circ)$.
3. Write the value of $\sin^{-1}(\theta) + \cos^{-1}(\theta)$.
4. List the elements of a triangle.
5. State the law of tangents.
6. Find the value of $\cos(\cos^{-1}(30^\circ))$.
7. Write the augmented matrix of the system of equations $3x + 2y - z = 4, 2x - 3y + 5z = 7$ and $x - y + z = 3$.
7. What is the formula for the solution of triangle ABC when two sides and an included angle are given?

PART-B

Instructions: 1. Answer All question.

04 × 03 = 12

2. Each question carries **THREE** marks.

9(a) Resolve $\frac{1}{(x+9)(x+7)}$ into partial fractions.

OR

9(b) Prove that $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{1}{2}\right)$.

10 (a) Prove that $\frac{\cos(A-B)}{\cos A \sin B} = \tan A + \cot B$.

OR

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

11(a) In any triangle ABC, show that $\sin A + \sin B + \sin C = \frac{s}{R}$.

OR

11(b) Prove that $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$.

12(a) Using the method of determinants find the value of x from $x + y + z = 2, x + 2y + 3z = 1$ and $3x + y - 5z = 4$.

OR

12(b) In any triangle ABC find the side c , if $a = 2, A = 30^\circ$ and $C = 60^\circ$.

PART C

Instructions: 1. Answer All questions

04 × 05 = 20

2. Each question carries **FIVE** marks

13(a) Resolve $\frac{2x}{x^2 + 2x + 1}$ into partial fractions.

OR

13(b) If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, then prove that $x + y + z = xyz$.

14(a) If $\cos x + \cos y = \frac{1}{3}$ and $\sin x + \sin y = \frac{1}{4}$, then find $\tan\left(\frac{x+y}{2}\right)$.

OR

14(b) Solve the triangle ABC, with $a = 2, b = \sqrt{2}, c = \sqrt{3} + 1$.

15(a) If $\cos^{-1} \frac{x}{a} + \cos^{-1} \frac{y}{b} = \theta$, then show that $\frac{x^2}{a^2} - \frac{2xy}{ab} \cos \theta + \frac{y^2}{b^2} = \sin^2 \theta$.

OR

15(b) Show that $\sum a \sin(B - C) = 0$.

16(a) Solve the system of simultaneous equations $x + 2y - z = -3$, $3x + y + z = 4$ and $x - y + 2z = 6$ by using Gauss-Jordan method.

OR

16(b) Using Matrix inversion method, solve the system of simultaneous equations $x + y + z = 6$, $x - y + z = 2$ and $2x + y - z = 1$.

SC-103-BASIC PHYSICS

Course Title:	Basic Physics	Course Code :	SC-103
Semester:	I Semester	Course Group :	Foundation
Teaching Scheme in Periods(L:T:P):	4:1:0	Credits :	2.5
Type of Course :	Lecture+ Tutorials	Total Contact Periods:	75 Periods
CIE :	60 Marks	SEE :	40 Marks

Pre requisites

This course requires the basic knowledge of Science and Mathematics

Course Outcomes

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

CO1	Identify the need of dimensional analysis and error measurements of physical quantities.
CO2	Apply vector concepts viz addition, multiplication to explain resultant of vectors, work done by force, power, torque and areas of triangle and parallelogram.
CO3	Analyze the kinematic equations for projectiles and objects moving on horizontal and inclined frictional surfaces.
CO4	Make use of the fundamental properties elasticity, surface tension and viscosity of solids and fluids to solve problems in mechanics.
CO5	Develop the knowledge associated with laws of conservation of energy and Renewable Energy sources such as Solar energy and Wind energy for sustainable environment.
CO6	Utilize the principles of thermal expansion to explain thermostat and identify the significance of laws of thermodynamics.

	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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	1	-	-	-	-	2	1,2,7
CO2	3	1	-	-	-	-	2	1,2,7
CO3	3	-	-	-	1	-	2	1,5,7
CO4	3	1	-	-	1	-	2	1,2,5,7
CO5	3	-	-	-	1	-	2	1,5,7
CO6	3	-	-	1	-	-	2	1,4,7

Course contents:

Unit 1 Units, Dimensions and Measurements

Duration: 12 periods (L:10 – T:2)

Physical quantity, Fundamental and derived quantities, unit-definitions- SI units -Advantages of S.I. units, Dimensions and dimensional formula - units and dimensional formulae for physical quantities - Dimensionless quantities - Principle of homogeneity –numerical problems, Applications of dimensional analysis -problems- Limitations of dimensional analysis –accuracy, precision of instruments, Errors in measurement.

Unit 2 Vectors

Duration: 13 periods (L:10 – T:3)

Scalar and Vector quantities – definition and examples, Graphical representation of a vector, Classification of vectors - numerical problems. Triangle law of vectors, 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 terms of unit vectors $\hat{i}$, $\hat{j}$ and $\hat{k}$ – numerical problems. Scalar product of vectors- application to work done by a force and power – properties of scalar product – Numerical problems. Vector product of vectors– application to torque –areas of triangle and parallelogram -properties of vector product - numerical problems.

Unit 3 Mechanics

Duration: 13 periods (L:10 – T:3)

Equations of motion in a straight line, acceleration due to gravity, equations of motion in vertical motion, Projectile motion of a body- examples, Oblique projection-expression for path of a projectile-derivation-Maximum height, Time of ascent, Time of descent, Time of flight, Horizontal range and maximum horizontal range of a projectile in oblique projection - related numerical problems

Friction – causes-types- Normal reaction, angle of repose and coefficient of friction-laws of static friction, expression for acceleration, displacement and time taken to come to rest by a body on a rough horizontal surface –derivation-numerical problems, expressions for acceleration of a body on a rough inclined surface - advantages and disadvantages of friction, methods of minimizing friction.

Unit 4 Properties of Matter

Duration: 12 periods ((L:10 – T:2)

Elasticity and elastic bodies-definition- examples, Stress and Strain-expressions-numerical problems, types of stress and strain, Elastic limit-definition, Hooke's law, stress and strain curve, Young's modulus of a wire – derivation-numerical problems, Cohesive and Adhesive forces, Surface tension- explanation and illustrations, capillarity and angle of contact-definitions, formula for determination of surface tension of a liquid based on capillary rise method – outline and related numerical problems, effect of temperature and impurity on surface tension of a liquid, Viscosity-explanation- Newton's formula for viscous force-derivation- coefficient of viscosity-numerical problems- Poiseuille's equation for coefficient of viscosity- related numerical problems, effect of temperature on viscosity of liquids and gases, importance of viscosity in lubricants.

Unit 5 Work and Energy

Duration: 12 periods (L:10 – T:2)

Work, Power and Energy-explanation-numerical problems, Potential energy and Kinetic energy-explanation- examples, expressions for Potential energy and Kinetic energy and related numerical problems, Work-Energy theorem – statement-proof-related numerical problems, law of conservation of energy-statement-examples-proof in case of a freely falling body - solve related numerical problems, law of conservation of energy in the case of simple pendulum, Non-renewable and Renewable energy sources-explanation- sources, Solar water heater and Wind mill.

Unit 6 Thermal Physics

Duration: 13 periods (L:10 – T:3)

Transmission of heat -Thermal expansion of solids and three coefficients of expansion of solids – applications, thermal conductivity of a solid – expression, principle of bimetallic strip, bimetallic thermostat, Boyle’s law in gases –explanation- its limitations-related numerical problems, concept of Absolute Zero, Absolute scale of temperature, Charles’ laws in gases in terms of absolute temperature – related numerical problems, Ideal gas equation-derivation- related numerical problems, gas equation in terms of density- solve related numerical problems, Isothermal and Adiabatic processes, internal energy and external work done – explanation, expression for work done by the gas –derivation- related numerical problems, 1st law of thermodynamics-explanation-list of applications, first law of thermodynamics to isothermal and adiabatic processes, 2nd law of thermodynamics –explanation- list of applications

Reference Books

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. Intermediate Physics, Telugu Academy, TS, Hyderabad.
4. Fundamentals of Physics by Halliday and Resnick.
5. Physics Part-I & II, NCERT

E-learning resources:

Hyper Physics website:

<http://hyperphysics.phy-astr.gsu.edu/>

Learning Outcome:

Upon completion of this course the student will be able to

CO1: Identify the need of dimensional analysis and error measurements of physical quantities.

- 1.1 Define Physical quantity, Fundamental quantity, derived physical quantity and Unit.
- 1.2 List SI units of fundamental physical quantities with their symbols (Base and Supplementary quantities).
- 1.3 Outline advantages of S.I. units.
- 1.4 Define Dimensions and Dimensional formula of a physical quantity.
- 1.5 List SI units and dimensional formulae of physical quantities (Area, Volume, Density, Velocity, Acceleration, Momentum, Impulse, Force, Work, Energy, Power, Pressure, Stress, Modulus of Elasticity, Angular velocity, Torque, Frequency, Surface Tension, Coefficient of viscosity, Universal Gravitational constant, Wavelength, Planck's constant)
- 1.6 List dimensionless quantities.
- 1.7 Explain principle of homogeneity of dimensions and solve related numerical problems (finding dimensions of terms in an equation).
- 1.8 List applications of dimensional analysis and solve problems
 - (1) Correctness of physical equations
 - (i) Displacement $S = ut + \frac{1}{2}at^2$
 - (ii) Velocity of sound in elastic medium $v = \sqrt{\frac{E}{d}}$ and
 - (iii) Work done by a gas $W = P(V_2 - V_1)$
 - (2) Conversion of a unit from SI to CGS (density, force and energy).
 - (3) Construct a relation between physical quantities. (Time period of simple pendulum $T = 2\pi\sqrt{\frac{l}{g}}$)
- 1.9 List the limitations of dimensional analysis.
- 1.10 Explain error, absolute error and percentage error of a physical quantity. Solve numerical problems on percentage error.

CO2: Apply vector concepts viz addition, multiplication to explain resultant of vectors, work done by force, power, torque and areas of triangle and parallelogram.

- 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 vectors, Parallel vectors, Negative vector, Unit vector, Null vector, Collinear vectors, Coplanar vectors and Position vector).
- 2.4 Explain resolution of a Vector into two orthogonal components and solve related numerical problems.
- 2.5 Explain Triangle law of vectors.
- 2.6 Explain Parallelogram law of vectors and develop expressions for magnitude and direction of resultant of two vectors and solve related numerical problems.
- 2.7 Illustrate parallelogram law of vectors (working of sling and flying bird).
- 2.8 Explain a vector in terms of unit vectors ($\hat{i}, \hat{j}, \hat{k}$) and solve related numerical problems on finding magnitude and unit vector.
- 2.9 Explain Scalar product of two vectors and solve numerical problems.
- 2.10 Construct expressions for work done ($W = \vec{F} \cdot \vec{S}$) and power ($P = \vec{F} \cdot \vec{v}$) in vector notation starting from force and solve related numerical problems.
- 2.11 Identify the properties of scalar product.
- 2.12 Explain vector product of two vectors and solve related numerical problems.
- 2.13 Construct an expression for torque in vector notation ($\vec{\tau} = \vec{r} \times \vec{F}$) starting from force and position vector and solve numerical problems.
- 2.14 Outline the expressions for areas of triangle and parallelogram in vector notation and solve numerical problems.
- 2.15 Identify the properties of vector product.

CO3: Analyze the kinematic equations for projectiles and objects moving on horizontal and inclined frictional surfaces.

- 3.1 Outline the equations of motion in a straight line.
- 3.2 Explain acceleration due to gravity and extend the equations of motion to freely falling body and body projected vertically upward.
- 3.3 Explain projectile motion of a body with examples.
- 3.4 Develop the expression for path of a projectile in oblique projection.
- 3.5 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 and solve related numerical problems.
- 3.6 Explain friction and causes of friction.
- 3.7 Classify types of friction.

- 3.8 Explain the concept of Normal reaction, Angle of repose and Coefficient of friction.
- 3.9 Outline the laws of Static friction.
- 3.10 Develop the expression for acceleration of a body on a rough horizontal surface and solve simple numerical problems on $a = -\mu g$ and $F = \mu R$
- 3.11 Develop the expressions for displacement and time taken to come to rest by a body over a rough horizontal surface and solve simple numerical problems on $s = \frac{u^2}{2\mu g}$ and $t = \frac{u}{\mu g}$
- 3.12 Develop the expressions for acceleration of a body on a rough inclined surface (moving upward and sliding downward)
- 3.13 Outline the advantages and disadvantages of friction.
- 3.14 Identify the methods of minimizing friction.

CO4: Make use of the fundamental properties elasticity, surface tension and viscosity of solids and fluids to solve problems in mechanics.

- 4.1 Define Elasticity and elastic bodies with examples.
- 4.2 Explain Stress and Strain with their expressions and solve related numerical problems.
- 4.3 Explain types of stress and strain (longitudinal, shear and bulk).
- 4.4 Define Elastic limit and explain Hooke's law.
- 4.5 Explain stress and strain curve of a metallic wire.
- 4.6 Develop a formula for Young's modulus of a wire having circular cross-sectional area and solve related numerical problems.
- 4.7 Compare Cohesive and Adhesive forces.
- 4.8 Explain Surface tension and illustrate Surface tension with examples.
- 4.9 Explain capillarity and angle of contact.
- 4.10 Outline the formula for determination of surface tension of a liquid based on capillary rise method with legible diagram (no derivation $T = \frac{hr\rho g}{2 \cos\theta}$) and solve related numerical problems.
- 4.11 Explain the effect of temperature and impurity on surface tension of a liquid.
- 4.12 Explain Viscosity.
- 4.13 Develop Newton's formula for viscous force and explain coefficient of viscosity and solve related numerical problems.
- 4.14 Outline Poiseuille's equation for coefficient of viscosity and solve related numerical problems.
- 4.15 Explain the effect of temperature on viscosity of liquids and gases.
- 4.16 Identify the importance of viscosity in lubricants.

CO5: Develop the knowledge associated with laws of conservation of energy and Renewable Energy sources such as Solar energy and Wind energy for sustainable environment.

- 5.1 Explain the concept of Work, Power and Energy and solve related numerical problems.
- 5.2 Explain Potential energy and Kinetic energy with examples.
- 5.3 Develop expressions for Potential energy and Kinetic energy and solve related numerical problems.
- 5.4 Develop Work-Energy theorem and solve related numerical problems.
- 5.5 Explain law of conservation of energy with examples.
- 5.6 Prove law of conservation of energy in the case of a freely falling body and solve related numerical problems.
- 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 sources.
- 5.9 Explain construction and working of Solar water heater and Wind mill with legible diagrams.

CO6: Utilize the principles of thermal expansion to explain thermostat and identify the significance of laws of thermodynamics.

- 6.1 Explain modes of transmission of heat.
- 6.2 Explain thermal expansion of solids and develop three coefficients of expansion of solids and identify the applications.
- 6.3 Explain thermal conductivity of a solid and develop the expression for it [$Q = KA(\theta_1 - \theta_2)t$].
- 6.4 Explain principle of bimetallic strip.
- 6.5 Explain construction and working of bimetallic thermostat as an automatic temperature control device in electrical gadgets.
- 6.6 Explain Boyle's law in gases and its limitations and solve related numerical problems.
- 6.7 Explain concept of Absolute Zero using volume and pressure coefficients of a gas [$V_t = V_0(1 + \frac{t}{273})$ and $P_t = P_0(1 + \frac{t}{273})$] and develop Absolute temperature scale.
- 6.8 Explain Charles' laws in gases in terms of absolute temperature and solve related numerical problems.
- 6.9 Develop Ideal gas equation and calculate universal gas constant and solve related numerical problems.
- 6.10 Translate gas equation in terms of density and solve related numerical problems.
- 6.11 Explain Isothermal and Adiabatic processes and identify differences between them.
- 6.12 Explain the terms internal energy and external work done by a gas.
- 6.13 Develop the expression for work done by the gas [$W = P(V_2 - V_1)$] and solve related numerical problems.
- 6.14 Explain first law of thermodynamics and list applications of it and solve related numerical problems.
- 6.15 Solve first law of thermodynamics to isothermal and adiabatic processes.
- 6.16 Explain second law of thermodynamics and list applications of it.

Course Content and Blue Print of Marks for SEE

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

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATION (C 24)
SEMESTER I
MID-I EXAM
SC 103 Basic Physics
Model Question paper

Duration: 1hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions.

2. Each question carries **ONE** mark.

4X1 =4

1. Define fundamental physical quantity.
2. Name the dimensional formula of Power.
3. How does vector is different from scalar?
4. Define unit vector.

PART-B

Instructions: 1. Answer **ALL** questions.

2. Each question carries **THREE** marks.

2X3 =6

5(a) Outline advantages of S.I. units.

(OR)

- (b) The displacement of a particle moving along x-axis with respect to time is $x=at+bt^2-ct^3$.
Find the dimensional formulae of a, b and c.

6(a) Explain triangle law of vectors.

(OR)

- (b) At an airport, a horizontal wind is blowing at 15 ms^{-1} at an angle of 60° north of east.
Calculate the components of the wind velocity in the north and east directions.

PART-C

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks.

2X5 =10

7(a) Apply dimensional analysis to convert unit of energy from SI to CGS.

(OR)

(b) Construct an expression for time period of simple pendulum using dimensional analysis starting from length of pendulum (l), mass of the bob (m) and acceleration due to gravity (g). Take proportionality constant as 2π .

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

(OR)

(b) Apply vector properties to find the angle between $\vec{P} = 2\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{Q} = \hat{i} - 2\hat{j} + \hat{k}$

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

DIPLOMA EXAMINATION (C 24)

SEMESTER I

MID-II EXAM

SC 103 Basic Physics

Model Question paper

Duration: 1 hour

Max. Marks: 20

PART-A

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

4X1 =4

1. What is a projectile?
2. Define Normal reaction
3. Define Elastic limit.
4. Define angle of contact.

PART-B

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

2X3 =6

- 5(a) A ball is kicked into air with a velocity of 20 ms^{-1} at an angle 30° to the Earth's surface. Find maximum height reached by the ball. (Take $g = 10 \text{ ms}^{-2}$)
(OR)

- (b) Outline the laws of Static friction.

- 6(a) An object of weight 20 N suspended vertically from a crane on a steel cable 4 m long and 2 mm in diameter produces an elongation of 0.24 mm. Calculate the stress and strain in the cable.

(OR)

- (b) Draw a neat diagram for the rise and fall of a liquid in a capillary tube showing meniscus and angle of contact.

PART-C

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks.

2X5 =10

7(a) Develop the expression for path of a projectile in oblique projection.

(OR)

(b) Develop the expression for acceleration of a body moving up on a rough inclined surface

8(a) Develop a formula for Young's modulus of a wire having circular cross-sectional area.

(OR)

(b) Develop Newton's formula for viscous force and explain coefficient of viscosity.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

DIPLOMA EXAMINATION (C 24)

SEMESTER I

SEMESTER END EXAM

SC 103 Basic Physics

Model Question paper

Duration: 2 hours

Max. Marks: 40

PART – A

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

8X1=8

1. Name the dimensional formula of universal gravitational constant.
2. Define angle of repose.
3. What is kinetic energy?
4. Name one example of surface tension.
5. Define renewable energy source.
6. What is the principle of working of wind mill?
7. Define convection..
8. Define internal energy.

PART – B

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

4X3=12

- 9(a). Explain vector product of two vectors.

(OR)

- (b). A gun fires 120 bullets per minute. Find the power of the gun if the mass of each bullet is 3 g and velocity is 500 ms^{-1} .

- 10(a). Draw a neat diagram to show various forces acting on a body which is (a) sliding downward and (b) moving upward on a rough inclined surface.

(OR)

- (b). Explain principle of bimetallic strip.

- 11(a). Calculate the work done by a ball of mass 2 kg when its velocity increases from 5 m/s to 10 ms^{-1} due to applied force.

(OR)

(b). The work done by a person in carrying a box of mass 20 kg through a vertical height of 5 m is 4900 J. Find the mass of the person.

12(a). The volume of a gas at 30°C is 200 cc. What is the volume of the gas if temperature of the gas is raised to 100°C at constant pressure?

(OR)

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

PART – C

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks.

4X5 = 20

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

(OR)

(b). Develop Work-Energy theorem.

14(a). Draw a schematic graph of the applied force versus resulting elongation of a metallic wire. Identify the important features in it.

(OR)

(b). Develop the relation between Pressure, Volume and Temperature of an ideal gas.

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

(OR)

(b). Explain working of wind mill with legible diagram.

16(a). Develop the relation between Pressure, Volume and Temperature of an ideal gas.

(OR)

(b). Explain thermal conductivity of a solid and develop the expression for it.

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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	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Prerequisite: Basic knowledge of chemistry in secondary education and appreciate the role of Chemistry and environmental science 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	Explain the concept of atomic structure, chemical bonding, oxidation, reduction and oxidation number and apply the knowledge in the selection of engineering materials.
CO2	Explain concept of mole, molarity, normality and colloids and utilize the knowledge in various industrial processes.
CO3	Make use of the different theories of acids and bases, concept of pH, buffer action and apply the knowledge in selection of solutions in industrial areas.
CO4	Extend the knowledge of Ecosystem, Biodiversity, Green Chemistry and Management of e-waste in maintaining the sustainable development of society.
CO5	Identify the hardness and degree of hardness of water and apply there Levant water treatment methods to solve domestic and industrial problems.
CO6	Explain 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 purposes.

CO-PO-Mapping

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

COURSE CONTENTS:

UNIT-I: Fundamentals of Chemistry

L10 + T3 Periods

Atomic Structure: Introduction – Atomic number – Mass number - Isotopes and Isobars -Bohr's Atomic Theory- Quantum numbers - 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 and Metallic bond- properties of Ionic and Covalent compounds.

Oxidation - Reduction: Electronic concept of Oxidation, Reduction and Redox reaction.

Oxidation number - Calculations.

UNIT-II: Solutions and Colloids

L10+ T2Periods

Introduction - Solution – Solubility - Classification of solutions based on solubility and 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 -Properties of Colloids -Industrial applications of colloids

UNIT-III: Acids and Bases

L10+ T2 Periods

Introduction - Theories of acids and bases and limitations - Arrhenius theory - Brownsted 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

L10+ T3 periods

Introduction-Environment –Scope and importance of environmental studies- Important terms- Concept of ecosystem - Producers, consumers and decomposers - Biodiversity, definition and threats to Biodiversity- Green Chemistry– e-waste –Management of e-waste.

UNIT-V: Water Technology

L10+ T3 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.

UNIT-VI: Electrochemistry

L10+ T2Periods

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.

COURSE OBJECTIVES

CO1: Explain the concept of atomic structure, chemical bonding, oxidation, reduction and oxidation number and apply the knowledge in the selection of engineering materials.

- 1.1 Compare the mass and charge of proton, electron and neutron
- 1.2 Define and explain atomic number, mass number, isotopes and isobars
- 1.3 State the postulates of Bohr's atomic theory and its limitations
- 1.4 Explain Quantum numbers and their Significances
- 1.5 Define an Orbital explain the shapes of s, p and d orbitals.
- 1.6 Outline the differences between Orbit and Orbital
- 1.7 Define electronic configuration and apply Aufbau principle, Hund's rule, and Pauli's exclusion principle in writing electronic configuration of elements up to atomic number 30
- 1.8 Explain the postulates of Electronic theory of valency
- 1.9 Define chemical bond and list the types of chemical bond
- 1.10 Define ionic bond and explain the Ionic bond formation in NaCl and MgO molecules
- 1.11 Define and explain the types of covalent bonds
- 1.12 Explain the covalent bond formation in homo atomic molecules (non-polar molecules):
H₂, O₂, N₂
- 1.13 Explain the covalent bond formation in hetero atomic molecules (polar molecules): HF and H₂O
- 1.14 Explain the properties of ionic compounds and covalent compounds
- 1.15 Compare the properties of ionic compounds and covalent compounds
- 1.16 Define Co-ordinate covalent bond and explain the bond formation in ammonia borontrifluoride and Hydronium ion
- 1.17 Define metallic bond and explain with free electron theory/ electron sea model
- 1.18 Define and explain the electronic concept of oxidation, reduction and redox reaction
- 1.19 Define oxidation number and list the rules for calculation of oxidation number
- 1.20 Find the oxidation number of C, N, S, P, Cr and Mn in their compounds

CO2: Explain concept of mole, molarity, normality and colloids and utilize the knowledge in various industrial processes.

- 2.1 Define the terms: solution, solute, solvent, aqueous solution and alcoholic solution with examples
- 2.2 Define solubility and classify the solutions based on solubility
- 2.3 Classify the solutions based on the physical state of solution, solute and solvent
- 2.4 Define atomic weight, molecular weight and equivalent weight
- 2.5 Find the molecular weight and the equivalent weights of acids, bases and salts
- 2.6 Explain mole concept and solve the numerical problems on mole
- 2.7 Define and explain molarity and normality
- 2.8 Find the relationship between molarity and normality
- 2.9 Solve numerical problems on molarity and normality of solutions
- 2.10 Define the terms: true solution, colloids and suspensions with examples
- 2.11 Classify the colloids and explain their properties
- 2.12 Compare the properties of Lyophilic Colloid and Lyophobic Colloid
- 2.13 Explain the general properties of colloids such as a) Tyndall effect b) Brownian movement and c) Coagulation
- 2.14 Explain in brief any five industrial applications of colloids

CO3: Make use of the different theories of acids and bases, concept of pH, buffer action and apply the knowledge in selection of solutions in industrial areas.

- 3.1 Explain the postulates and limitations of Arrhenius theory of acids and bases
- 3.2 Explain the postulates and limitations of Brownsted - Lowry theory of acids and bases
- 3.3 Explain the postulates and limitations of Lewis theory of acids and bases
- 3.4 Define and explain the ionic product of water and solve numerical problems
- 3.5 Define pH and solve numerical problems on pH
- 3.6. Explain Ostwald's theory of indicators with phenolphthalein and methyl orange indicators as examples
- 3.7 Define buffer solution and explain the acidic and basic buffers with examples
- 3.8 Explain buffer action of Acetate buffer and Ammonium buffer
- 3.9 Explain general applications of buffer solutions

CO4: Extend the knowledge of Ecosystem, Biodiversity, Green Chemistry and Management of e-waste in maintaining the sustainable development of society.

- 4.1 Define and explain different segments of environment: i) Atmosphere, ii) Hydrosphere, iii) Lithosphere and iv) Biosphere
- 4.2 Define the 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
- 4.3 Define Ecosystem. Explain the biotic and abiotic components of ecosystem.
- 4.4 Define and explain the following biotic components with examples:
 - 1) Producers, 2) Consumers and 3) Decomposers
- 4.5 Define biodiversity and explain the threats to biodiversity
- 4.6 Explain the methods of conservation of biodiversity
- 4.7 Define and explain the principles of Green chemistry
- 4.8 Define e-waste and explain the sources of e-Waste
- 4.9 Explain the effect of e-waste on environment and human beings
- 4.10 Explain the management of e-waste-Land filling, incineration and recycling.

CO5: Identify the hardness and degree of hardness of water and apply there Levant water treatment methods to solve domestic and industrial problems.

- 5.1 List the various sources of water.
- 5.2 Define the terms soft water and hard water
- 5.3 Define hardness of water and name the compounds responsible for hardness
- 5.4 Define and explain the types of hardness
- 5.5 Identify the disadvantages of using hard water in industries: i) Boilers ii) Laundry, iii) Textile industry, iv) Paper industry, v) Sugar Industry and vi) Pharmaceutical industry
- 5.6 Define degree of hardness and explain different units of hardness - ppm and mg/L solve numerical problems on degree of hardness
- 5.7 Utilize and explain a) Permutit process and b) Ion-Exchange process in softening of hard water:
- 5.8 Define desalination of water
- 5.9 Define Osmosis and Reverse Osmosis (RO)
- 5.10 Explain the process of conversion of sea water into drinking water by reverse osmosis
- 5.11 List the applications and advantages of RO.
- 5.12 Explain the desalination of sea water by Electro dialysis.
- 5.13 List the essential qualities of drinking water.
- 5.14 Explain the Municipal treatment of water for drinking purpose with flow chart-
 - a) Sedimentation b) Coagulation c) Filtration, d) Sterilization by Aeration and Chlorination

CO6: Explain 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 purposes.

- 6.1 Define the terms, conductor, insulator, electrolyte and non-electrolyte
- 6.2 Classify the electrolytes - strong and weak electrolytes with examples.
- 6.3 Compare and contrast the metallic conductors and electrolytic conductors.
- 6.4 Explain the Arrhenius theory of electrolytic dissociation.
- 6.5 Define electrolysis.
- 6.6 State and explain Faraday's laws of electrolysis
- 6.7 Define chemical equivalent and electrochemical equivalent and their relation
- 6.8 Numerical problems based on Faraday's I-law and II- law
- 6.9 Construct the suitable electrolytic cell to explain the electrolysis of fused NaCl and aqueous NaCl (Nelson Cell).
- 6.10 Apply the principle of electrolysis in Electrolytic refining of copper metal and Electroplating.

BOARD DIPLOMA EXAMINATIONS (C24)
FIRST SEMESTER EXAMINATION
MIDSEM -I
SC-104-GENERAL ENGINEERING CHEMISTRY

Time: 1 Hour

Max. Marks: 20

PART-A

Instructions: Answer all questions. Each question carries one mark

4 x 1 = 4 Marks

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

PART-B

2 x 3 = 6 Marks

Instructions: Answer the following questions.

Each question carries three marks

5. a) Outline the shapes of s and d orbitals.

(OR)

5. b) Explain the covalent bond formation in Nitrogen molecule by Lewis dot method.

6. a) Classify solutions based on their physical state.

(OR)

6. 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) Identify and explain the nature of bonding in the following molecule 1. MgO, 2. HCl

(OR)

- b) Find the oxidation number of 'S' in H_2SO_4 , 'Mn' in KMnO_4 and 'Cr' in $\text{K}_2\text{Cr}_2\text{O}_7$

8. a) Find the weight of H_2SO_4 required to prepare 400 ml of 0.5M solution.

(OR)

- b) Find the normality of 500 ml solution containing 0.53 grams of Na_2CO_3 .

BOARD DIPLOMA EXAMINATIONS (C24)
FIRST SEMESTER EXAMINATION
MIDSEM -II
SC-104-GENERAL ENGINEERING CHEMISTRY

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 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.

2 x 3 = 6 Marks

Each question carries three marks

5. a) Outline the limitations of Arrhenius theory of acid and bases?

(OR)

- b) Explain 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 effect of e-waste on environment.

PART - C

Instructions: Answer the following questions.

2 x 5 = 10 Marks

Each question carries five marks

7. a) Define pH. Find the pH of 0.5M NaOH solution.

(OR)

8. b) What are buffer solutions? Explain any four applications of buffer solutions.

9. a) What is Biodiversity? Explain the methods of Conservation of Biodiversity.

(OR)

- b) What is Green chemistry? Explain any four principles of Green Chemistry.

BOARD DIPLOMA EXAMINATIONS (C24)
FIRST SEMESTER EXAMINATION
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.

4x3=12Marks

Each question carries three marks

9. a) State and explain Hund's rule.

(OR)

- b) Interpret any six essential qualities of drinking water.

10. a) .Explain the terms producers, consumers and decomposers with examples.

(OR)

- b) Explain strong and weak electrolytes? Give examples.

11. a) Define reverse osmosis and predict its advantages.

(OR)

- b) Compare temporary and permanent hardness of water.

12. a) Identify the differences between metallic and electrolytic conductors.

(OR)

b) Explain Faraday's Laws of electrolysis.

PART- C

Instructions: Answer the following questions.

4 x5 =20 Marks

Each question carries five marks.

13. a) Find the Molarity and Normality of the two liters of solution containing 10.6 grams of Na_2CO_3 .

(OR)

b) Find the temporary and permanent hardness of water containing the following salts per liter

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 labeled diagram.

(OR)

b) Identify and explain the disadvantages of using hard water in the following industries?

i).Boilers ii) Laundry iii) Paper industry iv) Textile industry v) Pharmaceuticals

16. a).Explain the process of electrolytic refining of copper.

(OR)

b) Find the weight of Al deposited on the cathode if 0.5 amperes of electric current is passed through AlCl_3 solution for 1 hour.

EE-105 - ELECTRICAL ENGINEERING MATERIALS

Course Title:	Electrical Engineering Materials	Course Code	EE-105
Semester	I Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Knowledge of Basic Materials

Course Outcomes

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

CO1	Explain the properties of different conducting materials and their applications
CO2	Identify the semiconductor devices and its performance characteristics.
CO3	Mention the properties and applications of various insulation materials.
CO4	Describe Dielectric materials and their properties
CO5	Describe Magnetic materials and their properties
CO6	Distinguish the working function of Special purpose materials

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE					
			R		U	A		
I	Conducting Materials	12	Q4	Q1		Q9(a)	Q13(a)	
II	Semiconducting Materials	12						
III	Insulating Materials	15		Q2		Q10(a)	Q14(a)	
IV	Di-electric Materials	11						
V	Magnetic Materials	10		Q3	Q5,Q6		Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI	Special Purpose Materials	15						
	Total	75	8		8	8		

Course Contents

UNIT - 1: Conducting Materials

Duration: 12 Periods (L: 09 – T:3)

Conducting Materials – Properties -Hardening, Annealing – Its effects- Low Resistive Materials –Requirements – Properties and applications of Copper and Aluminum - Comparison between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements-Properties and applications of Manganin, Eureka, Constantan, Nichrome, Tungsten, Mercury and Carbon.

UNIT – 2: Semiconducting Materials

Duration: 12 Periods (L:10 – T:2)

Semiconductors - Intrinsic and Extrinsic semiconductors- 'P' and 'N' type materials- Distinguish between P-type and N- type Semi Conductors.

UNIT – 3: Insulating Materials

Duration: 15 Periods (L:13 – T:2)

Properties-Insulationresistance-FactorseffectingInsulationresistance-ClassificationofInsulating materials - Properties & Applications of Impregnated Paper, Wood, Asbestos, Mica, Ceramic, Glass- Thermo Plastics, Thermo Setting resins – PVC- Effects on PVC- Properties and Applications of Insulating Gases (Hydrogen and Sulphur Hexa Fluoride).

UNIT – 4: Di-electric materials

Duration: 11 Periods (L:09 – T:2)

Permittivity of different Di - electric materials- Polarization - Dielectric Loss Applications of Dielectrics.

UNIT – 5: Magnetic Materials

Duration:10 Periods (L:08 – T:2)

Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves- Hysteresis loop-Hysteresis loss –Steinmetz constant –Eddy Current Loss –Curie Point – Magnetostriction.

UNIT – 5: Special Purpose Materials

Duration:15 Periods (L:13 – T:2)

Need of Protective materials– List of Special Purpose Materials (Lead, Paints, Steel Tapes)- Thermocouple- Bi-metals - Soldering-Fuses-Galvanizing and Impregnating.

Reference Books

1. Dr.K.Padmanabham-ElectronicComponents-Laxmipublications(P)Ltd.
2. ElectronicComponents-D.V.Prasad-Radiantpublishers
3. ElectricalEngineeringMaterials–N.IT.T.T.R Publications
4. B.K.Agarwal-IntroductiontoEngineeringmaterials–TataMcGraw-Hillpublishers
5. Materialscience forElectricalandElectronicEngineers–IanP.Jones(OxfordPublications)

Suggested E-learning references

1. <https://nptel.ac.in/courses/>
2. <http://electrical4u.com/>

Suggested Learning Outcomes

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

C01: Explain the properties of different conducting materials and their applications

- 1.1 Define Conducting Materials
- 1.2 State the properties of conducting materials
- 1.3 Define the terms (a) Hardening (b) Annealing
- 1.4 Explain the effects of Hardening and Annealing on copper with regard to Electrical and Mechanical properties
- 1.5 State the main requirements of Low Resistivity Materials
- 1.6 List some examples of a) Low Resistivity Materials b) High Resistivity materials
- 1.7 Mention the Properties & Applications of Copper and Aluminum
- 1.8 Distinguish between Copper and Aluminum
- 1.9 Mention the properties & applications of ACSR Conductors and AAAC.
- 1.10 State the requirements of High Resistive Materials
- 1.11 State the types of High Resistive Materials
- 1.12 List the properties & Applications of High Resistive Materials
 - (a) Manganin (b) Eureka (c) Constantan (d) Nichrome
 - (e) Tungsten (f) Mercury (g) Carbon

C02: Identify the semiconductor devices and its performance characteristics.

- 2.1 Define Semiconducting materials.
- 2.2 Classify Semiconducting materials.
- 2.3 Define (a) Intrinsic Semiconductors and (b) Extrinsic Semiconductors.
- 2.4 Distinguish between Intrinsic and Extrinsic semiconductors.
- 2.5 Explain the formation of
 - (a) P-type semiconductor and (b) N-type semiconductor
- 2.6 Distinguish between P and N type Semiconductors

C03 - Mention the properties and applications of various insulation materials.

- 3.1 Define Insulating Materials.
- 3.2 Draw energy level diagrams of conductors, insulators and semi-Conductors.
- 3.3 Distinguish between Conductors, Insulators and Semiconductors
- 3.4 State the important electrical properties of Insulating materials
 - (a) Insulation resistance (b) Volume (c) Surface resistance
- 3.5 Explain factors affecting insulation resistance
- 3.6 Classify Insulating materials on the basis of temperature i.e., (Y, A, E, B, F, H and Class)
- 3.7 Classify insulating materials
- 3.8 State the properties and applications of (a) Impregnated paper (b) Wood (c) Asbestos
 - (d) Mica (e) Ceramics (f) Glass.
- 3.9 Explain Thermoplastic & Thermosetting resins with examples
- 3.10 Explain the properties and applications of PVC
- 3.11 State the effects of the following on P.V.C.
 - (a) Filler (b) Stabilizer (c) Plasticizer (d) Additives.
- 3.12 State the Properties and applications of the following gases
 - (a) Hydrogen (b) Sulphur –Hexafluoride(SF₆)

C04 - Describe Dielectric materials and their properties

- 4.1 Know the Permittivity of commonly used di-electric materials
(a) Air (b) Bakelite (c) Glass (d) Mica (e) Paper (f) Porcelain (g) Transformer oil
- 4.2 Explain Polarization
- 4.3 Explain Di-electric Loss
- 4.4 List any four applications of Di-electrics

C05 - Describe Magnetic materials and their properties

- 5.1 Classify the Magnetic Materials
(a) Ferro (b) Para (c) Dia-Magnetic materials with examples
- 5.2 Explain (a) Soft Magnetic materials (b) Hard Magnetic materials
- 5.3 Draw (a) B-H. Curve (b) Hysteresis loop
- 5.4 Explain Hysteresis loop
- 5.5 Explain Hysteresis loss and State Steinmetz equation (No-Problems)
- 5.6 Explain Eddy Current Losses
- 5.7 State Curie point
- 5.8 Define Magnetostriction

C06 - Distinguish the working function of Special purpose materials

- 6.1 State the need for protective materials
- 6.2 List the various protective materials like Lead, Paints, Steel Tapes etc.
- 6.3 Explain the thermocouple materials
- 6.4 State the Bi-metals
- 6.5 State the soldering materials
- 6.6 Define fuse
- 6.7 State the different types of materials used for fuse
- 6.8 Explain the process of Galvanizing and Impregnation
- 6.9 State the use of enamel coated copper wires (Thin, Medium and Thick)

Suggested Student Activities

1. Visit the Institute's Library / internet center and list the books/journals/ e-books and any other resources available on the topics suggested by the teacher.
2. Prepare charts of various electrical materials and its Applications.

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

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, and Sustainability Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	1						1,2
CO2	3	1						1,2
CO3	3	2						1,2
CO4	3	2		3	3			1,2,4,5
CO5	3	3						1,2
CO6	3	2	2					1,2,3

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 and Training, Telangana

Model Question paper

DEEE I semester

Mid Semester-I Examination

Course Code: EE-105

Duration:1 hour

Course Name: Electrical Engineering Materials

Max.Marks:20 Marks

PART-A

Answer **all** questions, Each Question carries **ONE** mark

4x1 = 4 Marks

1. List the properties of conducting materials.
2. Define hardening and annealing.
3. Define intrinsic semiconductors.
4. What is meant by doping in semiconductor?

PART-B

Answer **TWO** questions. Each question carries **THREE** marks **2x3 = 6 Marks**

- 5(a). State the requirements of low resistivity materials and high resistivity materials.

(OR)

- 5(b). List the properties and applications of copper.

- 6(a). Draw a neat diagram of covalent bond of P-type semiconductor.

(OR)

- 6(b). compare intrinsic and extrinsic semiconducting materials.

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x5= 10 Marks**

- 7(a). Mention the properties & applications of ACSR Conductors and AAAC.

(OR)

- 7(b). List the properties and applications of Mica.

- 8(a). Compare N-type and P-type semiconductors.

(OR)

- 8(b). Explain the formation of N-type semiconductor with a neat sketch.

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE I semester
Mid Semester-II Examination

Course Code: EE-105

Course Name: Electrical Engineering Materials

Duration: 1 hour

Max.Marks: 20 Marks

PART-A

Answer ALL questions, Each Question carries ONE mark

4x1 = 4 Marks

1. State the effects of additives on PVC
2. State the factors affecting insulation resistance.
3. Define di-electric loss.
4. Define polarization in dielectric materials.

PART-B

Answer TWO questions. Each question carries THREE marks.

2x3 = 6 Marks

5(a). State any three electrical properties of insulating materials

(OR)

5(b). State the effect of stabilizers and plasticizers additives on PVC.

6(a). List any three applications of di-electrics.

(OR)

6(b). State the permittivity of (a) air (b) paper

PART-C

Answer TWO questions. Each question carries FIVE marks

2x5 = 10 Marks

7(a). Explain thermoplastic and thermosetting resins with examples.

(OR)

7(b). State the properties and applications of (a) hydrogen and (b) sulphur hexafluoride.

8(a). Explain the process of polarization in dielectric material.

(OR)

8(b) State the permittivity of (a) Bakelite (b) Porcelain (c) Transformer oil

State Board of Technical Education and Training, Telangana

Model Question paper

DEEE I semester

I Semester End Examination

Course Code: EE-105

Course Name: Electrical Engineering Materials

Duration: 2 hours

Max.Marks: 40 Marks

PART-A

Answer **all** questions. Each Question carries one mark

8x1 = 8 Marks

1. List semiconducting materials with examples.
2. State the important electrical properties of Insulating materials
3. State Curie point
4. State the main requirements of Low Resistivity Materials.
5. Classify the Magnetic Materials
6. Define Magnetostriction
7. State the different types of materials used for fuse
8. State the Bi-metals

PART-B

Answer **FOUR** questions. Each question carries **three** marks.

4 x 3 = 12 Marks

9(a). State the requirements of High Resistive Materials and mention the Types.

(OR)

9(b). Compare (a) Ferro (b) Para (c) Dia- Magnetic materials with examples

10(a). Compare thermoplastic and thermosetting resins in five aspects.

(OR)

10(b). State the need for protective materials.

11(a). State any five properties of soft magnetic materials.

(OR)

11(b). State Steinmetz equation

12(a). State the use of Enamelled coated copper wires.

(OR)

12(b). List different types of soldering materials

PART-C

Answer **FOUR** questions. Each Question carries **FIVE** marks

4 x 5 = 20 Marks

13(a) List the applications of PVC.

(OR)

13(b) Illustrate hysteresis loop with a neat sketch.

14(a) Classify Insulating materials on the basis of temperature

(OR)

14(b) List the various protective materials.

15(a) Distinguish Hard and Soft magnetic materials.

(OR)

15(b) Explain B-H curve.

16(a) Explain the working of thermo Couple with diagram.

(OR)

16(b) Illustrate the process of Galvanisation and Impregnation.

EE-106 - BASIC ELECTRICAL ENGINEERING

Course Title:	Basic Electrical Engineering	Course Code	EE-106
Semester	I Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Knowledge of Basic Physics

Course Outcomes

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

CO1	Explain various laws and resistive circuits.
CO2	Practice of electricity bill of domestic consumers
CO3	Explain the heating effects of Electric current and Analysing CFL&LED lamps
CO4	Analyse different terms related to Magnetic field.
CO5	Analyse different terms related to Electro- magnetic induction.
CO6	Analyse principles of Electrostatics

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Basic Principles of Electricity	12	Q4	Q1	Q9(a)	Q13(a)
2	Work, Power, Energy	12				
3	Heating Effects of Electric current	15		Q2	Q10(a)	Q14(a)
4	Magnetic effects of Electric current	11				
5	Electro-magnetic Induction	15	Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Electrostatics and capacitance	10		Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	75	8		8	8

Course Contents

UNIT - 1: Basic Principles of Electricity

Duration: 12 Periods (L: 09 – T:3)

Conductor, Insulator, Semiconductor- Electric Potential–Ohm’s law–Resistance–Specific Resistance–Conductivity–Temperature coefficient of Resistance–Resistance in series, parallel and series-parallel combinations.

UNIT – 2: Work, Power, Energy

Duration: 12 Periods (L:10 – T:2)

Units of Work, Power and Energy.– Ratings of different Domestic Appliances- Conversion of Units–Efficiency-Electricity bill of Domestic Consumer.

UNIT-3: Heating Effects of Electric current

Duration: 15 Periods (L:12 – T:3)

Mechanical Equivalent of Heat - Heat produced due to flow of Current in Metal Filament lamps, Electrical Kettle, Electric Cooker, Electric Iron, Geyser- Merits and Demerits of CFL and LED lamps.

UNIT-4: Magnetic Effects of Electric current

Duration: 11 Periods (L:09 – T:2)

Coulombs laws- Permeability - Lines of force –Right hand Thumb rule - Field pattern due to long straight current carrying conductor - Fleming’s Left Hand rule-Force between two parallel current carrying conductors –Solve problems - Magnetic circuit-Magnetizing force – Permeability - Flux - Reluctance - Comparison of Magnetic circuit With Electric circuit-Magnetic leakage flux and leakage Co-efficient.

UNIT - 5: Electromagnetic Induction

Duration: 15 Periods (L:12– T:3)

Faraday’s laws-Dynamically and Statically induced E.M.F -Lenz’ s Law& Fleming’s Right Hand rule –Self and Mutual inductance - Co-efficient of coupling - Inductances in series - Energy stored in a magnetic field –Energy stored per unit volume – Lifting power of magnet-problems

UNIT – 6: Electrostatics and Capacitance

Duration: 10 Periods (L: 08 – T:2)

Coulomb’s Laws of Electrostatics–Permittivity- Electrostatic induction-Electrostatic field - Lines of force -Comparison of Electrostatic and Magnetic lines of force - Strength of electric field- Flux density-Concept of Electric potential and Potentialdifference–Di-electricstrength–Di-electricconstant–Capacitance.

Reference Books

1. B.L.Theraja-ElectricalTechnologyVol.I-S.Chand&co.
2. Hughes,JohnHiley-ElectricalandelectronicTechnology-Pearson
3. J.B.Gupta-AcourseinElectricalTechnology-KATSONBOOKS
4. G.B.Bharadhwajan&A.SubbaRao-ElementsofElectricalEngineering.
5. D.C.Kulshreshtha.-BasicElectricalEngineering–TataMcGraw-HillEducation

Suggested E-learning references

1. <https://nptel.ac.in/courses/>
2. <http://electrical4u.com/>

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

C01 - Explain various laws and resistive circuits.

- 1.1 List merits of Electrical Energy over other types of energy
- 1.2 Define Electric Current, Potential difference, Voltage and EMF
- 1.3 Distinguish between DC and AC quantities
- 1.4 State Ohm's Law and solve problems
- 1.5 List the limitations of Ohms Law
- 1.6 Define the terms i) Specific resistance ii) Conductance iii) Conductivity
- 1.7 Derive the relation $R = (\rho L) / a$ and solve the problems
- 1.8 Explain the effects of temperature on resistance
- 1.9 Define temperature Co-efficient of resistance and give its unit
- 1.10 Develop the expressions for equivalent Resistance with simple SERIES and PARALLEL connections
- 1.11 Solve problems on equivalent resistance in case of Series-Parallel networks
- 1.12 State the concept of division of current when two Resistors are connected in parallel and solve the problems

C02 - Practice of electricity bill of domestic consumers

- 2.1 Define Electric Work, Power and Energy
- 2.2 State the formula for Electric Work, Power and Energy and mention S.I. System of units for Work, Power and Energy
- 2.3 Solve problems on Work, Power and Energy in Electrical, Mechanical and Thermal units
- 2.4 Calculate Electricity bill of domestic consumers as per the Electricity Tariff

C03 – Explain the heating effects of Electric current and analyzing CFL & LED lamps

- 3.1 State the heat produced due to flow of current
- 3.2 Derive the expression for conversion of Electrical Energy into equivalent Heat energy in kilocalories (Joule's law)
- 3.3 Define Thermal efficiency
- 3.4 Solve problems on Electric heating
- 3.5 Explain the applications of heat produced due to Electric current
(i) Metal Filament lamp (ii) Electric kettle (iii) Electric Cooker (iv) Electric Iron
(v) Geyser
- 3.6 Mention the merits and demerits of CFL
- 3.7 Mention the merits and demerits of LED lamp

C04 - Analyse different terms related to magnetic field.

- 4.1 State Coulombs laws of Magnetism
- 4.2 Define the terms Absolute and Relative Permeability of medium and give relation between them
- 4.3 Explain the concept of lines of force & magnetic field
- 4.4 State Right hand Thumb rule
- 4.5 Draw the field patterns due to
(i) Straight current carrying conductor(ii) Solenoid and (iii) Toroid
- 4.6 Explain the Mechanical force on a current carrying Conduct or placed inside a Magnetic field.
- 4.7 Derive an expression for the magnitude of the force on a current carrying conductor inside a magnetic field.

- 4.8 State Fleming's Left Hand rule
- 4.9 Derive an expression for the force between two parallel current carrying conductors and solve problems
- 4.10 Understand the concept of the Magnetic circuit and Define the terms MMF, Flux and Reluctance
- 4.11 Compare Magnetic circuit with Electric circuit in different aspects.
- 4.12 Explain the effect of air gap in a magnetic circuit
- 4.13 Explain the terms leakage flux and leakage co-efficient

C05 - Analyse different terms related to Electromagnetic induction.

- 5.1 State Faraday's laws of Electro-Magnetic Induction
- 5.2 Explain dynamically and statically induced E.M.Fs.
- 5.3 State Lenz's law
- 5.4 Explain Fleming's Right Hand rule
- 5.5 Explain the concept of Self and Mutual inductance
- 5.6 Derive an expression for Self and Mutual inductance
- 5.7 State Co-efficient of coupling
- 5.8 Explain the total inductance in series connections (Series Aiding and Series Opposition)
- 5.9 Develop an expression for the energy stored in a magnetic field and solve problems
- 5.10 Develop an expression for the energy stored per unit volume in a magnetic field
- 5.11 Develop an expression for lifting power of a magnet and solve problems

C06 - Analyse principles of Electrostatics

- 6.1 State Coulomb's laws of Electrostatics and solve the problems
- 6.2 Define the following terms
(i) Unit Charge(ii)Absolute permittivity (iii)Relative permittivity(iv)Electric Flux
(v) Flux Density(vi) Field intensity
- 6.3 Compare Electrostatic and Magnetic circuits in different aspects.
- 6.4 Define the concept of electric potential and potential difference
- 6.5 Define Di-electric strength and Di-electric constant
- 6.6 Give the permittivity of commonly used Di-electric materials
- 6.7 Define Capacitance and state factors affecting the capacitance of a capacitor
- 6.8 Derive the formula for capacitance of a parallel plate capacitor
- 6.9 State different types of capacitors with its uses
- 6.10 Derive an expression for equivalent capacitance
a) When two Capacitors connected in series;
b) When two Capacitors connected in parallel
- 6.11 Derive an expression for the Energy stored in a capacitor and solve problems

Suggested Student Activities

- 1. Visit the Institute's Library / internet center and list the books/journals/ e-books and any other resources available on the topics suggested by the teacher.
- 2. Prepare charts of various electrical materials and its Applications.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, and Experimentation and Testing	Engineering Practices for Society, and Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	3		3				1,2,4
CO2	3	3				1		1,2,6
CO3	3					1	1	1,6,7
CO4	3		3		1			1,3,5
CO5	3		3	2	1			1,3,4,5
CO6	3	1	1				1	1,2,3,7

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 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 and Training, Telangana
Model Question paper
DEEE I semester
Mid Semester-I Examination

Course Code: EE-106
Course Name: Basic Electrical Engineering

Duration: 1 hour
Max. Marks: 20 Marks

PART-A

Answer all questions, Each Question carries ONE mark

4x1 = 4 Marks

1. State Ohm's law.
2. Compare series and parallel circuits in any three aspects.
3. Define electrical energy and mentions its S.I. unit.
4. Define work.

PART-B

Answer TWO questions. Each question carries THREE marks 2x3 = 6 Marks

5(a). Define specific resistance and state its SI units

(OR)

5(b). Derive an expression for division of current between resistances when two resistances are connected in parallel.

6(a). Define electrical power. Mention their electrical and mechanical units

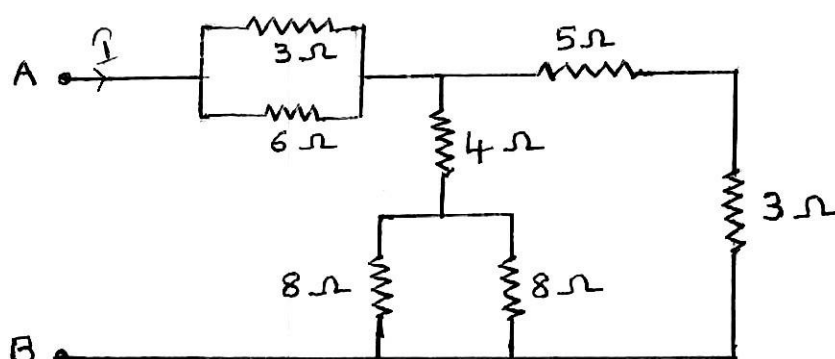
(OR)

6(b). Write the relations between mechanical, electrical and thermal units of work

PART-C

Answer TWO questions. Each question carries FIVE marks 2x5 = 10 Marks

7(a). Find current when a battery of 60 V is connected between A and B.



(OR)

7(b). List the limitations of Ohm's law

8(a). Two bulbs 60 W, 200 V and 40 W, 200 V are connected in series across 200 V DC supply. Calculate power absorbed by each lamp. If they are connected in parallel Across 200 V, what is the power absorbed by each?

(OR)

8(b). Calculate the monthly electricity bill for a month of 30 days, for the following loads in a house.

- (a) Four lamps of 100 W each used for 8 hours/day
- (b) Two fans of 80 W each used for 10 hours/day
- (c) 1000 W iron box used for 1 hour /day The cost per unit is ₹ 3.00/-

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE I semester
Mid Semester-II Examination

Course Code: EE-106

Duration: 1 hour

Course Name: Basic Electrical Engineering

Max.Marks: 20 Marks

PART-A

Answer ALL questions, Each Question carries ONE mark 4x1 = 4 Marks

1. State how the heat is produced due to flow of electric current.
2. State Joule's law of electric heating
3. State Fleming's left hand rule.
4. Write about Reluctance and its units

PART-B

Answer TWO questions. Each question carries THREE marks. 2x3 = 6 Marks

- 5(a). Write about Thermal Efficiency.

(OR)

- 5(b). Mention the merits and demerits of CFL

- 6(a). Write about magnetic flux, magnetic flux intensity with units.

(OR)

- 6(b). Compare magnetic circuit with electric circuit

PART-C

Answer TWO questions. Each question carries FIVE marks 2x5 = 10 Marks

- 7(a). Illustrate the applications of heat produced due to Electric current in Metal filament Lamp.

(OR)

- 7(b). Mention the applications of heat produced due to Electric current in Electric Iron.

- 8(a). Derive an expression for force between two parallel current carrying conductors.

(OR)

- 8(b). Explain the Mechanical force on a current carrying Conductor placed inside a magnetic field.

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE I semester
I Semester End Examination

Course Code: EE-106
hours

Duration:2

Course Name: Basic Electrical Engineering
Max.Marks:40 Marks

PART-A

Answer **all** questions. Each Question carries one mark

8x1 = 8

Marks

1. Define resistance, and mention its units.
2. List the heat producing appliances.
3. Define Absolute Permittivity
4. Define Fleming's left hand rule.
5. State Lenz's law
6. State the co-efficient of coupling
7. List the various types of capacitors
8. State Coulomb's laws of electrostatics

PART-B

Answer **FOUR** questions. Each question carries **three** marks.

4 x 3 = 12 Marks

- 9(a). Two resistors having resistances $6\ \Omega$ and $2\ \Omega$ are connected in series. What resistance must be connected across $6\ \Omega$ resistor to give the total resistance of the circuit $4\ \Omega$?

(OR)

- 9(b). Develop the concept of self and mutual inductance .

- 10(a). Determine the reluctance of a cylindrical steel rod of length 120 mm and diameter 40 mm. Take the relative permeability of the steel as 1000

(OR)

- 10(b). Compare Electrostatic and Magnetic circuits in different aspects.

- 11(a). Derive an expression for energy stored in a magnetic field

(OR)

- 11(b). Two coils with a coefficient of coupling 0.6 between them are connected in series so as to magnetize

(i) in the same direction and (ii) in the opposite direction. The corresponding values of total inductances are 2.02 H and 0.53 H respectively. Determine the self-inductance of the two coils and the mutual inductance between them.

- 12(a). Three capacitors are having capacitances of $2\ \mu\text{F}$, $4\ \mu\text{F}$ and $12\ \mu\text{F}$. Calculate equivalent capacitance when they are connected in (i) series and (ii) parallel.

(OR)

- 12(b). The capacitance of a capacitor formed by two parallel metal sheets, each $200\ \text{cm}^2$ in area, separated by a dielectric 3 mm thick is $4 \times 10^{-12}\ \text{F}$. Determine relative permittivity of the dielectric.

PART-C

Answer **FOUR** questions. Each Question carries **FIVE** marks

4 x 5 = 20 Marks

13(a) Two bulbs rated 60 W at 220 V and 100 W at 220 V are connected in series across a 220 V DC supply. Calculate the power absorbed by each lamp. If the above two bulbs are connected in parallel across the 220V DC Supply, What is the Power absorbed by each lamp.

(OR)

13(b) A coil has 400 turns. Find the induced e.m.f. in it, if the flux changes from 0.2 mWb to 1 mWb in 0.2 second.

14(a) Draw the parts of electric iron with a neat sketch.

(OR)

14(b) Derive the equivalent capacitance when two capacitors are connected in series.

15(a) Explain dynamically induced emf

(OR)

15(b) A flux of 0.4 mWb is produced by a current of 10A flowing through a 200 turns coil corresponding to the complete reversed of the current in 0.02 second. Also find the magnitude of the emf induced.

16(a) Derive an expression for energy stored in a capacitor.

(OR)

16(b) Two capacitors having capacitances of 4 F and 6 F are connected in series across 120 V DC supply. Calculate (i) total capacitance, (ii) charge on each capacitor and (iii) potential difference across each capacitor.

ME-107-ENGINEERING DRAWING - I

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

Course Title :	Engineering Drawing – I	Course Code	ME-107
Semester	I	Course Group	Practical
Teaching Scheme in Periods (L:P)	1:0:2	Credits	1.25
Methodology	Lecture + Practice	Total Contact Periods:	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 (CO)

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

Course Outcome		Cognizant Level	Linked Program Objectives (PO)
CO1	Recognize the importance of Engineering Drawing and usage of the drawing Instruments.	R	1, 4, 7
CO2	Practice free hand lettering & numbering in different styles.	R/U	1, 3, 4, 7
CO3	Use of different methods of dimensioning systems in Engineering Drawing.	R/U	1,3, 4, 7
CO4	Construct engineering curves such as parabola, hyperbola, ellipse, involute, cycloid, helix and their tangent lines.	R/U/A	1, 2, 3, 4, 7
CO5	Apply knowledge of orthographic projection principles to accurately represent the projection of points, lines, and planes onto different planes.	R/U/A	1, 2, 3, 4,6, 7
CO6	Explain the principles and conventions of orthographic projection, including the use of multiple views to fully describe an object.	R/U/A	1, 2, 3, 4, 7

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 as 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)					

COURSE CONTENTS

NOTE:

1. B.I.S Specification should in variably 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 (03periods)

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: Layout of sheet–as per SP-46-1988 to a suitable scale.

2.0 Free hand lettering & numbering (03periods)

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 (03periods)

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 (12periods)

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 (09 periods)

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 (15 periods)

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 Kapildev-(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
5. Engineering drawing + Auto CAD by Venugopal, K, New Delhi : New Age International

Online Resources

1. <https://nptel.ac.in/courses>
2. <https://nptel.ac.in/courses/124107157>
3. www.slideshare.net/shameem.mist/engineering-drawing
4. <https://www.powershow.com/viewfl/76303a->
5. OWI5M/Engineering_Drawing_powerpoint_ppt_presentation
6. <https://www.powershow.com/view0/91a2bf->
7. N2Q2N/Basic_engineering_drawing_solved_question_powerpoint_ppt_presentation

Suggested Learning 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.

- 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 link ages between Engineering drawing and other subjects of study in diploma course.
8. 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.

CO2: Practice free hand lettering & numbering in different styles.

- 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.

CO3: Use of different methods of dimensioning systems in Engineering Drawing.

- 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.

CO4: Construct engineering curves such as parabola, hyperbola, ellipse, involute, cycloid, helix and their tangent lines.

- 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.

CO5: Apply knowledge of orthographic projection principles to accurately represent the projection of points, lines, and planes onto different planes.

- 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)

CO6: Explain the principles and conventions of orthographic projection, including the use of multiple views to fully describe an object.

- 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.

CO-POMATRIX:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	3	-	-	3
CO2	3	1	2	2	-	-	3
CO3	3	1	2	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-24)
DME– I SEMESTER
ME-107, MID SEMESTER - I EXAMINATION
ENGINEERING DRAWING - I

Time:1Hour]

[TotalMarks:20

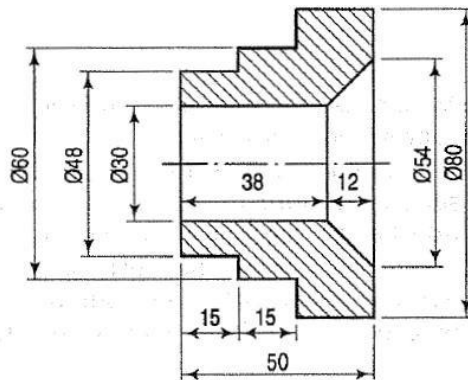
PART-A

04x02=08

Instructions : 1. Answer **ALL** questions.

9. Each question carries **TWO** marks.

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



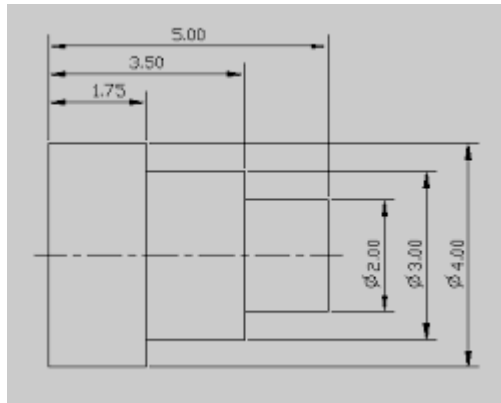
3. To divide a straight line of 70 mm into 6 equal parts.
4. Bisect a given line AB of length 75 mm.

PART-B

02x06=12

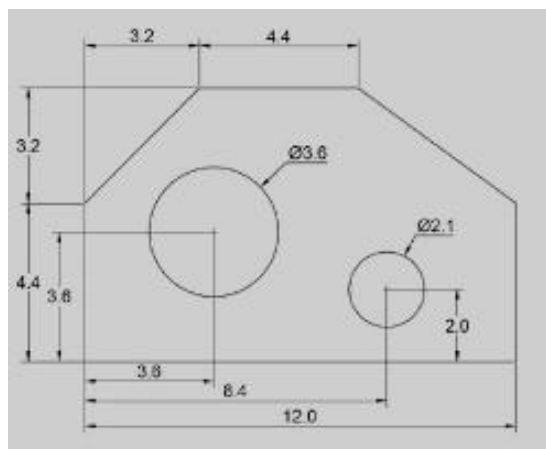
Instructions : 1. Answer **ALL** questions.
2. Each question carries **SIX** marks.

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-24)
DME– I SEMESTER
MID SEMESTER - II
EXAMINATIONENGINEERING
DRAWING - I

Time:1Hour]

[TotalMarks:20

PART-A

04x02=08

- Instructions :**
1. Answer **ALL** questions.
 2. Each question carries **TWO** marks.
1. Draw an arc of radius 30mm 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 30mm if the centre distance is 75 mm.
 3. Draw the projections of appoint A lying on both the planes.
 4. A line AB of length 70mm is parallel o V.P. and inclined an angle of 30^0 to H.P. Draw its projections when it send 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 30mm from both the reference planes.
- (Or)
6. (b) A square of base side 40mm is perpendicular to both the reference planes. Draw its projections.

MODEL PAPER SEE
BOARD DIPLOMA EXAMINATION, (C-24)
DME- I SEMESTER END EXAMINATION
ENGINEERING DRAWING - I

Time: 2 hours]

[Total Marks: 40

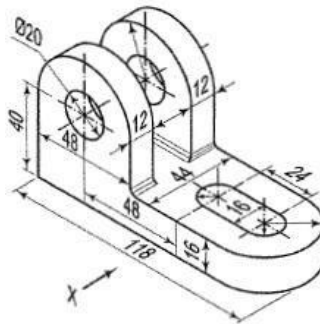
Important Note: Wherever any question has choice, marks will be allotted only to first attempted question. No marks will be allotted for extra questions answered.

PART-A

08x02=16

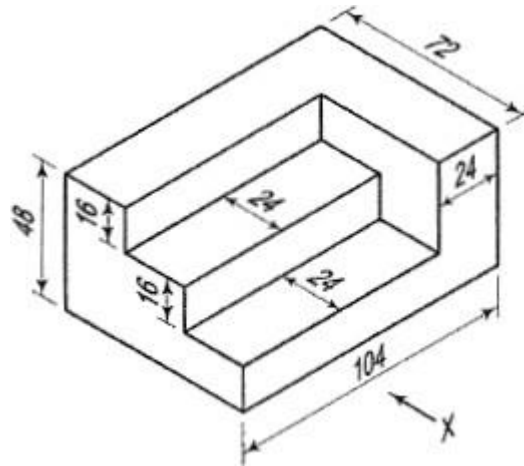
Instructions :

1. Answer **ALL** questions.
2. Each question carries **TWO** marks.
3. All the dimensions are in mm.
1. Write the following, using single stroke vertical capital letters of size 10 mm:
'DEVELOP AN ATTITUDE OF GRATITUDE'
2. Bisect the given angle of 55° .
3. Inscribe a pentagon in a given circle of radius 35 mm.
4. Draw the projections of a point 'P' lying on HP and 30 mm behind VP.
5. Draw the top view of a circular plate of diameter 50 mm when its plane is perpendicular to HP.
6. Draw the projections of a cube of base side 30 mm when it is resting on one of its base on HP with one of its vertical face is parallel to VP.
7. Draw the front view of the block shown in figure



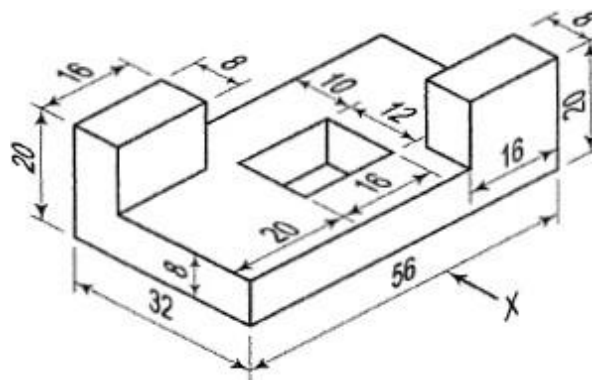
8. Draw the front view of the block shown in figure

9. (b) Inscribe a hexagon in a given circle of radius 30mm by keeping one of its sides 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 25mm 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

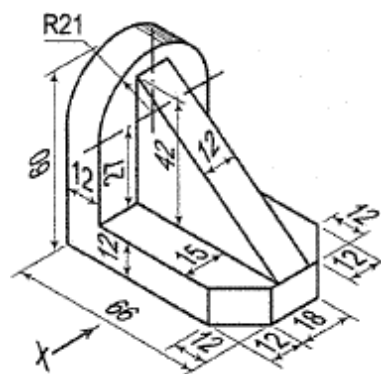


(Or)

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

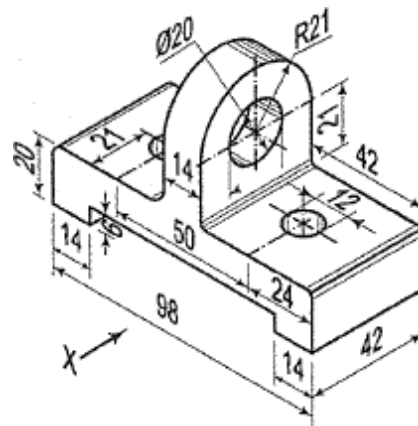


12. (a) Draw the front view of component shown in figure



(Or)

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



EE-108 - ELECTRICAL WORKSHOP PRACTICE

Course Title:	Electrical Workshop Practice	Course Code	EE-108
Semester	I Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic electricity

Course Outcomes

Upon completion of the course, the students will have the ability to:

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Identify Tools, Accessories and Perform various joints	R/U/A	1,2,4	09
CO2	Demonstrate various Electrical Wiring Circuits	U/A	3,4	21
CO3	Identify various Soldering Equipment and Perform Soldering	R/U/A	1,3,4,5	9
CO4	Build new circuits based on requirement	A	3,6,	6

Suggested Learning Outcomes

C01 - Identify Tools, Accessories and Perform various joints

1.1 Identify the following electrical wiring tools.

- a) Screw drivers
- b) Pliers
- c) Drilling machines & Drilling Bits.
- d) Rawl plug jumper
- e) Voltage/line tester
- f) Splicers (insulation remover)
- g) Standard Wire gauge

1.2 Identify different types of Electrical Wiring accessories.

- a) Switches
- b) Ceiling roses
- c) Lamp holders and adapters
- d) Sockets
- e) Plug top

1.3 Identify different types of main switches like

DP mains, 2-pole Isolators, 3-pole isolators, 4-pole isolators, DPDT, TPDT, Change over Switches.

- 1.4 Identify fuse, 1-pole, 2-pole and 3-pole MCB's, ELCBs and RCCBs
- 1.5 Identify various types of wires and cables with respect to sizes, rating, purpose and use etc.
- 1.6 Make straight joint/ married joint
- 1.7 Make T joint
- 1.8 Make Western union joint
- 1.9 Make pigtail joint

C02 - Demonstrate various Electrical Wiring Circuits

- 2.1 Make a circuit for two lamps controlled by two switches and Switch controlled 2/3 pin socket with PVC surface conduit system.
- 2.2 Make a circuit for stair case wiring.
- 2.3 Make a circuit for godown wiring.
- 2.4 Make a circuit for electrical bell connection.
- 2.5 Make a circuit for ceiling fan with regulator
- 2.6 Make a connection for Fluorescent Lamp with Choke and Starter

C03 - Identify various Soldering Equipment and Perform Soldering

- 3.1 Identify and handle various soldering tools and components
- 3.2 Practice soldering on PCB.

C04 - Build Simple circuits based on requirement.

- 4.1 Construct simple circuits on PCB using Electronic Components

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	PO6	PO7	
CO1	3	-	-	3	1	2	1	1,4,5,6,7
CO2	3	-	-	3	3	2	-	1,4,6,5
CO3	3	-	3	2	2	2	-	3,4,5,6,7
CO4	-	2	3	-	2	2	3	3,4,5,6.7

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE I Semester
Mid Semester-I Examination

Course Code: EE-108
Course Name: Electrical Workshop Practice

Duration: 1 Hour
Max. Marks: 20

Note: Answer allotted Question.

1. Perform married jointing of given wires.
2. Make T joint of given wires
3. Perform Western union jointing of given wires
4. Make pigtail joint of given wires
5. Perform installation of a wiring circuit for one lamp controlled by one switch with PVC surface conduit system.
6. Perform installation of a wiring circuit a circuit for two lamps controlled by two switches with PVC surface conduit system.

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE I Semester
Mid Semester-II Examination

Course Code: EE-108
Course Name: Electrical Workshop Practice

Duration: 1 Hour
Max. Marks: 20

Note: Answer allotted Question.

1. Connect a circuit for one lamp controlled by one switch and provision of 2/3pin socket.
2. Perform installation of a circuit for stair case wiring.
3. Connect a circuit for godown wiring.
4. Connect a circuit for electrical bell connection.
5. Perform installation a circuit for ceiling fan with regulator.

State Board of Technical Education and Training, Telangana

Model Question paper

DEEE I Semester

SEMESTER END EXAMINATION

Course Code: EE-108

Duration: 2 Hour

Course Name: Electrical Workshop Practice

Max. Marks: 40

Note: Answer allotted Question.

1. Perform married jointing of given wires.
2. Make T joint of given wires
3. Perform Western union jointing of given wires
4. Make pigtail joint of given wires
5. Perform installation of a wiring circuit for one lamp controlled by one switch with PVC surface conduit system.
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 soldering wherever it is required in a given electronic device.
13. Perform soldering on PCB.

SC-109-BASIC SCIENCE LAB

Course Title	Basic Science Lab	Course Code	SC-109
Semester	I Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Type of course	Lecture + Practical	Total Contact Periods	45 Periods
CIE	60 Marks	SEE	40 Marks

SC-109A - PHYSICS LAB

Pre requisites:

This course requires the basic knowledge of Science and Mathematics.

Course Outcomes

On completion of the course, the student shall be able to

CO1	Demonstrate the principle of Screw Gauge and calculate accurate measurement of thickness of glass plate and area of cross section of a wire.
CO2	Make use of laws of vector addition to verify Parallelogram law of forces and Triangle law of forces.
CO3	Determine the coefficient of friction between wood and wood and wood and glass surfaces on horizontal plane.
CO4	Calculate coefficient of viscosity of a liquid by capillary method.
CO5	Make use of Quill tube to verify Boyle's law.
CO6	Calculate the surface tension of water using capillary rise method. (Demonstration only)

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Practices Engineering Practices for Society, Sustainability and	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3					1	1	1,6,7
CO2	3					1	1	1,6,7
CO3	3					1	3	1,6,7
CO4	3					1	3	1,6,7
CO5	3					1	3	1,6,7

Learning outcomes

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

1. Demonstrate the principle of Screw Gauge and calculate accurate measurement of thickness of glass plate and area of cross section of a wire.
2. Make use of laws of vector addition to verify Parallelogram law of forces and Triangle law of forces.
3. Determine the coefficient of friction between wood and wood and wood and glass on horizontal plane.
4. Calculate coefficient of viscosity of a liquid by capillary method.
5. Make use of Quill tube to verify Boyle's law.

Demonstration Experiment:

1. Calculate the surface tension of water using capillary rise method.

Course Delivery:

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

Tutorial: 1Period /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.

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. Intermediate Physics lab manual – Telugu Academy
2. Laboratory manual for class XI and XII – NCERT

SC-109B - 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 primary standard solution to find out the concentrations of unknown solution.
CO2	Estimate the amount of the HCl in the given sample of solutions by volumetric analysis.
CO3	Estimate the amount of the NaOH in the given sample of solutions by volumetric analysis.
CO4	Find the pH of the unknown solutions collected from different industrial areas and recommend a remedial action.
CO5	Determine the hardness of water sample and recommend a solution for identified hardness

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

Course Delivery:

The course will be delivered through lectures, classroom interactions, group discussions, demonstrations 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-
Harness of water

List of experiments:

1. Preparation of primary standard solution.
2. Estimation of hydrochloric acid by using standard basic solution
3. Estimation of sodium hydroxide by using standard acidic solution.
4. Standardisation of disodium salt of EDTA using standard magnesium sulphate solution.
5. Determination of total hardness of water sample by EDTA method.

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. Standardisation of disodium salt of EDTA using standard magnesium sulphate solution.
5. Determine the total hardness of water sample by using 0.02N disodium salt of EDTA solution.

Reference Books:

1. Vogel's Inorganic Qualitative and Quantitative Analysis.
2. Practical chemistry by O.P. Pande & others.
3. Intermediate Chemistry Lab manual- Telugu academy (Telangana state)

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-voice	3
Total		20

BOARD DIPLOMA EXAMINATION, (C-24)

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. Determine the thickness of given glass plate using Screw gauge.
2. Find the cross sectional area of given wire using Screw gauge.
3. Verify parallelogram law of forces.
4. Verify triangle law of forces.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

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

BOARD DIPLOMA EXAMINATION, (C-24)

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. Determine the coefficient of friction between wooden surface and wooden block.
2. Determine the coefficient of friction between glass surfaces and wooden block.
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. Estimate the amount of NaOH present in 750ml solution using 0.02M HCl solution
3. Find out the Normality of EDTA solution using 0.02N MgSO₄ solution

BOARD DIPLOMA EXAMINATION, (C-24)
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. Determine the thickness of given glass plate using Screw gauge.
2. Find the cross sectional area of given wire using Screw gauge.
3. Verify parallelogram law of forces.
4. Verify triangle law of forces.
5. Determine the coefficient of friction between wooden surface and wooden block.
6. Determine the coefficient of friction between glass surfaces and wooden block.
7. Determine coefficient of viscosity of water using capillary method.
8. Verify Boyle's law using Quill tube.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Prepare 250ml of 0.05M sodium carbonate solution.
2. Estimate the amount of hydrochloric acid present in 500ml of the given solution using 0.02M sodium carbonate solution.
3. Find the Molarity and estimate the amount of NaOH present in 100ml of the given solution using 0.01M HCl solution.
4. Find out the Normality of EDTA solution using 0.02N MgSO_4 solution
5. Determine the total hardness of the given water sample using 0.02N EDTA solution.

CS-110-COMPUTER FUNDAMENTALS LAB

Course Title:	Computer Fundamentals Lab	Course Code	CS-110
Semester	I Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture + Tutorials	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre-requisite: The students should have basic knowledge of English

Pre-requisite: The students should have 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

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

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

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

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

Duration: 10 hrs

Building Worksheets – Building Charts, Printing EXCEL Worksheet

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:

CO1: Creating and saving a document, Formatting of text in 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.

CO2: 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.

CO2: Creating and Saving a presentation, inserting text and pictures & Formatting the text and pictures, Slide transition and Animation effects in MS-POWER POINT

- 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.

CO4: Building Worksheet & Charts In Ms-Excel and Printing Of Worksheet

- 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.

CO5: Creating Database, Tables, Forms, Queries, Reports In Ms-Access

- 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 and editing Data into Worksheet
21. Formatting the text in the cells
22. Formatting the numbers in the cells.
23. Changing the height and width of cells.
24. Freezing Titles, splitting screen
25. Enter formulae for calculation in the cells.
26. Copying the formula over a range of cells.
27. Inserting built-in functions in to the cells.
28. Create graphs for the data using Chart Wizard.
29. Practice Data Forms in Excel.
30. Printing of worksheet
31. Creating Tables using wizard in Access
32. Creating Tables using Design View in Access.
33. Entering Data into tables
34. Viewing the data in table.
35. Creating a new query using wizard.
36. Creating a new query using design view.
37. Viewing the data using a Select Query.
38. Updating the data in table using Update Query.

39. Linking two Tables on Relational Aspect.
40. Create forms using Form Wizard.
41. Create reports using Report Wizard.
42. 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

	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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO
CO1	3	1						1,2
CO2	3	2	1					1,2,3
CO3	3	1						1,2
CO4	3	1	2	2				1,2,3,4
CO5	3	1	2	1				1,2,3,4

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD
CS-110 Computer Fundamentals Lab
I-SEMESTER, MID -I MODEL PAPER

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 QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD
CS-110 Computer Fundamentals Lab
I -SEMESTER, MID -II MODEL PAPER

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 QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD
CS-110 Computer Fundamentals Lab
I-SEMESTER, END SEMESTER MODEL PAPER

TIME: 2hr

MARKS: 40

ANSWER ANY ONE QUESTION.

EACH QUESTION CARRIES TWENTY MARKS.

20 x 1 = 20

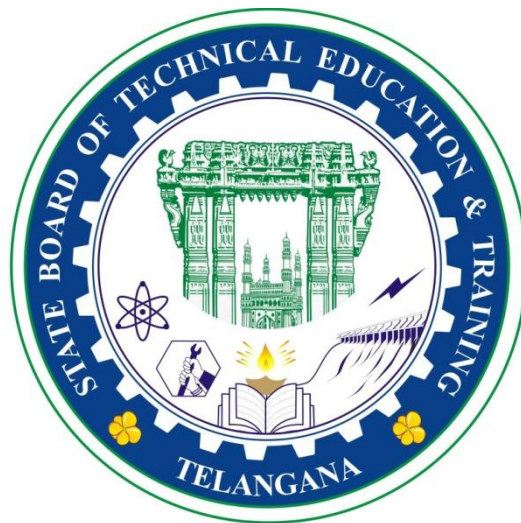
1. Write procedure for Creating and saving a document and draw and label the different parts of opening screen elements in Ms word.
2. Draw and explain the groups and commands in Home tab under ribbon in MS Power Point.
3. Write procedure for applying sounds, order, timing and effects of animation in 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

C24_CURRICULUM

**DIPLOMA IN
ELECTRICAL AND ELECTRONICS
ENGINEERING**



Offered By

**STATE BOARD OF
TECHNICAL EDUCATION AND TRAINING
TELANGANA HYDERABAD**

TEACHING AND EXAMINATION SCHEME

Sl. No.	Course Code	Course Name	Teaching Scheme					Examination Scheme						
			Instruction periods per week			Total Periods per semester	Credits	Continuous internal evaluation			Semester end examination			
			L	T	P			Mid sem. I	Mid sem. II	Internal evaluation	Max. Marks	Min. Marks	Total marks	Min. marks for passing including internal
1	HU-201	Advanced English	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be $\geq 35\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade Minimum
2	SC-202	Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	
3	SC-203	Applied Physics	4	1	0	75	2.5	20	20	20	40	14	100	
4	SC-204	Applied Engineering Chemistry	4	1	0	75	2.5	20	20	20	40	14	100	
5	CS-205	Programming In C	4	1	0	75	2.5	20	20	20	40	14	100	
6	EE-206	Electronic Devices	4	1	0	75	2.5	20	20	20	40	14	100	
7	ME-207	Engineering Drawing - II	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be $\geq 50\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade Minimum
8	EE-208	Electronic Devices Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	SC-209	Applied Science Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	CS-210	Programming In C Lab	1	0	2	45	1.25	20	20	20	40	20	100	
Total			28	6	8	630	20	200	200	200	400	164	1000	

HU – 201- ADVANCED ENGLISH

Course Title	Advanced English	Course Code	HU-201
Semester	II	Course Group	Foundation
Teaching Scheme in Minutes (L:T)	3:2	Credits	2.5
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 THROUGH READING - II

Duration: 15 Periods (L 9 P 6)

- a. Homonyms, Homophones and Homographs
- b. Root-words and Affixes
- c. Reading – III
Passages on Innovation, Science and Technology, History, Biography, Travel Writing, Nature Writing, Journal, Story, Process, Cause and Effect, Problem Solution, Evaluation of ideas, Reasons and Conclusion, etc.
- d. Reading – IV
Passages on Innovation, Science and Technology, History, Biography, Travel Writing, Nature Writing, Journal, Story, Process, Cause and Effect, Problem Solution, Evaluation of ideas, Reasons and Conclusion, etc.

MODULE 2: SPEAKING- III

Duration: 10 Periods (L 6 P 4)

- a. Making Requests
- b. Offering Help and Suggestions
- c. Expressing Obligations
- d. Seeking and Giving Permissions

MODULE 3: GRAMMAR-III

Duration: 15 Periods (L 9 P 6)

- a. Reported Speech
Conversion from Direct to Indirect Speech but not vice versa
- b. Error Analysis - I
On nouns, articles, pronouns and verbs
- c. Error Analysis - II
Adjectives, adverbs and Prepositions
- d. Error Analysis - III
Questions, concord, redundancy and other kinds of errors

MODULE 4: SPEAKING – IV

Duration: 10 Periods (L 6 P 4)

- a. Giving Directions
- b. Giving Instructions
- c. Talking about the Past
- d. Describing Objects

MODULE 5: WRITING - II

Duration: 15 Periods (L 9 P 6)

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

MODULE6: WRITING-III

Duration: 10 Periods – (L 6 P 4)

- a. Writing a Resume
 - i. Different formats of a resume
 - ii. Analyze strengths and weaknesses.
- b. Writing a Cover Letter
 - i. Importance of cover letter
 - ii. Format of cover letter
 - iii. Sample cover letter
- c. Note Making
 - i. Understand the Benefits of Note Making.
 - ii. Cue Method
 - iii. Mind Mapping
- d. Writing a Report
 - i. Understand the concept of report writing and formats of various reports.
 - ii. Report on an incident.
 - iii. Report on an industrial visit.
 - iv. Report on events.

COURSE OUTCOMES

CO	At the end of the course the students will be able to
CO 1	Learn vocabulary and use them in professional & social interactions and comprehend the passages.
CO 2	Make requests, offer help and suggestions, express obligations, seek and giving permissions.
CO 3	Learn English grammar to speak and write flawlessly.
CO 4	Give directions and instructions, talk about the past and describe objects.
CO 5	Learn the mechanics of writing to make the technical writing practical and meaningful and interpret the data given.
CO 6	Prepare resumes, prepare cover letters, make notes and draft reports.

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
CO 1	-	-	-	-	2	2	2	5, 6 and 7
CO 2	-	-	-	-	2	2	2	5, 6 and 7
CO 3	-	-	-	-	1	3	2	5, 6 and 7
CO 4	-	-	-	-	2	2	3	5, 6 and 7
CO 5	-	-	-	-	1	2	3	5, 6 and 7
CO 6	-	-	-	-	2	2	3	5, 6 and 7

CONTINUOUS INTERNAL EVALUATION (CIE)

Test	Modules	Marks	Pattern
Mid - I	1. Vocabulary Through Reading- II 2. Speaking - III	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 - II	1. Grammar - III 2. Speaking - IV	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 Through Reading - II 2. Speaking - III	5	2 questions out of 3 questions
Slip Test 2	1. Grammar - III 2. Speaking - IV	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	

Legend:

Remembering: 1 mark Understanding: 3 marks Application: Five marks

Suggested Student Activities:

- Practice conversation / dialogue / speech and answer the questions.
- Seminars.
- Collect the resumes of the successful people.
- Narrate a story.
- Prepare chain stories.
- Vocabulary building games.
- Speak about incidents / events / memories / dreams / role model.
- Interviews of famous personalities.
- Collect the biographies of unsung heroes.
- Read for main ideas and specific details.
- Picture description.
- Collect the letters written by famous persons and analyze them.
- Describe a process.
- Give directions using maps.
- Collect user manuals and analyze the sets of instructions given.
- Collect the various types of reports and analyze the information.
- Collect the official information given in the forms of tables, tree diagrams and pie charts.

REFERENCES:

1. High School English Grammar & Composition by Wren & Martin
2. Practical English Grammar by A.J Thomson and A.V. Martinet
3. A Course in Phonetics and Spoken English by J. Sethi and P.V Dhamija
4. Word Power Made Easy by Norman Lewis.
5. Essential English Grammar by Raymond Murphy.
6. Spoken English-A Self Learning Guide to Conversation Practice by V. Sasi Kumar.

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION -I

HU-201 ADVANCED ENGLISH

Time: One Hour

Total Marks: 20

PART - A

1 X 4 = 4 Marks

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

1. Write the antonym of words using the root word, 'Micro'.
2. Read the following paragraph and answer the question that follows.

Nature is the best gift of God to all living beings on earth. Human beings depend on nature to survive, whereas trees and other living beings balance eco system in nature. Trees, flowers, animals, mountains, rivers, oceans, valleys, sky, forest etc., are parts of nature. Nature provides us air, water, food, light, health and many more to live. But man is misusing all these natural resources for his greediness.

- a) What does nature provide us?
3. How do you request your teacher to repeat the lesson? Write in a sentence.
4. A pregnant lady is boarding a bus with heavy luggage. How do you offer her help?

PART – B

2 X 3 = 6 Marks

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

5. i) Use the following homonyms in your own sentences.
 - a. Right
 - b. Ring
 - c. Rise

(OR)

- ii) Form antonyms for the given words using suitable prefixes.
 - a) Loyal
 - b) Legal
 - c) Necessary
6. a) Using the words of obligation, write any three precautions you have to take when a little baby is in your home.

(OR)

- b) How do you seek permission from your teacher for attending a training programme? Write your discussion in the form of a dialogue.

PART – C**2 X 5 = 10 Marks**

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

7. a) Read the following passage and answer the questions given below it.

Man used to fly in hot air balloons before the airplane was invented. The first hot air balloon was invented in 1780. Hot air, being lighter than the cold air, made the balloon rise. The first hot air balloon was designed by the Montgolfier Brothers. It took flight in 1783. Hydrogen is the lightest of all gases. It is lighter than air. So it gives a greater lift to the balloon than hot air. Thus, the hydrogen balloon was an improvement on the hot air balloon. Ballooning was a popular sport until the 1930s. Today balloons are used for forecasting the weather and in scientific research most balloons contain Helium which is heavier than Hydrogen but does not burn as easily as Hydrogen.

- i. Who designed the hot air balloon?
- ii. When was the hot air balloon invented?
- iii. Why is hydrogen used in balloons?
- iv. How are the balloons used for today?
- v. What is the meaning of the word, forecast?

(OR)

b). Read the following passage and answer the questions given below it.

Malaria is one of the deadliest and most destructive of all diseases. Thousands of people die of it every year in India alone. In the middle ages, people realized that it was common in places where there was stagnant water or the places such as marshes and swamps. They thought the air was the cause of this disease and named it 'malaria' which means bad air. Not till nearly the end of the nineteen century, the great discovery was made that it was not the stagnant water nor was it the marshy air which spread malaria. The real culprit was the mosquito.

- i. Name the disease considered to be deadly and destructive?
- ii. What is the meaning of malaria according to people of middle ages?
- iii. Where was malaria very common?
- iv. Nearly how many people die of malaria in India every year?
- v. Name the insect responsible for causing malaria?

8. a) How do you request your friend to clarify your doubts in mathematics. Write a dialogue.

(OR)

b) Your younger brother wants to apply for POLYCET. Give him any five suitable suggestions.

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION -II

HU-201 ADVANCED ENGLISH

Time: One Hour

Total Marks: 20

PART - A

1 X 4 = 4 Marks

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

1. She said, 'I am hungry'. (Change the sentence into reported speech)
2. Vijay along with friends go to temple. (Correct the sentence)
3. Give directions to your sister from your home to reach library in your town.
4. Describe your mobile using four adjectives.

PART-B

2 x 3 = 6 Marks

Instructions: a) Answer all the questions. b) Each question carries three marks.

5. a) Change the following into indirect speech.
 - i. She said to him, "Where are you going?"
 - ii. He said to her, "I bought books yesterday."
 - iii. Sunil said to me, "Will you bring your camera tomorrow?"(OR)
 - b) Correct the following sentences.
 - i. They discussed about politics.
 - ii. We buy a car two days ago.
 - iii. She is my older sister.

6. a) How did you celebrate your birthday recently?
(OR)
- b) Describe your laptop or desktop computer in 50 words.

PART-C

2 X 5 = 10 Marks

Instructions: a) Answer all the questions. b) Each question carries five marks.

7. a) Change the following sentences into reported speech.
 - i. She said, "I saw a cute dog in the park."
 - ii. He said, "I am going out."
 - iii. Vijay said, "It may rain now."
 - iv. Chandu said, "We will go to school tomorrow."
 - v. Madhuri said to Prasad, "When did you come?"(Or)

b) Correct the following sentences.

- i) My birth day is on January.
- ii) You must and should come here.
- iii) This is the horse who won the race.
- iv) I prefer coffee than tea.
- v) I am having a car.

8. a) Write instructions for taking a bus pass.

(Or)

- b) Give suggestions to your friend on how to score good marks in POLYCET

BOARD DIPLOMA END EXAMINATION (C-24)

SEMESTER END EXAMINATION

HU-201 ADVANCED ENGLISH

Time: Two Hours

Total Marks: 40

PART-A

1 X 8 = 8 Marks

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

1. Write the antonyms of the following words using the suitable prefixes.
a) logical b) polite
2. Correct the following sentence.
a) This is the best of the two books I have.
3. What salutations do you use in a cover letter?
4. Rewrite the following sentence using appropriate punctuation marks and capital letters.
a) she told him that she had returned bhaskars book yesterday
5. Correct the spellings of the following words.
a) shedule b) plander
6. Rewrite the following sentence using the appropriate punctuation marks and capital letters.
vinod went to hyderabad on 2nd march 2024.
7. You are applying for the post of Assistant Engineer in BHEL. Write the educational qualifications in the resume.
8. What complimentary closure do you use in a cover letter?

PART-B

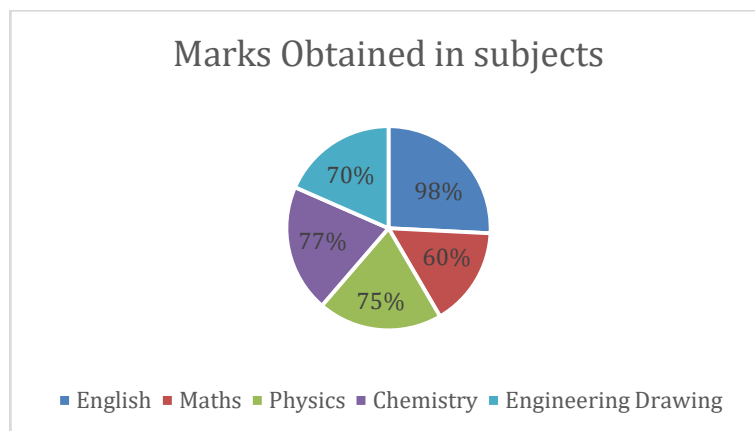
3 X 4 = 12 Marks

Instructions: a) Answer all the questions. b) Each question carries three marks.

9. a) Add affixes to the following words.
i) Value
ii) Create
iii) Sense

(OR)

- b) Write a short paragraph on the following Pie chart.



10.a) Write about your favourite past incident.

(OR)

b) Write your three strengths and three limitations.

11.a) Read the following sentence and provide proper punctuation marks.

i) drajay studied his mbbs in gandhi medical college

(OR)

b) Write a paragraph interpreting the data given in the following table.

Year	Salary	Expenditure on housing and transport	Interests on Loan	Savings
2018	70k	30k	7k	33k
2029	75k	35k	10k	30k
2020	80k	40k	13k	37k
2021	90k	45k	13k	37k
2022	1L	50k	14k	46k
2023	1.5L	52k	14k	86k

12. a) V. Vijay completed his M.Tech. He wants to apply for the post of Executive Engineer in Pragathi Engineering Company. Prepare a resume for the same.

(OR)

b) Read the following paragraph and make notes.

Yuvraj Singh is one of the most phenomenal cricketers who have redefined winning over struggle. Since the year 2000, this Punjab boy is the reason for many victories of India. His personal life and his struggle with the dreaded disease cancer is an inspiration for all of us. He is also one of the players who is honored with Arjuna award and has been declared Man of the Tournament in the 2011 ICC Cricket World Cup. Yuvraj Singh made a comeback to India national cricket team (ODI squad) after a lengthy period earlier this year, and fared average. The cricketer, also known for entrepreneurial initiatives and his charity work, says cricket will always be a priority in his life but he also tries to inspire young people with his story. He made India proud by hitting six sixes off an over in 2007, and was part of the Indian cricket team when they won World Cup 2011. But the turning point came in his life when he battled cancer in 2012. Yuvraj found a new meaning to life after the hardship. "Earlier on in my career, it was more about cricket and now it is being more about inspiring people to come out of the adversity and create examples... Since my treatment, things have changed a lot for me."

PART-C**4X 5 = 20 Marks****Instructions: a) Answer all the questions. b) Each question carries five marks. .**

13. a) Read the following paragraph and answer the questions:

Once, there lived two friends in a village. Their names were Bhaskar and Suresh. One day they set out on a journey and had to pass through a forest. As they were passing through the forest they saw a big bear coming towards them. They were frightened. Bhaskar at once climbed up a nearby tree to save his life. Suresh did not know how to climb up a tree. But he was wise and intelligent. He had heard that bears do not touch the dead. So he lay on the ground, held his breath and appeared to be dead. The bear came near him sniffed him, thinking him to be dead, it went away. When the bear had left Bhaskar came down from the tree and asked Suresh what the bear had whispered in his ear. Suresh said that the bear had advised him to beware of false friends.

1. Where were the friends going one day?
2. What is the antonym of the word, wise?
3. What did Bhaskar do when bear came towards them?
4. How can you say Suresh was wise and intelligent?
5. Did the Bear really whisper in Suresh's ear?

(OR)

b) Write a paragraph interpreting analyzing the information given in the following table.

Table Showing the Number of Students Admitted in Different Branches in Private Engineering Colleges in the Past Four Years.

Year	ECE	EEE	Mechanical	Civil	CSE
2023	54065	36255	21600	34000	13436
2022	49008	36255	20900	29000	22687
2021	45032	36255	20600	14500	32008
2020	38060	36254	20300	14500	38065

14.a) Change the following into indirect speech.

- i. He said, "I have eaten a banana."
- ii. She said, "I will go to Chennai tomorrow."
- iii. Hari said, "I can speak French."
- iv. Karunakar said to Vani, "I have completed my homework."
- v. Doctor said to Mani, "Are you a Professor?"

(OR)

b) Write a report on the industry you visited recently.

15. a) Rewrite the following sentences using proper punctuation marks and capital letters.

- i. when you are coming.
- ii. i love Flowers?
- iii. this is my cousins book.
- iv. "all that glittersis not gold.
- v. What a melodious song?

b)Observe the following flow chart and write a paragraph describing the steps involved in creating an e-mail.



16. a) Write a cover letter applying for the post of Work Supervisor at Bharath Electronics Private Limited.

(OR)

b) Write a report to the Principal on how you have conducted the Seminar on Robotics.

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	2.5
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	Solve simple problems in straight lines and circle using various formulae
CO 2	Solve the simple problems in conic section by using its properties
CO 3	Evaluate the Limits of Algebraic, Rational and Trigonometric functions.
CO 4	Determine the Derivatives of various Functions
CO 5	Determine the Derivatives of various functions by using various Differentiation Methods
CO 6	Solve some problems in Geometrical applications of derivatives and Maxima and Minima

Course Contents:

Unit – I Straight lines and Circles:

Duration: 12 Periods (L: 10– T:2)

Straight lines: Slope of straight line - Various forms of straight line-Horizontal and Vertical lines, Point-Slope form, Two-Point form, Slope-Intercept form, Intercept form, Normal form and General equation of a Straight line- Angle between two Straight lines- Conditions for Parallelism and Perpendicularity of the Straight lines –Equations of parallel and Perpendicular Straight lines- Distance of a point from a line -Distance between two Parallel lines - Intersection of two non-parallel lines - Related problems.

Circles: Definition of Locus of a point and Circle and its equation - Equation of the Circle, given(i) Centre and Radius, (ii) Two ends of a Diameter (iii) Centre and a point on the Circumference (iv) Centre and Tangent and (v) Three non-collinear points - Related problems.

Unit – II Conic Sections:

Duration: 13Periods (L: 10 – T:3)

Definitions of Conic Section, Focus, Eccentricity, Directrix, Axes and Latus rectum - **Parabola:** Standard equations of Parabolas have focus on one of the coordinate axes; vertex at origin and directrix is parallel to the other coordinate axis -**Ellipse:** Standard equations of Ellipses have centre at the origin and the major and minor axes are coordinate axes - **Hyperbola:** Standard equations of Hyperbola have centre at the origin and the transverse and conjugate axes are coordinate axes -Related properties and problems.

Unit-III Functions& Limits:**Duration: 12Periods (L: 10– T: 2)**

Definition of a function -Constants and Variables - Independent and Dependent Variables - Various types of functions: Constant function, Explicit and Implicit functions, Even and Odd functions, Hyperbolic functions, Modulus function and Function of a function with examples - Intervals and Neighbourhoods - Meaning of $x \rightarrow a$ - Definition of Limit of a function - Properties of Limits - Indeterminate forms- Standard Limits (without proof)- Evaluation of Limits of the form: $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$ using Algebraic techniques- Evaluation of limits of the form: $\lim_{x \rightarrow l} \frac{f(x)}{g(x)}$ using Direct Substitution, Factorization, Rationalization and Reduction to Standard forms.

Unit – IV Differential Calculus – I:**Duration: 13 Periods (L: 10 – T:3)**

Definition of Derivative of a function(First Principle of Derivatives) -Different notations - Derivatives of Standard Algebraic, Logarithmic, Exponential, Trigonometric, Hyperbolic and Inverse Trigonometric functions - Algebra of derivative of functions: Derivatives of Sum, Difference, Scalar Multiplication, Product, Quotient of functions-Derivative of function of a function(Chain rule)- Related problems.

Unit – V Differential Calculus – II:**Duration: 13Periods (L: 10 – T: 3)**

Logarithmic Differentiation -Derivative of Implicit functions - Differentiation of an Infinite Series - Derivative of Parametric functions- Differentiation of a function with respect to another function-Successive differentiation with emphasis on second order-Functions of several variables - Partial Differentiation - Euler's theorem for Homogeneous functions - Related problems.

Unit – VI Applications of Derivatives:**Duration: 12Periods (L: 10– T: 2)**

Geometrical Applications: Geometrical meaning of the Derivative -Slope of Tangent, Slope of Normal, Equations of Tangent and Normal to the curve at any point on the curve - Lengths of Tangent, Normal, Sub-tangent and Sub-normal to the curve at a point on the curve - Angle between two intersecting curves - Related problems.

Maxima & Minima: Increasing and decreasing functions - Extreme values and Extreme points - Conditions for Maxima and Minima of function of single variable -The maxima and minima of simple functions - Problems leading to engineering applications.

Reference Books:

1. The Elements of Co - Ordinate Geometry – by S.L. Loney.
2. Thomas Calculus, Pearson Publications.
3. NCERT Mathematics Text Books of Class XI, XII.
4. Intermediate Mathematics Text Book IB (Telugu Academy).
5. Differential Calculus -by Shanti Narayan and P. K. Mittal.

Suggested E-Learning references:

1. <https://www.khanacademy.org/>
2. <https://www.desmos.com/>
3. <https://www.wolframalpha.com/>
4. <http://tutorial.math.lamar.edu/>

Suggested Learning Outcomes:

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

CO1: Solve simple problems in straight lines and circle using various formulae

- 1.1 Define slope of a straight line.
- 1.2 Classify various forms of a straight line:
 - (i) Horizontal and Vertical lines,
 - (ii) Point-slope form,
 - (iii) Two-point form,
 - (iv) Slope-intercept form,
 - (v) Intercept form,
 - (vi) Normal form and
 - (vii) General equation of a straight line.
- 1.3 Solve the problems on 1.2.
- 1.4 Find the acute angle between two straight lines.
- 1.5 Explain the conditions for parallelism and perpendicularity of straight lines.
- 1.6 Find the equation of parallel line which is passing through the given point.
- 1.7 Find the equation of perpendicular line which is passing through the given point.
- 1.8 Calculate the distance of a point from a line.
- 1.9 Evaluate the distance between two parallel lines.
- 1.10 Determine the point of intersection of two non-parallel lines.
- 1.11 Define locus of a point and circle.
- 1.12 Write the general equation of a circle with centre and radius.
- 1.13 Find the equation of a circle having its centre and radius.
- 1.14 Find the equation of a circle having two ends of a diameter.
- 1.15 Find the equation of a circle having its centre and a point on the circumference.
- 1.16 Find the equation of a circle having its centre and tangent.
- 1.17 Find the equation of a circle passing through three non-collinear points.
- 1.18 Solve the related problems from 1.12 to 1.17.

CO2: Solve the simple problems in conic section by using its properties

- 2.1 Define conic section.
- 2.2 Explain the terms focus, eccentricity, directrix, axes and latus- rectum of the conic.
- 2.3 Describe the properties of parabola in standard forms have focus on one of the coordinate axes; vertex at origin and directrix is parallel to the other coordinate axis.
- 2.4 Describe the properties of ellipses in standard forms have centre at the origin and the major and minor axes are coordinate axes.
- 2.5 Describe the properties of hyperbolas in standard forms have centre at the origin and the transverse and conjugate axes are coordinate axes.
- 2.6 Solve the problems related to 2.3, 2.4 and 2.5

CO3: Evaluate the Limits of Algebraic, Rational and Trigonometric functions.

- 3.1 Define function with example.
- 3.2. Explain constants, variables, independent and dependent variables.
- 3.3 Define various types of functions:
 - (i) Constant function,
 - (ii) Explicit and Implicit functions,
 - (iii) Even and Odd functions,
 - (iv) Hyperbolic functions,
 - (v) Modulus function and
 - (vi) Function of a function with examples.
- 3.4 Explain intervals and neighbourhoods.

- 3.5 Explain the meaning of $x \rightarrow a$.
- 3.6 Define Limit of a function.
- 3.7 Explain the Properties of Limits.
- 3.8 State indeterminate forms.
- 3.9 State the standard limits: $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$,
 $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}$, $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$.
- 3.10 Evaluate the Limits of the form $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$ using Algebraic techniques.
- 3.11 Evaluate limits of the form $\lim_{x \rightarrow l} \frac{f(x)}{g(x)}$ using
 (i) Direct substitution,
 (ii) Factorization,
 (iii) Rationalization and
 (iv) Reduction to standard forms.

CO4: Determine the Derivatives of various Functions

- 4.1 Define the concept of derivative of a function $y = f(x)$ as $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ (First Principle of Derivatives) and also provide standard notations to denote the derivative of a function.
- 4.2 Find the derivatives of simple elementary functions like k (constant), x^n , $\sqrt{x}$, $\sin x$, $\cos x$ using the First Principle of Derivatives.
- 4.3 List the formulae for derivatives of standard algebraic, logarithmic, exponential, trigonometric, hyperbolic and inverse trigonometric functions.
- 4.4 Use the Algebra of derivatives of functions, i.e. derivative of sum, difference, scalar multiplication, product and quotient of functions to solve problems.
- 4.5 Find the derivatives using the method of Differentiation of a Function of a function (Chain rule).

CO5: Determine the Derivatives of various functions by using various Differentiation Methods

- 5.1 Apply the Properties of Logarithms for differentiating functions of the form: $[f(x)]^{g(x)}$.
- 5.2 Explain the procedure for finding derivatives of Implicit functions with examples.
- 5.3 Find the derivatives of Infinite series of the form: (i) $\sqrt{f(x) + \sqrt{f(x) + \sqrt{f(x)} \dots \infty}}$ and
 (ii) $f(x)^{f(x)^{f(x) \dots \infty}}$.
- 5.4 Explain the method of Parametric Differentiation with examples.
- 5.5 Explain the method of Differentiation of a function with respect to another function with examples.
- 5.6 Explain successive differentiation with examples and solve engineering problems related to second order.
- 5.7 Define functions of several variables and explain partial derivatives up to second order with examples.
- 5.8 Define homogeneous functions with examples.
- 5.9 State Euler's theorem for homogeneous functions.
- 5.10 Verify Euler's theorem for homogeneous functions.
- 5.11 Apply Euler's theorem to solve engineering problems involving partial derivatives.

CO6: Solve some problems in Geometrical applications of derivatives and Maxima and Minima

- 6.1 State the geometrical meaning of the derivative of a function as the slope of the tangent to the curve $y=f(x)$ at any point on the curve.
- 6.2 Use the concept of derivative to find the slope of normal at a point on the curve.
- 6.3 Determine the equations of tangent and normal to the curve $y=f(x)$ at any point on the curve.
- 6.4 Calculate the lengths of tangent, normal, sub-tangent and sub-normal at any point on the curve $y=f(x)$.
- 6.5 Apply the concept of derivatives for finding the angle between two intersecting curves with illustrative examples.
- 6.6 Define increasing and decreasing functions.
- 6.7 State the conditions for increasing and decreasing functions.
- 6.8 Use the conditions 6.7 to find points where the given function is increasing or decreasing.
- 6.9 Define Extreme Values (Maximum and minimum values) and Extreme points (Points of Maximum and minimum) of a function of single variable.
- 6.10 Explain conditions for maxima and minima.
- 6.11 Find the Maxima and minima of simple functions.
- 6.12 Apply maxima and minima to solve engineering problems.

Suggested Student Activities:

- 1. Student visits Library to refer Standard Books on Mathematics and collect related material.
- 2. Quiz.
- 3. Group discussion.
- 4. Group Tests.
- 5. Formulae Tests.
- 6. Surprise tests.
- 7. Seminars.
- 8. Home assignments.
- 9. 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	1				3	1,2,3,7
CO4	3	2	1				3	1,2,3,7
CO5	3	2	1				3	1,2,3,7
CO6	3	2	3				3	1,2,3,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-202
SEMESTER II, MID – I EXAM, MODEL PAPER
ENGINEERING MATHEMATICS

Duration: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions: 1. Answer **ALL** questions.

04 × 01 = 04

2 Each question carries **ONE** mark.

1. Write the normal form of a straight line.
2. Find the equation of the point circle whose centre is (1,2).
3. Write the standard form an ellipse whose major axis is x- axis.
4. Find the equation of directrix of the parabola $y^2 = 36x$.

PART-B

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

02 × 03 = 06

2. Each question carries **THREE** marks.

- 5(a) If the equation of a line is $3x - 4y + 10 = 0$, then find i) its slope ii) x & y intercepts.

OR

- 5(b) Find the equation of the circle passing through the points (2,3) and touches the line

$$x - 3y - 11 = 0.$$

- 6(a) Find the equation of the parabola whose focus is (5, 0) and directrix is $x + 5 = 0$.

OR

- 6(b) Find the equation of an ellipse whose end points of major axis are $(\pm 3, 0)$ and end points of minor axis are $(0, \pm 2)$.

PART C

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

02 × 05 = 10

2. Each question carries **FIVE** marks.

- 7(a) Find the angle between straight lines $x + 3y - 1 = 0$ and $2x + 5y - 2 = 0$.

OR

- 7(b) Find the equation of the circle passing through the points (0, 0), (2, 0) and (0, 3).

- 8(a) Find the coordinates of foci, eccentricity and the length of latus rectum, equations of latera-recta and directrices of the ellipse $49y^2 - 16x^2 = 784$.

OR

- 8(b) Find the equation of the hyperbola whose centre is at (0,0) and passes the points (3,2) and (1,6).

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-202

SEMESTER II, MID – II EXAM, MODEL PAPER
ENGINEERING MATHEMATICS

Duration: 1: 00 Hour

Max. Marks: 20

PART-A

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

1. Find $\lim_{x \rightarrow 3} \left(\frac{x^3 - 3x^2}{x^2 - 5x + 6} \right)$.
2. Find $\lim_{\theta \rightarrow 0} \left(\frac{\sin 2\theta}{\theta} \right)$.
3. Differentiate $\tan(3x - 7)$ with respect to x .
4. If $y = x \cdot e^x$, then find $\frac{dy}{dx}$.

PART-B

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

5(a) Evaluate: $\lim_{x \rightarrow 5} \left(\frac{x^3 - 125}{x - 5} \right)$.

OR

5(b) Evaluate: $\lim_{x \rightarrow \infty} \left(1 + \frac{5}{x} \right)^x$.

6(a) Find the derivative of $\left(\frac{2x+3}{4x+5} \right)$ with respect to x .

OR

6(b) Differentiate $\sin^{-1}(3x - 4x^3)$ with respect to x .

PART C

Instructions: 1. Answer any **FOUR** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\lim_{n \rightarrow \infty} \frac{1^2 + 2^2 + 3^2 + \dots + n^2}{n^3}$.

OR

7(b) Evaluate: $\lim_{\theta \rightarrow 0} \left(\frac{\cos 3\theta - \cos 5\theta}{\cos 7\theta - \cos 9\theta} \right)$.

8(a) If $y = \sqrt{e^x + \log(\log(\sin x))}$ then find $\frac{dy}{dx}$.

OR

8(b) Find the derivative of $\sin x$ with respect to x by using first principle of derivatives.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-202

SEMESTER II, END SEMESTER EXAM, MODEL PAPER
ENGINEERING MATHEMATICS

Duration: 2:00 Hours

Max. Marks: 40

PART-A

Instructions: 1. Answer **ALL** questions.

08 × 01 = 08

2 Each question carries **ONE** mark.

1. Find the slope of a straight line passing through the points $(-2, 3)$ and $(4, 8)$.
2. Find $\lim_{x \rightarrow 0} \frac{x^2 + 3x + 2}{x^2 + 4x + 3}$.
3. Find the second order derivative of $x^3 + 4x^2 + 2$ with respect to x .
4. Write the equation of a parabola whose focus is $(a, 0)$ and the directrix is $x = -a$.
5. If $u(x, y) = x^2y$, then find $\frac{\partial y}{\partial x}$.
6. Find $(\frac{dy}{dx})$ if $xy = 2025$.
7. Find the slope of the curve $y = x^2 + 5x - 2025$ at $(1, 2)$.
8. Write the conditions for a point to be a minimum point on the curve $y = f(x)$.

PART-B

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

04 × 03 = 12

2. Each question carries **THREE** marks.

9(a) If $(1, 3)$ is an extremity of a diameter of the circle $3x^2 + 3y^2 + 6x - 12y - 2 = 0$, then find the other end point of the diameter.

OR

9(b) If $y = x^x$, then find $\frac{dy}{dx}$.

10(a) Evaluate: $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$.

OR

10 (b) Find the equation of tangent to the curve $y^2 = 8x$, at $(2, 4)$.

11(a) Find $\frac{dy}{dx}$, if $x = \lambda t$ and $y = \frac{\lambda}{t}$.

OR

11(b) If $u = \tan^{-1} \left(\frac{y}{x} \right)$, then prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

12(a) The sum of two numbers is 20. Find the numbers such that the sum of their squares is minimum.

OR

12 (b) Find the angle between the curves $y = x^2$ and $x^2 = y$.

PART C

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

04 × 05 = 20

13(a) Find the centre, foci, vertices, eccentricity, length of latus-rectum and lengths of major and minor axes of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$

OR

13 (b) Find $\frac{dy}{dx}$, if $\sqrt{x} + \sqrt{y} = \sqrt{a}$

14 (a) Differentiate $\log(x + \sqrt{x^2 + 1})$ with respect to x .

OR

14 (b) Show that $y^2 = 4(x + 1)$ and $y^2 = 36(9 - x)$ cut each other orthogonally.

15(a). If $y = (\sin x)^{(\sin x)^{(\sin x)^{\dots \infty}}}$, then find $\frac{dy}{dx}$.

OR

15 (b) Find the derivative of $\log \tan 2x$ with respect to $\cot 2x$

16 (a). A right circular cylinder is inscribed in a sphere of radius R , show that the volume is maximum when its height is $\frac{2R}{3}$.

OR

16 (b) Find the lengths of tangent, normal, sub-tangents and sub-normal for the curve

$$2x^2 + 3xy - 2y^2 - 8 = 0 \text{ at } (2, 3).$$

SC-203 - APPLIED PHYSICS

Course Title:	Applied Physics	Course Code :	SC-203
Semester:	II Semester	Course Group :	Foundation
Teaching Scheme in Periods(L:T:P):	4:1:0	Credits :	2.5
Type of Course :	Lecture+ Tutorials	Total Contact Periods :	75 Periods
CIE :	60 Marks	SEE :	40 Marks

Pre requisites

This course requires the basic knowledge of Science and Mathematics

Course Outcomes

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

CO1	Explain the motion characteristics displacement, velocity, acceleration of Simple Harmonic Motion and apply the formulation to obtain time period of simple pendulum.
CO2	Classify wave motions and apply mathematical formulations to echo, Doppler effect and identify causes, effects and minimizing method of noise pollution.
CO3	Explain basic concepts of electricity and extend Kirchhoff's laws to construct Meter bridge to determine unknown resistance.
CO4	Identify magnetic materials and apply laws of electromagnetic induction to construct transformer.
CO5	Utilize the laws and principles of Photoelectric effect, LASER and optical fibers to build Photocell and Ruby LASER.
CO6	Apply the properties of semiconductors and volt-ampere characteristics of P-N junction diode to construct half wave and full wave rectifiers and Light Emitting Diode.

	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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	-	-		-	-	2	1,7
CO2	3	-	-	1	-	-	2	1,4,7
CO3	3	1	-	1	-	-	2	1,2,4,7
CO4	3	1	-	1	-	-	2	1,2,4,7
CO5	3		-	1	-	-	2	1,4,7
CO6	3		-	1	1	-	2	1,4,5,7

Course content:

Unit 1 Simple Harmonic Motion

Duration: 12 periods (L: 10 – T: 2)

Periodic motion and Simple Harmonic Motion (SHM) – examples of SHM, conditions of SHM, time period, frequency, amplitude and phase of a particle in SHM-definitions, expressions for Displacement, Velocity, Acceleration, Time period and Frequency of a particle executing in SHM – derivations- numerical problems, Ideal simple pendulum-definition, expression for time period of simple pendulum-derivation- numerical problems, laws of simple pendulum, second's pendulum-length of second's pendulum.

Unit 2 Waves and Acoustics

Duration: 13 periods (L:10 – T:3)

Wave-definition-characteristics, longitudinal and transverse waves –explanation- examples –Audible range, infrasonic and ultrasonic waves, expression relating wave velocity, frequency and wavelength-derivation- numerical problems, , phenomenon of beats - applications - numerical problems, echo – explanation- time of echo from a distant obstacle-derivation- numerical problems-applications of echo, Doppler Effect in sound-formula for Doppler shift- numerical problems, applications of Doppler Effect, SONAR, Reverberation, reverberation time and Sabine's formula, acoustics of good auditorium, free and forced vibrations, and resonance – definition-examples, noise pollution- causes, effects and methods to minimize noise pollution.

Unit 3 Electricity

Duration: 12 periods (L: 10 – T: 2)

Electric current and potential difference-summarize, Ohm's law-explanation-numerical problems, specific resistance-explanation-numerical problems, conductivity and conductance-definitions, combination of resistors in electric circuit –formula for series and parallel combination-related numerical problems, Heating effect of electric current –applications- heat produced and electric power consumed in a current carrying wire -derivations, electric power- numerical problems, Kirchhoff's laws in electricity –explanation- numerical problems, Wheatstone's bridge –explanation, condition for balancing of Wheatstone's bridge –derivation-numerical problems, Meter Bridge-explanation-numerical problems.

Unit 4 Electromagnetism

Duration: 13 periods(L: 10 – T: 3)

Magnetic pole, pole strength, magnetic length of a bar magnet. Magnetic field, magnetic lines of force and magnetic induction, properties of magnetic lines of force, uniform and non uniform magnetic fields, magnetic flux, magnetization, magnetic intensity, magnetic permeability and magnetic susceptibility- simple numerical problems, types of magnetic materials. Coulomb's inverse square law of magnetism-explanation-numerical problems, expression for moment of couple on a bar magnet placed in a uniform magnetic field- derivation- numerical problems, expression for magnetic induction field strength at a point on the axial line of a bar magnet –derivation- numerical problems, Faraday's laws of electromagnetic induction, Lenz's law-explanation, self induction and mutual induction, construction of transformer-types of transformers-numerical problems.

Unit 5 Modern Physics

Duration: 13 periods (L: 10 – T: 3)

Electromagnetic spectrum-regions, Photo electric effect-explanation-Einstein's photo electric equation, work function and threshold frequency, laws of photo electric effect, working of photocell, applications of photocell, LASER-definition, concept of energy levels, Spontaneous emission, Stimulated emission, population inversion and optical pumping, characteristics of LASER, Ruby LASER, applications of LASER, critical angle and total internal reflection of light, principle and working of Optical fiber, types of optical fiber (Step index and Graded index), applications of optical fiber, Nanosclae and properties of nanomaterials - applications.

Unit 6 Semiconductor Physics

Duration: 12 periods (L: 10 – T: 2)

Valence band, Conduction band and Forbidden energy gap in solids-explanation, Conductors, Insulators and Semiconductors on the basis of energy band diagram, Fermi level, Intrinsic semiconductors-explanation-examples, concept of hole and doping in semiconductors, Extrinsic semiconductors-explanation, PN Junction Diode-explanation, Forward bias and Reverse bias of PN diode, Volt-Ampere (V-I) characteristics of PN Diode, applications of PN Diode, half wave rectifier and full wave rectifier, working principle of Light Emitting Diode (LED).

Reference Books

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. Intermediate Physics, Telugu Academy, TS, Hyderabad.
4. Fundamentals of Physics by Halliday and Resnick.
5. Physics Part-I & II, NCERT

E-learning resources:

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

Learning Outcome:

Upon completion of this course the student will be able to

CO1: Explain the motion characteristics displacement, velocity, acceleration of Simple Harmonic Motion and apply the formulation to obtain time period of simple pendulum.

- 1.1 Explain 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 and solve numerical problems.
- 1.6 Define Ideal simple pendulum and develop the expression for time period of simple pendulum and solve numerical problems.
- 1.7 Develop the laws of simple pendulum.
- 1.8 Define second's pendulum and determine its length on the Earth.

CO2: Classify wave motions and apply mathematical formulations to echo, Doppler effect and identify causes, effects and minimizing method of noise pollution.

- 2.1 Define wave and outline the characteristics of wave (frequency, wavelength, amplitude and time period).
- 2.2 Explain longitudinal and transverse waves with examples and distinguish them.
- 2.3 Explain audible range, infrasonic waves and ultrasonic waves.
- 2.4 Develop the expression relating wave velocity, frequency and wavelength ($v = n\lambda$) and solve numerical problems.
- 2.5 Explain the phenomenon of beats with legible diagram, list the applications of beats and solve numerical problems.
- 2.6 Explain echo and develop the formula for time of echo from a distant obstacle and solve numerical problems.
- 2.7 List the applications of echo.
- 2.8 Explain Doppler Effect in sound (no derivation, formulae only)- (i) source moves toward stationary observer (ii) source moves away from stationary observer (iii) observer moves

toward stationary source (iv) observer moves away from stationary source and solve simple numerical problems.

- 2.9 List the applications of Doppler Effect.
- 2.10 Explain SONAR.
- 2.11 Explain Reverberation, reverberation time and outline Sabine's formula.
- 2.12 Identify the requirements for acoustically good auditorium.
- 2.13 Explain free vibrations, forced vibrations and resonance with examples.
- 2.14 Explain noise pollution and identify the causes, effects and methods to minimize noise pollution.

CO3: Explain basic concepts of electricity and extend Kirchhoff's laws to construct Meter bridge to determine unknown resistance.

- 3.1 Summarize the concept of electric current and potential difference.
- 3.2 Explain Ohm's law and solve numerical problems.
- 3.3 Explain specific resistance ($\rho = \frac{RA}{l}$) and solve related numerical problems.
- 3.4 Define conductivity and conductance.
- 3.5 Explain combination of resistors in electric circuit and develop formulae for equivalent resistance in series and parallel connection and solve related numerical problems.
- 3.6 Explain Heating effect of electric current and list the applications of it. Develop formulae for heat produced ($H = I^2Rt$) and electric power consumed ($P=VI$) in a current carrying wire and solve numerical problems.
- 3.7 Explain Kirchhoff's laws in electricity and solve numerical problems.
- 3.8 Construct Wheatstone bridge and develop balancing condition of it starting from Kirchhoff's laws in electricity and solve numerical problems.
- 3.9 Construct Meter Bridge for determination of unknown resistance and solve numerical problems.

CO4: Identify magnetic materials and apply laws of electromagnetic induction to construct transformer.

- 4.1 Explain magnetic pole, pole strength and magnetic length of a bar magnet.
- 4.2 Explain magnetic field, magnetic lines of force and magnetic induction.
- 4.3 List the properties of magnetic lines of force.
- 4.4 Explain uniform and non uniform magnetic fields.
- 4.5 Define magnetic flux.
- 4.6 Explain magnetization, magnetic intensity, magnetic permeability and magnetic susceptibility and solve simple numerical problems.
- 4.7 Explain types of magnetic materials (dia, para and ferro magnetic materials) based on magnetic properties.
- 4.8 Explain Coulomb's inverse square law of magnetism and solve numerical problems.
- 4.9 Develop expression for moment of couple on a bar magnet placed in a uniform magnetic field ($C = MB \sin\theta$) and solve numerical problems.
- 4.10 Develop expression for magnetic induction field strength at a point on the axial line of a bar magnet [$B = \frac{\mu_0}{4\pi} \frac{2M}{d^3}$] and solve numerical problems for short bar magnet.
- 4.11 Explain Faraday's laws of electromagnetic induction.
- 4.12 Explain Lenz's law.
- 4.13 Explain Self induction and Mutual induction.
- 4.14 Explain construction and working of transformer using the principles of electromagnetic induction with legible diagram.
- 4.15 Construct a transformer to Step up and Step down input voltage with legible sketch.

CO5: Utilize the laws and principles of Photoelectric effect, LASER and optical fibers to build Photocell and Ruby LASER.

- 5.1 Outline the regions of electromagnetic spectrum.
- 5.2 Explain Photo electric effect.
- 5.3 Outline Einstein's photo electric equation; explain work function and threshold frequency and solve numerical problems.
- 5.4 Develop laws of photo electric effect.
- 5.5 Explain construction and working of photocell.
- 5.6 Identify applications of photocell.
- 5.7 Explain LASER and concept of energy levels (Ground state, excited state and Meta stable state).
- 5.8 Explain Spontaneous emission, Stimulated emission, population inversion and optical pumping.
- 5.9 List the characteristics of LASER.
- 5.10 Explain construction and working of Ruby LASER.
- 5.11 Identify applications of LASER.
- 5.12 Explain critical angle and total internal reflection of light.
- 5.13 Make use of optical properties to explain working of Optical fiber.
- 5.14 Construct Step index and Graded index optical fibers.
- 5.15 Identify applications of optical fiber.
- 5.16 Explain Nanoscale and identify properties at nano scale.
- 5.17 Classify Nanomaterials (zero, one, two and three dimensional).
- 5.18 Identify applications of nano materials.

CO6: Apply the properties of semiconductors and volt-ampere characteristics of P-N junction diode to construct half wave and full wave rectifiers and Light Emitting Diode.

- 6.1 Outline the concept of 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 with examples.
- 6.5 Explain the concept of hole and doping in semiconductors.
- 6.6 Explain Extrinsic semiconductors and identify differences between P-type and N-type semiconductors.
- 6.7 Explain PN Junction Diode.
- 6.8 Explain Forward bias and Reverse bias PN junction diode.
- 6.9 Summarize Volt-Ampere (V-I) characteristics of PN Diode.
- 6.10 Identify the applications of PN Diode.
- 6.11 Construct half wave and full wave rectifiers by making use of the characteristics of PN Diode.
- 6.12 Draw a labeled diagram and explain working of Light Emitting Diode (LED).

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

DIPLOMA EXAMINATION (C 24)

SEMESTER II

MID-I EXAM

SC 203 Applied Physics

Model Question paper

Duration: 1 hour

Max. Marks: 20

PART-A

4 X 1 = 4

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

1. Define periodic motion.
2. Define second's pendulum.
3. Name one example each for longitudinal and transverse waves.
4. Define reverberation.

PART-B

2 X 3 = 6

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

- 5 (a) List the conditions for SHM.

(OR)

- (b) The acceleration of a particle in S.H.M. is 0.09 ms^{-2} when its displacement is 0.25 m. Find the period of oscillation.

- 6 (a) The frequency of sound is 110 Hz and wavelength is 3 m. Calculate the velocity of the wave.

(OR)

- (b) Draw a neat labeled sketch of formation of beats.

PART-C

2 X 5 = 10

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

- 7 (a) Develop the formula for acceleration of a particle executing SHM and analyze for maximum and minimum accelerations.

(OR)

- (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)

- (b) List five methods to minimize noise pollution.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATION (C 24)
SEMESTER II
MID-II EXAM
SC 203 Applied Physics
Model Question paper

Duration: 1 hour

Max.Marks: 20

PART-A

4 X 1 = 4

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

1. Define conductance.
2. What is the principle involved in Meter Bridge?
3. Define magnetic field.
4. Define magnetic permeability.

PART-B

2 X 3 = 6

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

- 5 (a) An electric fan has a resistance of 100ohms. It is plugged into potential difference of 220 V.
How much current passes through the fan?

(OR)

(b) Explain specific resistance of a conductor.

- 6 (a) Two magnetic poles of strengths 40 A-m and 30 A-m are separated by a distance of 0.2 m in air. Calculate the force between them.

(OR)

(b) Draw labeled diagrams of step up and step down transformers and identify various components.

PART-C

2 X 5 = 10

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

- 7 (a) Explain heating effect of current and develop the formula for heat produced in a current carrying wire.

(OR)

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

- 8(a) Develop expression for moment of couple on a bar magnet placed in a uniform magnetic field.

(OR)

(b) Classify magnetic materials based on their magnetic properties.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATION (C 24)
SEMESTER II
SEMESTER END EXAM
SC –203 Applied Physics
Model Question paper

Duration: 2 hours

Max.Marks: 40

PART-A

8 X 1= 8

Instructions: 1. Answer **ALL** questions.

2. Each question carries **ONE** mark

1. What is the formula for maximum acceleration of a particle in S.H.M?
2. Define magnetic field.
3. Define critical angle.
4. What is audible range of human beings?
5. What is photo electric effect?
6. Define population inversion in LASER.
7. What is forbidden gap?
8. Define intrinsic semiconductors.

PART-B

4 X 3 = 12

Instructions: 1. Answer **ALL** questions.

2. Each question carries **THREE** marks.

9(a) The Simple Harmonic oscillations executed by a particle of mass 0.5 kg are represented by the

equation $y = 2 \sin \left(10t + \frac{\pi}{4} \right)$. Find (a) velocity when the displacement is 1 unit and (b) maximum acceleration.

(OR)

(b) List the applications of optical fibre.

10(a) Explain Coulomb's inverse square law of magnetism.

(OR)

(b) Explain the concept of Fermi level.

11(a) The work function of a photoelectric material is 3.3 eV. Calculate threshold frequency? Given Planck's constant $h = 6.6 \times 10^{-34}$ joule-sec, velocity of light $c = 3 \times 10^8 \text{ ms}^{-1}$ and $1 \text{ eV} = 1.6 \times 10^{-19}$ joule.

(OR)

(b) Draw and label the diagram showing various regions of Electromagnetic spectrum in the order of increasing wavelength.

12(a) Explain valance band, conduction band and forbidden energy gap in solids.

(OR)

(b) Explain P-type and N-type semiconductors.

PART-C

4 X 5 = 20

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks.

13(a) Two tuning forks when sounded together give 5 beats per second. The frequency of the first fork is 480 Hz. When a piece of wax is attached to the second fork, the beats are reduced to 4. Find the frequency of the other tuning fork.

(OR)

(b) Develop laws of photoelectric effect.

14(a) Explain construction and working of transformer using the principles of electromagnetic induction with legible diagram.

(OR)

(b) Explain forward bias and reverse bias PN diode.

15(a) Identify the differences between step index and graded index optical fibers.

(OR)

(b) Identify applications of nano materials.

16(a) Construct full wave rectifier.

(OR)

(b) Draw a labeled diagram and explain working of Light Emitting Diode (LED).

SC - 204 - APPLIED ENGINEERING CHEMISTRY

Course Title	Applied Engineering Chemistry	Course Code	SC-204
Semester	II	Course Group	Foundation
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60Marks	SEE	40Marks

Prerequisite: Basic knowledge of Chemistry in Secondary Education.

Course Objective: 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	Explain the formation and functioning of Galvanic Cells, Batteries and Fuel Cells and apply the knowledge to identify and compare the materials best suited for construction of Batteries and Fuel Cells.
CO2	Explain the different metallurgical processes and apply the knowledge in the extraction of metals and in making alloys for industrial needs.
CO3	Explain the various corrosion processes, protection methods and apply the knowledge to reduce the corrosion in domestic and industrial areas.
CO4	Explain the different methods of preparation and characteristics of organic polymers and apply the knowledge to select suitable polymer for domestic and industrial use.
CO5	Identify the importance of Gaseous fuels, Lubricants, engineering materials and their uses for domestic and industrial applications.
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

COURSE CONTENTS

UNIT – I: ELECTROCHEMICAL CELL– BATTERIES:

L10 + T3 Periods

Galvanic cell–Standard electrode potential–Reference electrodes–Electro chemical series–EMF of cell– Batteries-Types of batteries–Leclanche cell, Lead storage battery – H₂-O₂ Fuel cells.

UNIT -II: MTALLURGY:

L10 + T2 Periods

Characteristics of metals- Distinguish between metals and non metals - Mineral, Ore, Gangue, Flux, Slag - Concentration of ore, Methods of extraction of crude metal - Roasting, Calcination, Smelting, Extraction of Al, and Fe – Alloys-Purpose of making alloys – Composition and uses of Brass, Nichrome and Duralumin.

UNIT –III: CORROSION:

L10 + T2 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–IV: POLYMERS:

L10 + T3 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.Urea formaldehyde 4. Bakelite - Compounding of plastics – Natural rubber – Vulcanization of natural rubber - Elastomers – Preparation and uses of Buna-s, Neoprene rubber - Biodegradable polymers-preparation and uses.

UNIT–V: INDUSTRIAL FUELS AND MATERIALS

L10 + T3 Periods

Definition and classification of fuels- Characteristics of good fuel-composition, calorific value, and uses of gaseous fuels- a) CNG b) LPG c) Bio gas – Lubricants– Classification and functions of lubricants – Engineering material -Glass-Properties- Manufacturing of glass-melting, Forming and shaping-Annealing -Finishing, Chemical components -uses of soft glass, hard glass, flint glass and laminated glass.

UNIT –VI: ENVIRONMENTAL POLLUTION AND CONTROL

L10 + T2 Periods

Air pollution-Introduction, Classification of air pollutants based on origin and states of matter, Causes, effects, and controlling methods - Water pollution – Causes, effects, controlling methods– Soil pollution – Causes, General effects,-Controlling methods –Carbon credit and carbon trading

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:

<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:

CO1: Explain the formation and functioning of Galvanic Cells, Batteries and Fuel Cells and apply the knowledge to identify and compare the materials best suited for construction of Batteries and Fuel Cells.

- 1.1. Define galvanic cell
- 1.2. Explain the construction and working of Daniel cell
- 1.3. Explain the differences between electrolytic cell and galvanic cell
- 1.4. Explain Electrode potential, Oxidation potential, reduction potential and standard electrode potential.
- 1.5. Define Reference electrode give examples.
- 1.6. Explain the construction and working of standard hydrogen electrode (SHE).
- 1.7. Explain the construction and working of calomel electrode
- 1.8. Define electrochemical series and explain its significance.
- 1.9. Define and explain EMF of cell and solve the numerical problems
- 1.10. Define battery and explain the types of batteries-Primary and secondary battery with examples
- 1.11. Explain the construction, working and applications of Dry cell (Leclanche cell) and Lead storage battery
- 1.12. Explain the construction, working and advantages of Hydrogen-Oxygen fuel cell

CO2: Explain the different metallurgical processes and apply the knowledge in the extraction of metals and in making alloys for industrial needs.

- 2.1 Identify the characteristics of metals.
- 2.2 Explain the differences between metals and non-metals
- 2.3 Define and explain the terms 1.Mineral 2.Ore 3.Gangue, 4.Fluxand 5.Slag -with examples
- 2.4 Explain the minerals and ores of Iron, and Aluminium.
- 2.5 Froth floatation and Electromagnetic separation methods for the concentration of ore
- 2.6 Explain the metallurgical processes -Roasting, Calcination, Smelting.
- 2.7 Extraction of Al from Bauxite (Flow chart)
- 2.8 Extraction of Fe from Hematite (flow chart)
- 2.9 Define an alloy and explain the purpose of making of alloys
- 2.10 Explain the composition and uses of following alloys i) Brass ii) Nichrome iii) Duralumin

CO3: Explain the various corrosion processes, protection methods and apply the knowledge to reduce the corrosion in domestic and industrial areas.

- 3.1 Define corrosion
- 3.2 Explain the factors influencing the rate of corrosion based on i) Nature of metal ii) Nature of environment of metal.
- 3.3 Explain the Electrochemical theory of corrosion.
- 3.4 Explain the formation of a) Composition cell b) Stress cell c) Concentration cell
- 3.5 Define rust and explain the mechanism of rusting of iron with chemical reactions.
- 3.6 Explain the following methods of prevention of corrosion:
 - a). Protective coatings i) Metallic coatings (Anodic coating and cathodic coating) ii) Inorganic coatings iii) Organic coatings
 - b). Cathodic protection i) Sacrificial anode method ii) Impressed voltage method.
- 3.7 Define the term paint.
- 3.8 Explain the characteristics of a good paint.
- 3.9 List the constituents of paint (pigment, vehicle or drying oil, thinner, drier, filler and plasticizers) and explain the functions of constituents of paint.

CO4: Explain the different methods of preparation and characteristics of organic polymers and apply the knowledge to select suitable polymer for domestic and industrial use.

- 4.1 Define polymerization
- 4.2 Explain the types of polymerization (Addition polymerization and Condensation polymerization) with examples.
- 4.3 Define the term plastic
- 4.4 Identify the characteristics of plastics.
- 4.5 Summarize the advantages of plastics over traditional materials
- 4.6 Explain the impact of plastics on environment.
- 4.7 Explain the types of plastics with examples.
- 4.8 Identify the differences between thermo plastics and thermosetting plastics
- 4.9 Explain the methods of preparation and uses of the following plastics: 1. Polythene, 2. Polyvinylchloride, 3. Urea formaldehyde resin 4. Bakelite (Only flow chart for Bakelite i.e. without chemical equations).
- 4.10 Define the term natural rubber
- 4.11 Explain the processing of natural rubber from latex.
- 4.12 Explain the structural formula of natural rubber
- 4.13 Explain the characteristics of natural rubber
- 4.14 Explain the process of vulcanization of natural rubber with chemical reactions.
- 4.15 Interpret the characteristics of vulcanized rubber
- 4.16 Define the term elastomer
- 4.17 Explain the preparation and uses of the following synthetic rubbers a) Buna-S b) Neoprene rubber.
- 4.18 Define a biodegradable polymer and explain a method of preparation and uses of biodegradable polymer-polylactic acid and polycaprolactone.

CO5: Identify the importance of Gaseous fuels, Lubricants, engineering materials and their uses for domestic and industrial applications.

- 5.1 Define fuel.
- 5.2 Classify the fuels based on their physical state with examples.
- 5.3 Classify the fuels based on occurrence-primary and secondary fuels with examples.
- 5.4 Define calorific value
- 5.5 Calculate the oxygen required for combustion of methane and ethane gases
- 5.6 Explain the characteristics of a good fuel
- 5.7 Explain the advantages of gaseous fuels
- 5.8 Explain the chemical composition, calorific value and uses of a) CNG b) LPG c) Bio gas
- 5.9 Define lubricant.
- 5.10 Classify the lubricants based on physical state.
- 5.11 Explain the functions of lubricants.
- 5.12 Explain General characteristics of Glass.
- 5.13 Explain a method of manufacture of Glass -melting, Forming and shaping-Annealing - Finishing,
- 5.14 Explain the components and uses of the following commercial Glasses 1. Soft glass, 2. Hard glass, 3. flint glass, 4. Laminated glass.

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.

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 Greenhouse effect- its consequences and control methods

6.6 Explain the Acid rain-its consequences and control methods

6.7 Explain the controlling methods of air pollution

6.8 Define water pollution

6.9 Explain the causes of water pollution

6.10 Explain the effects of water pollution on living and non-living things

6.11 Utilize the available methods to control water pollution.

6.12 Define soil pollution.

6.13 Explain the causes of soil pollution.

6.14 Explain the general effects of soil pollution.

6.15 Explain the methods of control 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

BOARD OF DIPLOMA EXAMINATIONS (C24)
SEMESTER EXAMINATION
MIDSEM– I

SC-204- ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES
Time: 1Hour

Max.Marks:20

PART–A

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

4X 1=4 marks

1. Define Galvanic cell.
2. What is standard electrode potential?
3. Define an ore.
4. Define Roasting.

PART–B

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

2x 3=6 Marks

5. a. Explain any three differences between Electrolytic cell and Galvanic cell
(OR)
b. Explain the types of batteries with examples.
6. a. Explain Magnetic separation method of concentration of Ore.
(OR)
b. Explain the purpose of making alloy (any six).

PART–C

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

2x 5=10 marks

7. a. Explain the construction and working of Leclanche cell.
(OR)
b. Define and explain EMF. Find the EMF of Cell $\text{Zn} / \text{Zn}^{2+} (1\text{M}) || \text{Cu}^{2+} (1\text{M}) | \text{Cu}$ Given E° of $\text{Zn}^{2+} | \text{Zn} = - 0.76\text{V}$ and E° of $\text{Cu}^{2+} | \text{Cu} = 0.34\text{V}$
8. a. Select a systematic process of extraction Fe from Hematite (Flow chart only).
(OR)
b. Show the Chemical composition and explain the uses of following alloys a) Brass and
b) Nichrome

BOARD OF DIPLOMA EXAMINATIONS (C24)
SEMESTER EXAMINATION
MIDSEM-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
1=4 marks

4X

1. Define Corrosion.
2. What is a Paint?
3. Define polymerization
4. What is the chemical name of natural rubber?

PART-B

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

2x 3=6

Marks

5. a. Select any six characteristics of a good paint.
(OR)
b. Explain Sacrificial anode method of prevention of corrosion.
6. a. Write any three advantages of plastics over traditional materials.
(OR)
b. Write any three differences between thermo plastic and thermosetting plastic.

PART-C

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

2x 5=10

marks

7. a. Explain any five factors influencing the rate of corrosion of metal.
(OR)
b. Explain any five constituents of a paint with their functions
8. a. What is vulcanization of rubber and explain with chemical equations.
(OR)
b. Explain preparation and uses of following plastics 1. Polyethene 2. PVC
(polyvinyl chloride)

BOARD OF DIPLOMA EXAMINATIONS (C24)
SEMESTER END EXAMINATION

SC-204- ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Time: 2Hour

Max. Marks: 40

PART-A

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

8X 1=8 marks

1. What is electrochemical series?
2. What is the composition of Rust?
3. Define a Fuel
4. Define gangue.
5. Define a Lubricant
6. What is the composition of potash lime Glass?
7. Define air pollution.
8. Define water pollution.

PART-B

4x3=12 marks

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

9. a. Choose any six characteristics of Metals.
(OR)
b. Classify the Lubricants based on physical state. Give examples.
10. a. Identify any six advantages of plastics over traditional material.
(OR)
b. Explain any three methods of control of soil pollution.
11. a. Explain the classification of fuels based on physical state. Give examples.
(OR)
b. Explain the general characteristics of Glass (any six).
12. a. Explain the causes and effects of Greenhouse effect.
(OR)
b. Explain the effects of water pollution on Living things.

PART-C

4X5= 20 marks

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

13. a. Explain the construction and working of Hydrogen-Oxygen Fuel cell.
(OR)
b. Explain a method of manufacture of Glass with labelled diagram.
14. a. Identify any five differences between Thermoplastics and Thermosetting plastics
(OR)
b. Explain the controlling methods of water pollution.
15. a. Explain the chemical composition and uses of LPG and CNG fuels
(OR)
b. Explain the components and uses following Glasses
1. Lead glass. 2. Soda lime glass 3. Laminated Glass
16. a. Explain any five causes of Air pollution
(OR)
b. Explain any five methods of control of Water pollution

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	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge Of Mathematics, Logical, Reasoning and IT skills

Course Outcomes

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

CO1	Develop Algorithms and Draw Flowchart for given problems.
CO2	Use Data types and classify Operators.
CO3	Develop Programs Using Decision Making Branching and looping statements.
CO4	Create Arrays, know the usage of strings.
CO5	Analyze and implement Modular Programming using Functions
CO6	Develop programs Using structures and Unions

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
I	Programming Methodology and Introduction to C Language	10	Q4	Q1		Q9(a)	Q13(a)
II	Understand Constants, Variables and Data types in C and Understand Operators and Expressions in C	10					
III	Decision making and Looping statements	14		Q2		Q10(a)	Q14(a)
IV	Arrays and Strings	14					
V	User Defined functions	13		Q3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Structures and Unions	14			Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8		8	8	

1. Programming Methodology and Introduction to C Language**Duration: 10 periods(L:8 – T:2)**

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(L:7 – T:3)**

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 - 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(L:12 – T:2)**

Decision making in C programming - simple if statement – if-else statement – nested if statement - else-if ladder –Switch statement - Classification of various loop statements- while loop – do-while loop - for loop - break and continue statements - nesting of loops- Comparisons of different loop statements.

4. Arrays and Strings**Duration: 14 Periods(L:11 – T:3)**

Arrays – definition, types, 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(L:10 – T:3)**

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- storage classes- 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**Duration: 14 Periods(L:12 – T:2)**

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 –structures vs. arrays – Array of structures - Structure containing arrays- array of structures containing arrays - Union and illustrate usage of a union – difference between Structures and Union.

Text Books

1.LetUsC	--	YeshwanthKanetkarBPBPublications
2.Programmingin ANSIC	--	E.Balaguruswamy TataMcGrawHill
3.ProgrammingwithC	--	GottfriedSchaum'outline
4.CThecomplete Reference	--	SchildtTataMcGraw Hill

Reference Books

1. The C Programming Language- Brian W. Kernighan,Dennis M.Ritchie- Pre Publicationntice Hall
2. Programming in C 3rd Edition-Sams Publishing- Steven G. Kochan- Sams Publishing
3. Expert C Programming: Deep Secrets-Peter Van Der Linden- Pearson Publications
4. C Programming: A Modern Approach. K.N. King- Norton Publications
5. Learn to Program with C- Noel Kalicharan- APress Publications

Suggested e-Learning Links

1. https://www.w3schools.com/c/c_intro.php?external_link=true
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <https://www.programiz.com/c-programming>
4. <https://www.javatpoint.com/c-programming-language-tutorial>
5. <https://www.freecodecamp.org/news/the-c-programming-handbook-for-beginners/>
6. <https://www.tutorialspoint.com/cprogramming/index.htm>
7. <https://www.codecademy.com/catalog/language/c>
8. <https://www.codechef.com/learn/course/c>
9. <https://archive.nptel.ac.in/courses/106/104/106104128/>
10. <https://www.youtube.com/watch?v=3QiItnIWmOM>
11. <https://www.digimat.in/nptel/courses/video/106105171/L01.html>
12. <https://www.digimat.in/nptel/courses/video/106105171/L07.html>

Suggested Learning Outcomes

For achieving the Course outcomes, the following learning outcomes must be achieved

CO1: Develop Algorithms and Draw Flowchart for given problems.

- 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.

CO2: Use Data types and classify Operators.

- 2.1 Describe Character set, C Tokens-Keywords, Variables, Identifiers, Constants and Variables.
- 2.2 Define Data type.
- 2.3 Classify Primary data types and explain with examples
- 2.3 Write the syntax to declare and assigning values to variables.
- 2.4 Define operator.
- 2.5 Classify and explain operators with examples
- 2.6 Describe operator precedence and associativity of operators.
- 2.7 Define expression.
- 2.8 Describe evaluation of Arithmetic, Relational and logical expressions.
- 2.9 Illustrate type conversion (implicit and explicit) 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.

CO3: Develop Programs Using Decision Making Branching and looping statements.

- 3.1 Discuss decision making in programming
- 3.2 Explain decision making statements- if, if-else, nested if-else, else-if ladder - with syntax and programs.
- 3.3 Explain decision making statement- switch statement - with syntax and programs.
- 3.4 Define looping and list loop statements.
- 3.5 Discuss the iterative statements – while, do- while, for statement- with syntax and programs.
- 3.6 Discuss break and continue statements.
- 3.7 Compare and Contrast break and continue statements.
- 3.8 Define Nested loops.
- 3.9 Develop programs using Nested loops.
- 3.10 Compare different loop statements.

CO4: Create Arrays, know the usage of strings.

- 4.1 Define an Array.
- 4.2 List different types of Arrays.
- 4.3 Declare and initialize One Dimensional Array with example program.
- 4.4 Develop a program to read, access and display the elements of a one dimensional array
- 4.5 Develop a program to sort the elements in ascending or descending order using one-dimensional Array.
- 4.6 Develop a c program to count the even and odd numbers for a given array of n elements.
- 4.7 Declare and initialize two Dimensional Arrays with example program.
- 4.8 Illustrate the concept of two dimensional arrays with the following programs
 - a. Matrix addition, subtraction
 - b. Matrix multiplication
 - c. Transpose of a matrix and check whether the given matrix is symmetric or not.
- 4.9 Define String
- 4.10 Declare and initialize a String variable.
- 4.11 Outline the different ways of reading and writing strings using scanf(), getchar(), gets(), printf(), putchar(), puts() functions.

- 4.12 Create a program to concatenate, copy, and finding out the length of a string without using string handling functions.
- 4.13 Explain about various String handling functions with sample programs.
- 4.14 Develop C programs using different string handling functions.

CO5: Analyze and implement Modular Programming using Functions

- 5.1 Define function,
- 5.2 Discuss the need of functions.
- 5.3 List out the advantages of functions.
- 5.4 Identify the elements of function.
- 5.5 Define and discuss function prototype, function call, and function definition with syntax and program.
- 5.6 Discuss the scope, visibility and lifetime of variables in functions.
- 5.7 Classify different storage classes.
- 5.8 Illustrate functions with no arguments and no return values with syntax and example programs.
- 5.9 Illustrate functions with no arguments and with return values with syntax and example programs.
- 5.10 Illustrate functions with arguments and with no return values with syntax and example programs.
- 5.11 Illustrate functions with arguments and with return values with syntax and example programs.
- 5.12 Illustrate passing arrays to functions as arguments with example programs.
- 5.13 Define recursion.
- 5.14 Develop the following programs using recursion
 - a. Factorial of a number.
 - b. compute x^n (hint : x raised to the power n).
 - c. Fibonacci series.

CO6: Develop programs Using structures and Unions

- 6.1 Define structure
- 6.2 State the uses of structures.
- 6.3 Declaration and initialization of a structure template and structure variables.
- 6.4 Explain accessing structure members using (.) dot operator.
- 6.5 Develop a C program to create, initialize a structure and access its data members.
- 6.6 Syntax to know the size of a structure.
- 6.7 Discuss nested structure concept.
- 6.8 Illustrate the concept of nested structure with a program.
- 6.9 Know the differences between Structures and Arrays.
- 6.10 Illustrate array of structures, structures containing arrays, array of structures containing arrays.
- 6.11 Illustrate array of structures using sample C program.
- 6.12 Illustrate structure as function arguments and returning of structure variables as function values.
- 6.13 Define Union.
- 6.14 State the usage of unions.
- 6.15 Declaration and initialization of a union.
- 6.16 Explain accessing of union members using (.) dot operator.
- 6.17 Know the differences between Structure and Unions.

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

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
CO1	2	1	1			1	1	1,2,3,6,7
CO2	2					1	2	1,6,7
CO3	2	1	2	1	1	2	2	1,2,3,4,5,6,7
CO4	2	2	2	1	1	1	2	1,2,3,4,5,6,7
CO5	2	2	2	1	3	2	2	1,2,3,4,5,6,7
CO6	2	1	1			1	2	1,2,3,6,7

State Board of Technical Education and Training, Telangana
Model Question paper
PROGRAMMING IN CII-SEMESTER
Mid Semester-I Examination

Course Code: CS-205
Course Name: Programming in C

Duration: 1 hour
Max. Marks: 20 Marks

PART-A

Answer **all** questions- Each Question carries **ONE** mark

4x1 = 4 Marks

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

Answer **two** questions- Each Question carries **THREE** marks

2x3 = 6 Marks

- 5.a) List out any 6 symbols used in Flowchart.
(OR)
- b) Write any three differences between high level language and low level language
- 6.a) Write the syntax to declare variable in C? Give examples.
(OR)
- b) Evaluate an expression $(2+5)*(10-4)\%10$.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks

2x5 = 10 Marks

- 7.a) Draw a flowchart to find factorial of given number N.
(OR)
- b) Explain the stages to execute a C-Program
- 8.a) Explain different data types in C with examples.
(OR)
- b) Elaborate any three categories of operators in C.

State Board of Technical Education and Training, Telangana
Model Question paper
PROGRAMMING IN C II-SEMESTER
Mid Semester-II Examination

Course Code: CS-205
Course Name: PROGRAMMING IN C

Duration: 1 hour
Max.Marks: 20 Marks

PART-A

Answer **all** questions- Each Question carries **ONE** mark

4x1 = 4 Marks

1. Write the syntax of if statement.
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

Answer **two** questions- Each Question carries **THREE** marks

2x3 = 6 Marks

5a) Explain switch statement with syntax.

(OR)

5b) Write any three differences between while and do-while statements.

6a) Write a C program to find largest number in array.

(OR)

6b) Explain any three String handling functions.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks

2x5 = 10 Marks

7a) Explain do-while statement with syntax and sample program

(OR)

7b) Write a C program whether a given number is Armstrong or not using while loop

8. a Write a C program to multiply two matrices.

(OR)

8.b Write a C program to check whether given string is palindrome or not.

State Board of Technical Education and Training, Telangana
Model Question paper
PROGRAMMING IN C II-SEMESTER
Semester End Examination

Course Code: CS-205

Course Name: Programming in C

Duration: 2 hour

Max.Marks: 40 Marks

PART-A

Answer all questions- Each Question carries ONE mark

8x1 = 8 Marks

1. List any two differences between algorithm and program.
2. Give the syntax of simple 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. Write any two uses of structures.
8. Define Union?

PART-B

Answer Four questions- Each Question carries THREE marks

4x3 = 12 Marks

9. a) Write any three characteristics of algorithm.
(OR)
9. b) Write any three advantages of functions.
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 how to access structure members.
(OR)
- b. Compare structure and arrays.

PART-C

Answer Four questions- Each Question carries FIVE marks

4x5 = 20 Marks

13. a) Explain the structure of a C-Program.
(OR)
13. b) Write a C program to compute the transpose of given matrix.
14. a) Write a C program to sort the elements of a one-dimensional array.
(OR)
14. b) Write a C program to access the elements of a union.
15. a) Write a C program to illustrate functions with arguments and without return values.
(OR)
15. b) Write a C program to find the factorial of a number using recursion.
16. a) Write a C program to implement nested structures.
(OR)
- b) Write a C program to implement array of structures.

EE-206 - ELECTRONIC DEVICES

Course Title:	Electronic Devices	Course Code	EE-206
Semester	II Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Knowledge of Semi conductor devices

Course Outcomes

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

CO1	Analyze the formation and working of various semiconductor devices.
CO2	Explain the rectifiers and voltage regulators.
CO3	Analyze the need of biasing, small signal amplifier, large signal amplifier and feedback amplifier.
CO4	Analyze various oscillators.
CO5	Analyze the op-amp application circuits.
CO6	Interpret the performance of circuit by various Electronics Instruments

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Semiconductor devices	12	Q4	Q1	Q9(a)	Q13(a)
2	Power Supplies	10				
3	Amplifiers	15		Q2	Q10(a)	Q14(a)
4	Oscillators	13				
5	Linear Integrated Circuits	15	Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
6	Electronic Instruments	10		Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8

Course Contents

UNIT - 1: Semi-conductor Devices

Duration: 12 Periods (L: 09 – T:3)

PN Junction Diode, forward and reverse bias- Zener diode, Zener diode characteristics - formation of PNP and NPN transistors- Transistor configurations - CB, CE and CC - Input and output characteristics

of CB, CE and CC - Comparison of CB, CE and CC configurations - FET, LED, LDR, Opto-Coupler, Photo diode, Photo transistor - characteristics and their applications.

UNIT - 2: Power supplies

Duration: 10 Periods (L:8 – T:2)

Half wave, Full wave and Bridge rectifiers, Types of Filters, Voltage regulated power supply using Zener Diode.

UNIT - 3: Amplifiers

Duration: 15 Periods (L:12 – T:3)

Principles of Operation- Biasing and stabilization technique - Operating point and Load line Characteristics - Classification of Amplifiers, Coupling methods, Frequency Response of R.C coupled amplifier, transformer coupled amplifiers – applications - Power amplifier - feedback- Voltage Series and Voltage Shunt, current series and current shunt feedback amplifiers.

UNIT – 4: Oscillators

Duration: 13 Periods (L:10– T:3)

Oscillator - types of oscillators - AF Oscillator - RF Oscillator -Square wave Oscillator - RC phaseshift Oscillator -Hartley oscillator- Colpitt's oscillator - applications of oscillators.

UNIT - 5: Linear Integrated circuits

Duration: 15 Periods(L:12– T:3)

Differential Amplifier - advantages of ICs - Operational Amplifier – Gain – summer – integrator – differentiator - scale changer – inverter -741 IC - IC 555 timer.

UNIT – 6 Electronic Instruments

Duration: 10 Periods (L:08 – T:2)

Electronic Instruments - Advantages-CRO-necessity of time base voltage- digital frequency meter function generator

Reference Books

1. V.K. Mehta,Rohitmehta-Principles of Electronics, S Chand & Co.
2. G.K. Mithal -Industrial Electronics-Khanna Publishers
3. G.K. Mithal -Applied Electronics-Khanna publishers
4. G.K.Mithal - Electronic devices and circuits-Khanna publishers
5. Albert Malvino,David J Bates-Electronic Principles-McGraw Hill
6. J.B.Gupta-A textbook of Electronics Engineering-KATSON BOOKS

Suggested E-learning references

<https://nptel.ac.in/courses/>

1.

Suggested Learning Outcomes

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

C01: Analyze the formation and working of various semiconductor devices.

- 1.1 Define PN Junction Diode and explain the formation of it.
- 1.2 Explain the working of PN Junction diode with no bias, forward bias and reverse bias.
- 1.3 Draw the VI characteristics of PN Junction Diode.
- 1.4 Explain the working of Zener diode.

- 1.5 Draw the VI characteristics of Zener diode.
- 1.6 Explain formation of PNP and NPN transistors
- 1.7 State the different configurations of transistors.
- 1.8 Plot the Input / Output characteristics of a transistor in CB, CE and CC configurations.
- 1.9 Compare the performance characteristics of a transistor in CB, CE and CC configurations.
- 1.10 Explain the working and VI characteristics of

(a) FET	(b) LED	(c) LDR	(d) Photo Diode
(e) Photo Transistor	(f) Opto-coupler		

CO2: Explain the rectifiers and voltage regulators.

- 2.1 Define Rectifier.
- 2.2 Explain the working and, draw the circuit diagrams and waveform diagrams of Half Wave Rectifier
- 2.3 Explain the working and, draw the circuit diagrams and waveform diagrams of Full Wave Rectifier
- 2.4 Explain the working and, draw the circuit diagrams and waveform diagrams of Bridge Rectifier
- 2.5 State the need of filter in power supplies
- 2.6 List the different types of filters used in power supplies.
- 2.7 Explain the working of Zener diode as a Voltage regulator in a power supply.
- 2.8 Explain the working of voltage regulated power supply.

CO3: Analyze the need of biasing, small signal amplifier, large signal amplifier and feedback amplifier.

- 3.1 Define Amplifier
- 3.2 Explain the operation of transistor as an amplifier.
- 3.3 State the necessity of proper biasing in transistor amplifier.
- 3.4 List different biasing methods.
- 3.5 Explain the potential divider bias.
- 3.6 Determine the operating point on the set of characteristics.
- 3.7 Classify amplifiers on the basis of

Frequency	(b) Function	(c) Type of load
(d) Period of Conduction	(e) Number of stages.	
- 3.8 Define the terms (a) gain (b) band width
- 3.9 List the applications of amplifiers.
- 3.10 List the different types of coupling methods in amplifiers
- 3.11 Explain the working and, draw the circuit diagrams and frequency response curves of:

3.12 RC coupled amplifier	(b) Transformer coupled amplifier
- 3.12 Explain the need for power amplifier.
- 3.13 Distinguish between voltage amplifier and power amplifier.
- 3.14 Define the terms (a) feedback (b) feedback factor
- 3.15 Explain the effect of feedback on gain, band width and noise
- 3.16 Draw the block diagrams and explain the working of Voltage Series, Voltage Shunt, Current Series and Current Shunt feedback amplifiers.

CO4: Analyze various oscillators.

- 4.1 Define Oscillator and classify different types of oscillators
- 4.2 State the conditions required for sustained oscillations
- 4.3 State the need of (a) AF Oscillator (b) RF Oscillator (c) Square Wave Oscillator
- 4.4 Draw the circuit diagram and explain the working of
(a) RC Phase Shift Oscillator (b) Hartley Oscillator (c) Colpitt's Oscillator
- 4.5 Explain the working of transistor based A stable Multi vibrator circuit.
- 4.6 List the applications of oscillators.

CO5: Analyze the op-amp application circuits.

- 5.1 Define Integrated Circuit.
- 5.2 List the advantages of Integrated Circuits over Discrete Circuits.
- 5.3 Explain the operation of Differential Amplifier.
- 5.4 List the characteristics of an Ideal Operational Amplifier.
- 5.5 Explain the working of Operational Amplifier.
- 5.6 Explain the working of Op Amp Inverting Amplifier.
- 5.7 State the concept of virtual ground.
- 5.8 Explain the Operational Amplifier as
(a) summer (b) integrator (c) differentiator (d) inverter.
- 5.9 Draw the Pin Diagram of 741 IC and state its important specifications and function of each pin.
- 5.10 Draw the Pin Diagram of 555 Timer IC and state its important specifications and function of each pin.

CO6: Interpret the performance of circuit by various Electronics Instruments

- 6.1 State the advantages of Electronic Instruments.
- 6.2 Explain the need of Cathode Ray Oscilloscope (CRO) as a Laboratory Instrument.
- 6.3 Explain the functions of various stage of a C.R.O. with the help of a block diagram
- 6.4 State the necessity of time base voltage
- 6.5 Mention the use of various front panel controls of a C.R.O.
- 6.6 List the applications of C.R.O.
- 6.7 Explain the digital frequency meter with the help of a block diagram.
- 6.8 Explain the working principle of function generator

Suggested Student Activities

1. Visit the Institute's Library / internet center and list the books/journals/ e-books and any other resources available on the topics suggested by the teacher.
2. Prepare charts of various electronic components
3. Purchase electronic components and work on doing mini projects

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, and Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3							1
CO2	3		2					1,3
CO3	3	1						1,2
CO4	3	1	1					1,2,3
CO5	3	1		1	1			1,2,4,5
CO6	2	1	1					1,2,3

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE II semester
Mid Semester-I Examination

Course Code: EE-206
Course Name: Electronic Devices

Duration: 1 hour
Max. Marks: 20 Marks

PART-A

Answer **all** questions, Each Question carries **ONE** mark

4x1 = 4 Marks

1. Draw the symbol of PNP transistor.
2. List different Transistor configurations.
3. State the need for filter.
4. What is a Rectifier

PART-B

Answer **TWO** questions. Each question carries **THREE** marks

2x3 = 6 Marks

- 5(a). Compare CB and CE transistor configuration.
- (OR)
- 5(b). Draw the circuit diagram for CC transistor configuration.
- 6(a). Compare center tapped and Bridge type full-wave rectifier.
- (OR)
- 6(b). List the different types of filters used in DC power supplies.

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks

2x5= 10 Marks

- 7(a). Explain the working of NPN transistor
- (OR)
- 7(b). Draw the circuit and explain the transistor in CE configuration with the help of input and output characteristics.
- 8(a). Illustrate the operation of Bridge rectifier circuit with waveforms.
- (OR)
- 8(b). Explain the Zener diode as a voltage regulator with a neat circuit diagram..

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE II semester
Mid Semester-II Examination

Course Code: EE-206
Course Name: Electronic Devices

Duration: 1 hour
Max. Marks: 20 Marks

PART-A

Answer **all** questions, Each Question carries **ONE** mark

4x1 = 4 Marks

1. State the necessity of proper biasing for amplifier action.
2. Classify the amplifiers according to the method of coupling.
3. Define oscillator
4. Mention the different applications of oscillator

PART-B

Answer **TWO** questions. Each question carries **THREE** marks

2x3 = 6 Marks

5(a). Classify amplifiers on the basis of period of conduction and number of stages
(OR)

5(b). List different biasing methods.

6(a). State the conditions required for sustained oscillations
(OR)

6(b). Draw the circuit diagram of Colpitts Oscillator.

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks

2x5= 10 Marks

7(a). Explain the transistor as an amplifier.

(OR)

7(b). Explain the working of transformer coupled amplifier with neat circuit diagram and draw its frequency response.

8(a). Explain the working principle of R-C phase-shift oscillator.

(OR)

8(b). Draw and explain the working principle of Hartley oscillator

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE II semester
End Examination

Course Code: EE-206
Course Name: Electronic Devices

Duration: 2 hour
Max.Marks: 40 Marks

PART-A

Answer all questions. Each Question carries one mark

8x1 = 8 Marks

1. Draw the V-I characteristics of Zener diode.
2. Define the term gain in terms of decibel and bandwidth..
3. Mention two important specifications of 741 IC
4. List the different types of filters
5. Define CMRR of differential amplifier.
6. List the characteristics of an Ideal Operational Amplifier.
7. State the advantages of Electronic Instruments.
8. State the necessity of time base voltage

PART-B

Answer FOUR questions. Each question carries three marks.

4 x 3 = 12 Marks

- 9(a). Draw the block diagram of Regulated power supply.
(OR)
- 9(b). Draw the symbol of Op Amp and mark the terminals.
- 10(a). Classify amplifiers on the basis of period of conduction and number of stages.
(OR)
- 10(b). Mention the use of various front panel controls of a C.R.O.
- 11(a). List the applications of OPAmps
(OR)
- 11(b). Give the Pin out diagram of 741 IC
- 12(a). List the applications of C.R.O.
(OR)
- 12(b). List the parts of function generator.

PART-C

Answer FOUR questions. Each Question carries FIVE marks

4 x 5 = 20 Marks

- 13(a) Draw the input and output characteristics of transistor in CE configuration and explain.
(OR)
- 13(b) Explain the Operational Amplifier as Summer.
- 14(a) Explain the working of RC coupled amplifier with its circuit diagram..
(OR)
- 14(b) Illustrate the working principle of function generator .
- 15(a) Explain inverting amplifier configuration with input and output waveform
(OR)
- 15(b) Analyse the operation of Differential Amplifier with the help of a circuit diagram.
- 16(a) Mention the functions of various stage of a C.R.O. with the help of a block diagram.
(OR)
- 16(b) Describe the digital frequency meter with the help of a block diagram.

ME-207 - ENGINEERING DRAWING – II

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

Course Title	Engineering Drawing -II	Course Code	ME-207
Semester	II	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.25
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		Cognizant Level	Linked Program Objectives (PO)
CO1	Draw the specified projections of solids for the given 3D representation of the regular solids	R / U / A	1, 2, 3, 4, 7
CO2	Create sectional views using cutting-plane lines and appropriate section lining.	R / U / A	1, 2, 3, 4, 7
CO3	Practice drawing auxiliary views of engineering components, ensuring accuracy and alignment with other views.	R / U / A	1, 2, 3, 4, 7
CO4	Create detailed engineering drawings that include isometric views to provide a comprehensive understanding of component geometry.	R / U / A	1, 2, 3, 4, 7
CO5	Identify different types of surfaces and their corresponding development methods, such as cylindrical, conical, and spherical surfaces.	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] <u>Note:</u> 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)					

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

(06 periods)

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: Isoaxis, 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
5. Engineering drawing + AutoCAD by Venugopal, K, New Delhi : New Age International

ONLINE RESOURCES

1. <https://nptel.ac.in/courses>
2. <https://nptel.ac.in/courses/124107159>
3. www.slideshare.net/shameem.mist/engineering-drawing
4. https://www.powershow.com/viewfl/76303aOWI5M/Engineering_Drawing_powerpoint_ppt_presentation
5. https://www.powershow.com/view0/91a2bfN2Q2N/Basic_engineering_drawing_solved_question_powerpoint_ppt_presentation

SPECIFIC LEARNING OUTCOMES

CO1: Draw the specified projections of solids for the given 3D representation of the regular 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.

CO2: Create sectional views using cutting-plane lines and appropriate section lining.

- 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.

CO3: Practice drawing auxiliary views of engineering components, ensuring accuracy and alignment with other 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

CO4: Create detailed engineering drawings that include isometric views to provide a comprehensive understanding of component geometry.

- 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.

CO5: Identify different types of surfaces and their corresponding development methods, such as cylindrical, conical, and spherical surfaces.

- 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	2	2	-	-	3
CO2	3	3	3	2	-	-	3
CO3	3	3	3	2	-	-	3
CO4	3	2	3	3	-	-	3
CO5	3	2	2	2	-	-	3
CO6	3	2	2	2	-	-	3

**BOARD DIPLOMA EXAMINATION, (C-24) DME – II SEMESTER
MID SEM - I EXAMINATION
ENGINEERING DRAWING - II**

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
ENGINEERING DRAWING - II

Time: 1 Hours]

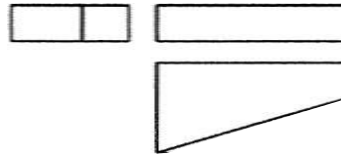
[Total Marks: 20

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.



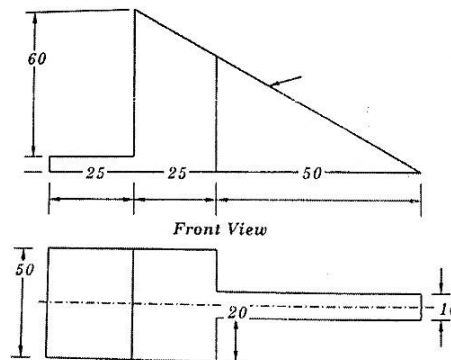
4. Draw the isometric view of a hexagonal plane of base side 30 mm when one of its side is parallel to H.P, when it is horizontal.

PART-B

2x6=12

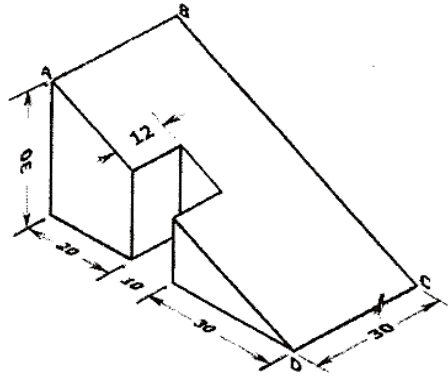
- Instructions :**
1. Answer any **ALL** questions.
 2. Each question carries **SIX** marks.

5. (a) Draw the auxiliary view of a component given below.

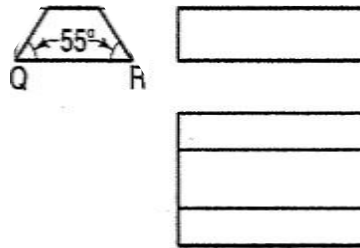


(Or)

5. (b) Draw the auxiliary view of the slopping surface of the cast iron block as shown in the figure.

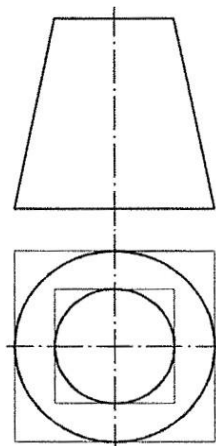


6. (a) Draw the isometric view of the block whose orthographic projections are given below by assuming proper dimensions.



(Or)

6. (b) Draw the isometric drawing of the frustum of a cone shown in figure with proper dimensions.



MODEL PAPER SEE
BOARD DIPLOMA EXAMINATION, (C-21)
DME-II SEMESTER END EXAMINATION
ENGINEERING DRAWING - II

Time: 2hours]

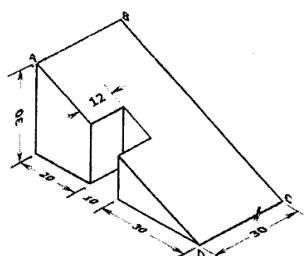
[Total Marks:40

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.**

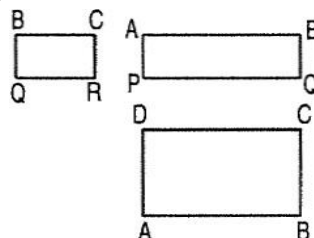
PART-A

- Instructions :**
1. Answer **ALL** questions. 8x2=16
 2. Each question carries **TWO** marks.
 3. All the dimensions are in mm.

1. Draw the projections of the cone with 30 mm height and 10 mm base circle radius, resting on H.P. on its base.
2. A cylinder with base radius 20 mm and height 60 mm resting on the ground, a 30° inclined section plane perpendicular to V.P. cuts the cylinder axis at mid-point. Draw the sectional top view of the cylinder.
3. Draw the auxiliary view of sloping surface of the object whose isometric view is given below.



4. Draw the isometric view of a block whose orthographic views are given below by assume proper dimensions.



5. Develop the lateral surface of a cube of side length 30 mm.
6. Develop the lateral surface of a triangular pyramid of base side 25 mm and height 50 mm.
7. Develop the lateral surface of a cylinder of base diameter 60 mm.
8. Develop the lateral surface of a hexagonal prism of base side 25 mm and 60 mm height.

PART-B

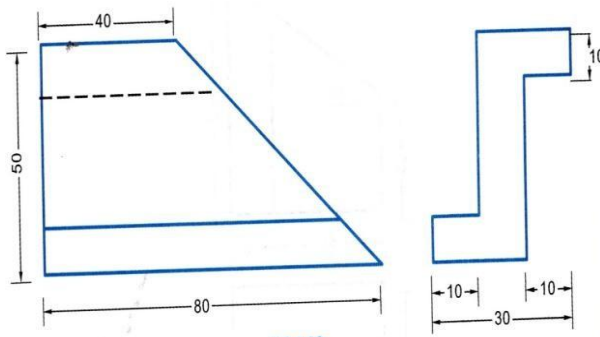
4x6=24

- 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.

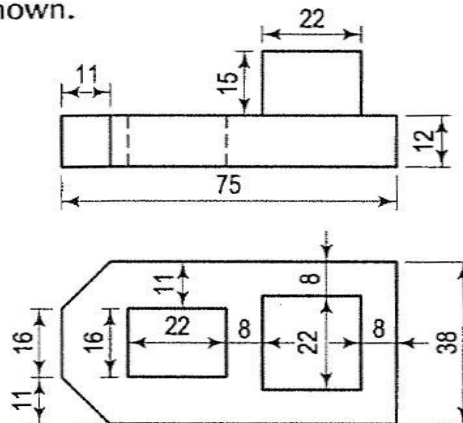
(Or)

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 frontview and sectional top view.
10. a) Draw the auxiliary view of sloping surface of an object shown in figure.

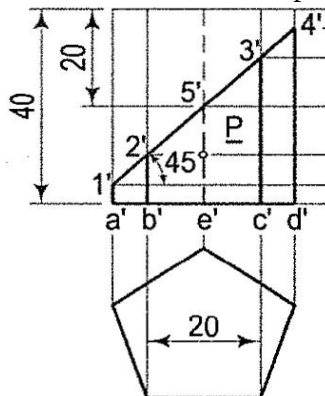


(Or)

10. b) Draw the isometric view of the block, whose orthographic views are shown in figure.

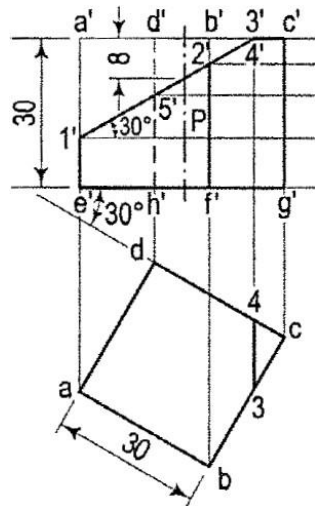


11. a) Develop the lateral surface of the truncated pentagonal prism as shown in figure.

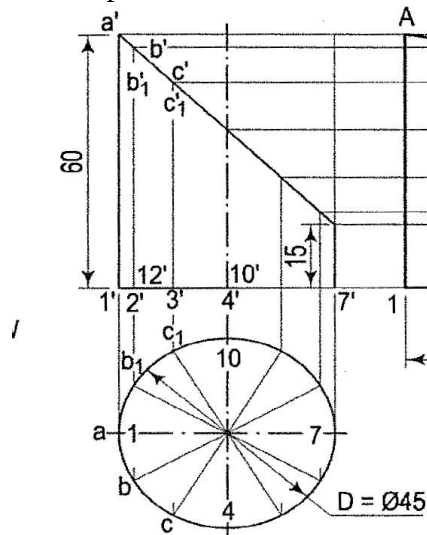


(Or)

11. b) Draw the development of a truncated cube shown in below figure.

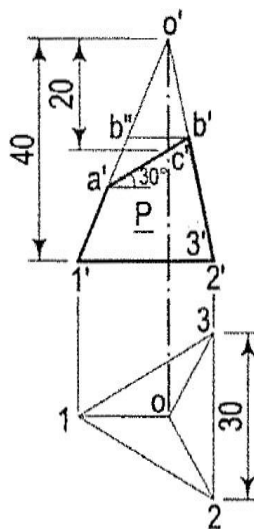


12. a) Develop of bottom portion of the truncated cylinder.



(Or)

12. b) Develop the portion 'P' in the below figure.



EE-208 - ELECTRONIC DEVICES LAB

Course Title:	Electronic Devices Lab	Course Code	EE-208
Semester	II Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of Electronic devices.

Course Outcomes

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

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Use CRO/DSO and function generators to analyze different diode rectifier circuits	R/U/A	1,2,4	09
CO2	Draw the characteristics of Field Effect Transistor by conducting suitable experiment.	U/A	3,4	21
CO3	Analyze the effect of varying feed-back gain on frequency of an oscillator circuit.	R/U/A	1,3,4,5	9
CO4	Design circuits using Op-Amp for various applications	A	3,6,	6

Suggested Learning Outcomes

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

CO1 - Analyze the working of different diode rectifier circuits using devices such as CRO and function generators

- 1.1 Measure amplitude, frequency, and time period of a given signal from function generator by using CRO.
- 1.2 Construct and test a switching circuit with diode as switching element.
- 1.3 Build and test an unbiased Serial clipper circuit.
- 1.4 Build Full-wave centre-tapped rectifier with filter.
- 1.5 Build Full-wave Bridge rectifier with filter.
- 1.6 Draw the regulation characteristics of a regulated power supply constructed using Zener diode.

CO2 - Draw the characteristics of Field Effect Transistor by conducting suitable experiment.

- 2.1 Draw input and output characteristics of JFET by conducting suitable experiment and determine Pinch-Off voltage and Trans-conductance.
- 2.2 Show that a FET can be used as a constant current source with appropriate bias.

CO3 - Analyze the effect of varying feed-back gain on frequency of an oscillator circuit.

- 3.1 Construct RC coupled amplifier and draw its frequency response.
- 3.2 Build Hartley oscillator and verify the effect of varying tank circuit component values and observe wave form on CRO.

CO4 - Design circuits using Op-Amp for various applications

- 4.1 Obtain the specifications of Operational amplifier 741 and Quad Op-amp LM 324 and comparator LM 339 ICs from data sheets.
- 4.2 Construct and verify Inverting amplifier using Op-amp.
- 4.3 Build and verify Non inverting amplifier using Op-amp.
- 4.4 Build and verify summing amplifier using Op-amp.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3			3	1	2		PO 1,4,5,6
CO2	3			3		2	1	PO 1,4,6,7
CO3	3	2		3		2		PO 1,2,4,6
CO4	3	3	2	3		2	2	PO 1,2,3,4,6,7
CO1	3			3	1	2		PO 1,4,5,6
CO2	3			3		2	1	PO 1,4,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-208

Course Name: Electronics Devices Lab Practice

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. Measure amplitude, frequency, and time period of a given signal from function generator by using CRO.
2. Construct and test a switching circuit with diode as switching element.
3. Build and test an unbiased Serial clipper circuit.
4. Build Full-wave centre-tapped rectifier with filter.
5. Build Full-wave Bridge rectifier with filter.
6. Draw the regulation characteristics of a regulated power supply constructed using Zener diode.
7. Draw input and output characteristics of JFET by conducting suitable experiment and determine Pinch-Off voltage and Trans-conductance.
8. Show that a FET can be used as a constant current source with appropriate bias.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA

**MODEL QUESTION PAPER
DEEE III SEMESTER
MID SEMESTER-II EXAMINATION**

**Course Code: EE-208
Course Name: Electronics Devices Lab Practice**

**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. Construct RC coupled amplifier and draw its frequency response.
2. Build Hartley oscillator and verify the effect of varying tank circuit component values and observe wave form on CRO.
3. Obtain the specifications of Operational amplifier 741 and Quad Op-amp LM 324 and comparator LM 339 ICs from data sheets.
4. Construct and verify Inverting amplifier using Op-amp.
5. Build and verify Non inverting amplifier using Op-amp.
6. Build and verify summing amplifier using Op-amp.

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING,
TELANGANA**

**MODEL QUESTION PAPER
DEEE III SEMESTER
MID SEMESTER-II EXAMINATION**

Course Code: EE-208

Duration:

1 Hour

Course Name: Electronics Devices Lab Practice

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. Measure amplitude, frequency, and time period of a given signal from function generator by using CRO.
2. Construct and test a switching circuit with diode as switching element.
3. Build and test an unbiased Serial clipper circuit.
4. Build Full-wave centre-tapped rectifier with filter.
5. Build Full-wave Bridge rectifier with filter.
6. Draw the regulation characteristics of a regulated power supply constructed using Zener diode.
7. Draw input and output characteristics of JFET by conducting suitable experiment and determine Pinch-Off voltage and Trans-conductance.
8. Show that a FET can be used as a constant current source with appropriate bias.
7. Construct RC coupled amplifier and draw its frequency response.
8. Build Hartley oscillator and verify the effect of varying tank circuit component values and observe wave form on CRO.
9. Obtain the specifications of Operational amplifier 741 and Quad Op-amp LM 324 and comparator LM 339 ICs from data sheets.
10. Construct and verify Inverting amplifier using Op-amp.
11. Build and verify Non inverting amplifier using Op-amp.
12. Build and verify summing amplifier using Op-amp.

SC-209 - APPLIED SCIENCE LAB

Course Title	Applied Science Lab	Course Code	SC-209
Semester	II Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Type of course	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

SC-209 (A) Physics Lab

Pre requisites:

This course requires the basic knowledge of Science and Mathematics.

Course Outcomes

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

CO1	Determine the value of acceleration due to gravity using simple pendulum and verify with $L-T^2$ graph.
CO2	Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0°C .
CO3	Draw magnetic lines of force, locate neutral points and calculate magnetic moment of a bar magnet.
CO4	Determine the specific resistance of given wire using meter bridge.
CO5	Determine the refractive index of a solid using travelling microscope
CO6	Develop V-I characteristics of Photocell (Demonstration only)

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3					1	1	1,6,7
CO2	3					1	1	1,6,7
CO3	3					1	3	1,6,7
CO4	3					1	3	1,6,7
CO5	3					1	3	1,6,7

Learning outcomes

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

1. Determine the value of acceleration due to gravity using simple pendulum and verify with $L-T^2$ graph.
2. Determine the velocity of sound in air at room temperature and calculate velocity of sound at 00 C.
3. Draw magnetic lines of force, locate neutral points and calculate magnetic moment of a bar magnet. Determine the specific resistance of given wire using meter bridge.
4. Determine the refractive index of a solid using travelling microscope.
5. V-I characteristics of Photocell (Demonstration only)

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. Intermediate Physics lab manual – Telugu Academy
2. Laboratory manual for class XI and XII – NCERT

SC-209 (B) 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	Determine the molarity of potassium permanganate solution.
CO2	Estimate the amount of the Mohr's salt in the given solution.
CO3	Determine of acidic impurities present in water samples.
CO4	Determine of alkaline impurities present in water samples.
CO5	Estimate the amount of the chlorides in the water sample.

CO-PO Matrix:

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

Course Delivery: The course will be delivered through lectures, classroom interaction, group discussion, demonstration and practical.

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-End point of titration - Neutralization.

List of experiments:

1. Determination of molarity of KMnO_4 by using standard oxalic acid solution
2. Estimation of Mohr's salt by using standard KMnO_4 solution.
3. Determination of acidity of water sample by using standard NaOH solution.
4. Determination of alkalinity of water sample by using standard H_2SO_4 solution.
5. Estimation of chloride content present in water sample by using standard AgNO_3 solution.

Specific Learning Outcomes

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

1. Determine the molarity of KMnO_4 by using 0.1 M oxalic acid solution
2. Estimate Mohr's salt by using 0.05M potassium permanganate solution.
3. Determine the partial and total acidity of water sample by using 0.02N NaOH solution.
4. Determine the partial and total alkalinity of water sample by using 0.02N H_2SO_4 solution.
5. Estimate the chloride content present in water sample by using 0.0141N AgNO_3 solution.

Reference Books:

1. Vogel's In organic 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-24)
SECOND SEMESTER EXAMINATION
MIDSEM – I
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 value of acceleration due to gravity using L-T² graph.
2. Determine the value of acceleration due to gravity using simple pendulum.
3. Determine the velocity of sound in air at room temperature.
4. Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0° C.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the molarity of KMnO₄ solution by using 0.1M oxalic acid.
2. Estimate the amount of Mohr's salt present in the given 500 ml of solution by using 0.02M Potassium permanganate solution
3. Estimate the amount of Mohr's salt present in the given 750 ml of solution by using 0.02M Potassium permanganate solution.

BOARD DIPLOMA EXAMINATION, (C-24)
SECOND SEMESTER EXAMINATION
MIDSEM – II
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. Draw magnetic lines of force and calculate magnetic moment of a bar magnet.
2. Draw magnetic lines of force and locate neutral points of a bar magnet.
3. Determine the specific resistance of given wire using meter bridge.
4. Determine the resistance of given wire using meter bridge.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the partial acidity of water sample by using 0.02N NaOH solution.
2. Determine the total acidity of water sample by using 0.02N NaOH solution
3. Determine the partial alkalinity of water sample by using 0.02N H₂SO₄ solution.
4. Determine the total alkalinity of water sample by using 0.02NH₂SO₄ solution

BOARD DIPLOMA EXAMINATION, (C-24)
SECOND SEMESTER END 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 value of acceleration due to gravity using L-T² graph.
2. Determine the value of acceleration due to gravity using simple pendulum.
3. Determine the velocity of sound in air at room temperature.
4. Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0° C.
5. Draw magnetic lines of force and calculate magnetic moment of a bar magnet.
6. Draw magnetic lines of force and locate neutral points of a bar magnet.
7. Determine the specific resistance of given wire using meter bridge.
8. Determine the resistance of given wire using meter bridge.
9. Determine the refractive index of a solid using travelling microscope.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Determine the molarity of KMnO₄ solution by using 0.1M oxalic acid.
2. Estimate the amount of Mohr's salt present in the given one litre of solution by using 0.02M KMnO₄ solution.
3. Determine the partial acidity of water sample by using 0.02N NaOH solution.
4. Determine the total acidity of water sample by using 0.02N NaOH solution
5. Determine the partial alkalinity of water sample by using 0.02N H₂SO₄ solution.
6. Determine the total alkalinity of water sample by using 0.02N H₂SO₄ solution
7. Estimate the chloride content present in water sample by using 0.0141N AgNO₃ solution

CS - 210 – PROGRAMMING IN ‘C’ LAB

Course Title	Programming in C Lab	Course Code	CS-210
Semester	II Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture + Practical	Total Contact Hours:	45
CIE	60Marks	SEE	40Marks

Prerequisites

Basic knowledge of Mathematics, Logical, Reasoning and IT skills.

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Hours/ Periods	Marks for SEE			Marks weightage	% Weightage
			Coding	Execution	Viva		
1	Programming in C Lab	45	20	10	10	40	100
	Total	45	40			40	100

Course Outcomes

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

CO'S	Description
CO1	Use the concepts of algorithm and flow chart for developing programs in C language.
CO2	Use variables, constants, data types, operators and Input / Output functions in programs
CO3	Apply decision making and looping concepts for developing programs in C language
CO4	Implement the concepts of arrays and structures for a given problem
CO5	Illustrate the use of functions in developing modular programming
CO6	Illustrate the usage of structures and unions.

Course Content

Unit Number	Unit Name	Periods
1	Programming Methodology and Introduction to C Language	2
2	Understand Constants, Variables and Data types in C and Understand Operators and Expressions in C	4
3	Decision making and Looping statements	9
4	Arrays and Strings	10
5	User Defined functions	10
6	Structure, union	10
	Total	45

Recommended Books

1. Let Us C	--	Yeshwanth Kanetkar BPB Publications
2. Programming in ANSI C	--	E. Balaguruswamy Tata McGraw Hill
3. Programming with C	--	Gottfried Schaum's outline
4. C The complete Reference	--	Herbert Schildt Tata McGraw Hill

Suggested E-learning references

1. https://www.w3schools.com/c/c_intro.php?external_link=true
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <https://www.programiz.com/c-programming>
4. <https://www.javatpoint.com/c-programming-language-tutorial>
5. <https://www.freecodecamp.org/news/the-c-programming-handbook-for-beginners/>
6. <https://www.tutorialspoint.com/cprogramming/index.htm>
7. <https://www.codecademy.com/catalog/language/c>
8. <https://www.codechef.com/learn/course/c>
9. <https://archive.nptel.ac.in/courses/106/104/106104128/>
10. <https://www.youtube.com/watch?v=3QiltmIWmOM>
11. <https://www.digimat.in/nptel/courses/video/106105171/L01.html>
12. <https://www.digimat.in/nptel/courses/video/106105171/L07.html>

Suggested Learning Outcomes

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

List of Exercises:

1. Write an algorithm to compute whether a given number is even or odd.
2. Write an algorithm to check whether a given year is leap year.
3. Draw a flowchart to identify whether the given number is a "BUZZ" number or not.
4. Write and execute a C program to compute number of months, number of remaining weeks and number of remaining days, given number of days. (**hint : Input:** 265 days
Output: 8 months, 3 weeks, 4 days)
5. Write and execute a C program to compute Lateral surface area, Total surface area and volume of a cuboid given length, breadth and height.
6. Write and execute a C program to evaluate an expression using operator precedence and associativity rule.
(hint: $a + b/c * d - (e * (f - z) \% k)$)
7. Write and execute a C program to display the following pattern using for loop given n rows
(hint n=4).

```
1
1 2
1 2 3
1 2 3 4
```
8. Write and execute a C program to reverse a 4 digit number.
9. Write and execute a C program to print all the prime numbers from 2 to n.
10. Write and execute a C program to read two matrices to perform matrix addition.
11. Write and execute a C program to perform matrix multiplication.
12. a. Write and execute a C program to check whether the given string is palindrome or not.

- b. Write and execute a C program to read a line of text and display the vowels and consonants.
13. Write and execute a C program to compute the following series using functions
 $1 + x + (x^2/2!) + (x^3/3!) + \dots + (x^n/n!)$
14. Write and execute a C program to compute the sum of first n natural numbers using recursion.
15. Write and execute a C program on "TOWERS OF HANOI PROBLEM" using recursion.
16. Write and execute a C program to read two integers and compute sum, difference, product, quotient using "functions with arguments and with return values".
17. Consider and execute a structure with the following structure members
 a. Student name b. PIN c. subject1 marks d. subject2 marks e. subject3 marks
 Write and execute a Program to compute individual subject total, individual student marks total for n number of students.
18. Write and execute a c program to read, retrieve, and display the members of a union.

Suggested Student Activities

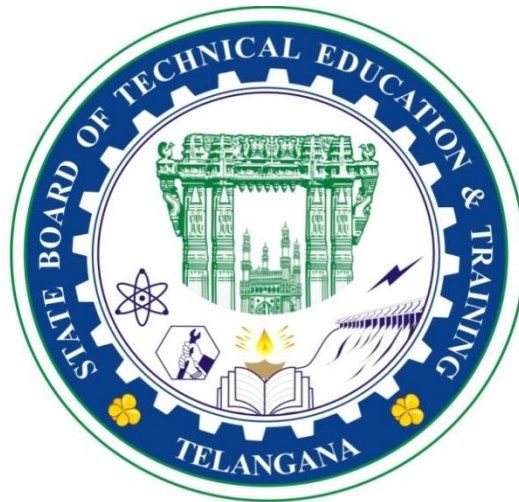
1. Slip test on C snippets
2. Lab Slip test to execute a random program beyond the given list of exercises

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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	1	1	1			2	1	1,2,3,6,7
CO2	1						1	1,7
CO3	1	2	1	2	1	2	1	1,2,3,4,5,6,7
CO4	1	1	1	1	2	1	1	1,2,3,4,5,6,7
CO5	2	2	1	3	1	2	1	1,2,3,4,5,6,7
CO6	1	1	1			1	1	1,2,3,6,7

C24_CURRICULUM

**DIPLOMA IN
ELECTRICAL AND ELECTRONICS
ENGINEERING**



**Offered By
STATE BOARD OF
TECHNICAL EDUCATION AND TRAINING
TELANGANA HYDERABAD**

III SEMESTER

S. NO	Course		Teaching Scheme					Examination Scheme						
	Code	Course Name	Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-301	Applied Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be $\geq 35\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade Minimum
2	EC-302	Digital Electronics	4	1	0	75	2.5	20	20	20	40	14	100	
3	EE-303	DC Machines & Batteries	4	1	0	75	2.5	20	20	20	40	14	100	
4	EE-304	Electrical Circuits	4	1	0	75	2.5	20	20	20	40	14	100	
5	EE-305	Electrical Power Systems-Generation	4	1	0	75	2.5	20	20	20	40	14	100	
6	EE-306	Electrical & Electronic Measuring Instruments	4	1	0	75	2.5	20	20	20	40	14	100	
7	EC-307	Digital Electronics Lab	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be $\geq 50\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade
8	EE-308	DC Machines Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	EE-309	Circuits & Measurements Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	HU-310	Communication Skills & Life Skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

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	2.5
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 various continuous functions using substitution method
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Integrate various functions by using Partial fractions and Integration by parts.
CO 4	Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.
CO 5	Solve the problems in Areas of irregular shapes and Volumes of solids of revolution
CO 6	Solve the engineering problems by applying concept of Mean and RMS values of varies functions and Solve numerical problems in the engineering by using Trapezoidal and Simpson's 1/3 rd rule

Course Content:

Unit-I Indefinite Integration – I:

Duration: 13Periods (L: 10– T:3)

Integration as an inverse process of Differentiation- Indefinite integral of standard functions- Properties of Indefinite Integral- Integration by Substitution - Integrals using Trigonometric identities of the form: $\int \sin^2 x \, dx$, $\int \cos^2 x \, dx$, $\int \sin^3 x \, dx$, $\int \cos^3 x \, dx$, $\int \sin Ax \cos Bx \, dx$, $\int \cos Ax \cos Bx \, dx$ and $\int \sin Ax \sin Bx \, dx$, where A and B are constants- Integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ -Integrals of the form $\int \sin^m x \cdot \cos^n x \, dx$ and $\int \tan^m x \cdot \sec^n x \, dx$, where m and n are positive integers.

Unit – II Indefinite Integration – II:**Duration: 12Periods (L: 10– T:2)**

Integrals of some particular functions (Nine standard integrals) of the type: $\int \frac{1}{a^2+x^2} dx$, $\int \frac{1}{a^2-x^2} dx$,

$\int \frac{1}{x^2-a^2} dx$, $\int \frac{1}{\sqrt{a^2+x^2}} dx$, $\int \frac{1}{\sqrt{a^2-x^2}} dx$, $\int \frac{1}{\sqrt{x^2-a^2}} dx$, $\int \sqrt{a^2+x^2} dx$, $\int \sqrt{a^2-x^2} dx$ and $\int \sqrt{x^2-a^2} dx$ -

Integrals of the type:

$\int \frac{1}{ax^2+bx+c} dx$, $\int \frac{1}{\sqrt{ax^2+bx+c}} dx$, $\int \sqrt{ax^2+bx+c} dx$, $\int \frac{px+q}{ax^2+bx+c} dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$, $\int (px+q)\sqrt{ax^2+bx+c} dx$, $\int \frac{1}{a \pm b \sin x} dx$, $\int \frac{1}{a \pm b \cos x} dx$ and $\int \frac{1}{a \sin x \pm b \cos x \pm c} dx$, where a , b , c , p and q are

constants.

Unit-III Indefinite Integration–III:**Duration: 12 Periods (L: 10 – T:2)**

Integration by using Partial fractions-Integration by parts - Bernoulli's rule for integration by parts -

Integrals of the type: $\int e^{ax} \sin bx dx$, $\int e^{ax} \cos bx dx$ and $\int e^x [f(x) + f'(x)] dx$, where a and b are constants.

Unit – IV Definite Integral and its Properties:**Duration:13Periods(L:10–T:3)**

Definite integral - Fundamental Theorem of Integral Calculus –Evaluation of definite integrals by Substitution Method- Properties of Definite Integrals -Evaluation of Definite integrals by applying their properties.

Unit – V Applications of Definite Integrals:**Duration: 13Periods (L: 10 – T:3)**

Areas under simple curves -Sign of the Area -The area of the region bounded by a curve and a line - Area between two curves -Volumes of solids of revolution about axes - Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes - Volumes of solids formed by rotating a region bounded by the curves about axes.

Unit – VI Mean, RMS values and Numerical Integration: Duration: 12Periods (L: 10 – T:2)

Mean Values and Root Mean Square (R.M.S) values of a function in a given interval-Numerical Integration: Trapezoidal rule and Simpson's $\frac{1}{3}$ -rule to evaluate an approximate value of a definite integral in a given interval- Problems leading to engineering applications.

Reference Books:

1. Higher Engineering Mathematics, by B.S.Grewal - Khanna publishers.
2. Thomas' Calculus, Pearson Publishers.
3. NCERT Mathematics Text Book for class XII, Part II.
4. Integral Calculus by Shanti Narayan and P. K. Mittal, S. Chand Publishers.

Suggested E-Learning references:

1. <https://www.khanacademy.org/>
2. <https://www.wolframalpha.com/>
3. <https://onlinecourses.nptel.ac.in/>
4. <http://tutorial.math.lamar.edu/>

Suggested Learning Outcomes:

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

1.0 Apply the properties of Indefinite Integral and Substitution Method to evaluate the Indefinite Integrals of various functions.

- 1.1 Explain the concept of Integration as an inverse process of Differentiation with standard notations.
- 1.2 Classify the Definite and Indefinite Integrals.
- 1.3. Formulate the standard Integrals using the definition of Integration.
- 1.4. State the properties of Definite Integrals.
(i.e., $\int (u \pm v) dx$, and $\int k u dx$, where u, v are functions in x and k is a scalar).
- 1.5 Use the Indefinite integrals of standard functions and properties of Integrals in solving engineering problems.
- 1.6 Evaluate Integrals involving simple functions of the following types by the method of Substitution:
 - i) $\int f(ax + b) dx$, where $f(x)$ is in standard form,
 - ii) $\int f(g(x))g'(x) dx$,
 - iii) $\int f(x^n)x^{n-1} dx$,
 - iv) $\int [f(x)]^n f'(x) dx$,
 - v) $\int \frac{f'(x)}{\sqrt{f(x)}} dx$

and vi) $\int \frac{f'(x)}{f(x)} dx$

1.7 Find the integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$.

1.8 Use some trigonometric identities to find the integrals of the type: $\int \sin^2 x dx$, $\int \cos^2 x dx$, $\int \sin^3 x dx$, $\int \cos^3 x dx$, $\int \sin Ax \cos Bx dx$, $\int \cos Ax \cos Bx dx$ and $\int \sin Ax \sin Bx dx$, where A and B are constants.

1.9 Evaluate the integrals of the type: $\int \sin^m x \cdot \cos^n x dx$, where m and n are positive integers.

1.10 Evaluate the integrals of type: $\int \tan^m x \cdot \sec^n x dx$, where m and n are positive integers.

2.0 Formulate the Integrals of some particular functions and apply them for integrating many other related standard Integrals.

2.1 Evaluate the integrals of some particular functions (Nine standard integrals) of the type:

$\int \frac{1}{a^2+x^2} dx$, $\int \frac{1}{a^2-x^2} dx$, $\int \frac{1}{x^2-a^2} dx$, $\int \frac{1}{\sqrt{a^2+x^2}} dx$, $\int \frac{1}{\sqrt{a^2-x^2}} dx$, $\int \frac{1}{\sqrt{x^2-a^2}} dx$, $\int \sqrt{a^2+x^2} dx$, $\int \sqrt{a^2-x^2} dx$ and $\int \sqrt{x^2-a^2} dx$, where a is a constant.

2.2 Evaluate the integrals of the type: $\int \frac{1}{ax^2+bx+c} dx$, $\int \frac{1}{\sqrt{ax^2+bx+c}} dx$ and $\int \sqrt{ax^2+bx+c} dx$, where a , b and c are constants.

2.3 Evaluate the integrals of the type: $\int \frac{px+q}{ax^2+bx+c} dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ and $\int (px+q)\sqrt{ax^2+bx+c} dx$, where a , b , c , p and q are constants.

2.4 Evaluate the integrals of the type: $\int \frac{1}{a \pm b \sin x} dx$, $\int \frac{1}{a \pm b \cos x} dx$ and $\int \frac{1}{a \sin x \pm b \cos x \pm c} dx$, where a , b and c are constants.

3.0 Integrate various functions by using Partial fractions and Integration by parts.

3.1 Evaluate Indefinite Integrals using Partial fractions.

3.2 Evaluate Indefinite Integrals using Integration by parts.

3.3 Apply the Bernoulli's rule for evaluating the Integrals of the form $\int u \cdot v dx$, where u and v are functions in x .

3.4 Evaluate the Integrals of the form $\int e^{ax} \sin bx dx$ and $\int e^{ax} \cos bx dx$, where a and b are constants.

3.5 Evaluate the Integrals of the form $\int e^x [f(x) + f'(x)] dx$.

4.0 Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.

4.1 State the Fundamental Theorem of Integral Calculus.

4.2 Calculate the Definite Integrals over an interval by using the Fundamental Theorem of Integral Calculus.

4.3 Evaluate the Definite Integrals by using Substitution Method.

4.4 Explain various properties of Definite Integration.

4.5 Evaluate the Definite Integrals by using its properties.

5.0 Compute the Areas of irregular shapes and Volumes of solids of revolution using the concept of Definite Integrals.

- 5.1 Define Area under simple curves.
- 5.2 Describe the sign of the Areas of simple curves.
- 5.3 Calculate the Areas under simple curves.
- 5.4 Determine the area of the region bounded by a curve and a line.
- 5.5 Find the area enclosed between two curves using methods of Definite Integration.
- 5.6 Define the volume of a solid generated by revolving a region bounded by the curves about axes.
- 5.7 Explain Volumes of solids of revolution.
- 5.8 Calculate the Volumes of a solid that is obtained by revolving a plane region about axes.
- 5.9 Compute the Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes.
- 5.10 Evaluate the Volumes of solids formed by rotating a region bounded by the curves about axes.

6.0 Find the Mean and RMS values of various functions in engineering problems and evaluate Numerical Integral of functions available only at discrete points.

- 6.1 Explain Mean Value, Mean Square Value and Root Mean Square (RMS) value of the functions in any given interval.
- 6.2 Obtain the Mean Value, Mean Square Value and Root Mean Square (RMS) values of the functions in any given interval.
- 6.3 Explain Trapezoidal rule and Simpson's $\frac{1}{3}$ rules.
- 6.4 Apply the Trapezoidal rule, Simpson's $\frac{1}{3}$ rules for approximation of definite integrals
- 6.5 Solve the 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	2				3	1, 2, 3, 7
CO6	3	2	2				3	1, 2, 3, 7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-301

SEMESTER III, MID – I EXAM, MODEL PAPER

APPLIED ENGINEERING MATHEMATICS

(Open Book System)

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

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

04 × 01 = 04

1. Find: $\int (2x - \sqrt{x} + x^3) dx$.

2. Find: $\int \frac{dx}{3x+7}$.

3. Find: $\int \frac{dx}{\sqrt{25-x^2}}$.

4. Find: $\int \sqrt{7+x^2} dx$.

PART-B

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

02 × 03 = 06

5(a) Evaluate: $\int \sin^3 x dx$.

OR

5(b) Evaluate: $\int \frac{\cos \sqrt{2x}}{\sqrt{2x}} dx$.

6(a) Evaluate: $\int \frac{3x^2}{4+x^6} dx$.

OR

6(b) Evaluate: $\int \sqrt{x^2 + 2x + 5} dx$.

PART- C

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

02 × 05 = 10

7(a) Evaluate: $\int \frac{dx}{4\sin^2 x + 9\cos^2 x}$.

OR

7(b) Evaluate: $\int \sin^7 x \cdot \cos^3 x dx$

8(a) Evaluate: $\int \frac{2x+5}{\sqrt{x^2-2x+2}} dx$.

OR

8(b) Evaluate: $\int \frac{1}{4\sin x + 3\cos x + 6} dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-301

SEMESTER III, MID –II EXAM, MODEL PAPER

APPLIED ENGINEERING MATHEMATICS

(Open Book System)

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

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

04 × 01 = 04

1. Find: $\int e^{2x} \sin 3x \, dx$.
2. Find: $\int e^x (\cot x + \log \sin x) \, dx$.
3. Find: $\int_0^1 (x^4 + 1) \, dx$
4. Find: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x \cos x^2 \, dx$.

PART-B

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

02 × 03 = 06

5(a) Evaluate: $\int \sinh 2x \cdot \sin 2x \, dx$.

OR

5(b) Evaluate: $\int x^3 \sin 2x \, dx$ by using Bernoulli's rule.

6(a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sin^{2025} x}{\sin^{2025} x + \cos^{2025} x} \, dx$.

OR

6(b) Evaluate: $\int_0^{2\pi} \cos^2 7x \, dx$.

PART C

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

02 × 05 = 10

7(a) Evaluate: $\int \frac{x^2}{x^2 + 7x + 10} \, dx$.

OR

7(b) Evaluate: $\int \frac{x \cos^{-1} x}{\sqrt{1-x^2}} \, dx$.

8(a) Evaluate: $\int_0^{\pi} \frac{x}{25 \cos^2 x + 16 \sin^2 x} \, dx$.

OR

8(b) Evaluate: $\int_0^1 \frac{\cos^{-1} x}{x} \, dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-301

SEMESTER III, SEMESTER END EXAM, MODEL PAPER

APPLIED ENGINEERING MATHEMATICS

(Open Book System)

Time: 2 hours

[Total Marks: 40]

PART-A

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

2 Each question carries **ONE** mark.

1. Find $\int (a_0 + a_1x + a_2x^2 + \dots + a_nx^n)dx$.
2. Find $\int_{-1}^1 x^2 \sin x^3 dx$.
3. Find the area bounded by the curve $y = x^2$, the x – axis and the ordinates $x = 1$ and $x = 3$.
4. Find $\int \frac{1}{x \cos^2(\log x)} dx$.
5. Find the mean value of $\sin x$ over $(0, 2\pi)$.
6. Find the volume of the solid generated when the area bounded by the curve $y = x^3$, the x – axis and the lines $x = 0$ to $x = 1$.
7. Find the R.M.S value of $\sqrt{x}$ over the range $(2, 3)$.
8. Find the approximate value of $\int_0^6 f(x) dx$ from the following table:

x	0	2	4	6
$f(x)$	3	7	11	9

by Trapezoidal Rule.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12

2. Each question carries **THREE** marks.

9(a) Evaluate: $\int \frac{1}{\sqrt{\sin^{-1}x} \sqrt{1-x^2}} dx$.

OR

9(b) Find the area bounded by the curve $y = \cos x$ in $(0, \pi)$.

10(a) Evaluate: $\int_0^5 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{5-x}} dx$.

OR

10(b) A swimming pool is 100 feet wide and the depth d in meters at a distance x meters from one bank is given by the following table:

x	0	20	40	60	80	100
d	0	7	9	15	8	2

Find the cross-section area of the swimming pool using Simson's $\frac{1}{3}$ -rule.

11(a) Find the area included between the parabola $x^2 = 16y$ and its latus rectum.

OR

11(b) Find the volume of the solid by rotating one arc of the curve $y = \sin 3x$ about x – axis.

12(a) Find the RMS value of $i = 3 \sin x$ over the half wave.

OR

12(b) Find the Mean value of $x^2 - 5x + 4$ between the values of x , where the expression vanishes.

PART C

Instructions: 1. Answer **ALL** questions

04 × 05 = 20

2. Each question carries **FIVE** marks

13(a) Evaluate: $\int \frac{5x+3}{\sqrt{x^2+4x+10}} dx$.

OR

13(b) Find the area enclosed between the curve $y^2 = 8x$ and the line $2y = x$.

14(a) Evaluate: $\int \frac{1}{x^4-1} dx$.

OR

14(b) The velocity of a train which starts from rest is given by the following table. The time is recorded in minutes from the start and speed in miles per hour.

Minutes	0	2	4	6	8	10	12	14	16	18	20
Miles/hour	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the total distance run in 20 meters using Simson's $\frac{1}{3}$ - rule.

15(a) Find the area between the two parabolas $y^2 = 4x$ and $x^2 = 12y$.

OR

15(b) Find the volume of the right circular cone of height h and semi vertical angle α .

16(a) Determine the Root Mean Square value of the function $y = x^2 e^{3x}$ in the range between $x = 0$ and $x = 2$.

OR

16(b) Find the Mean value of $\sin^2 \omega t$ in the interval $\left[0, \frac{2\pi}{\omega}\right]$.

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	2.5
Methodology	Lecture+ Assignments	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre-requisites

This course requires the basic knowledge of Semiconductor Devices.

COURSE OUTCOMES

CO1	Comprehend Number Systems and Binary Codes
CO2	Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map
CO3	Design combinational circuits – I
CO4	Design combinational circuits – II
CO5	Analyse and compare flip flops and registers
CO6	Design counters and comprehend memories

COURSE CONTENT AND BLU PRNT OF MARKS FOR SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Number systems and Binary codes	10	Q4	Q1	Q9(a)	Q13(a)
II	Boolean algebra, Logic gates and Karnaugh map	15				
III	Combinational circuits - I	15		Q2	Q10(a)	Q14(a)
IV	Combinational circuits - II	10				
V	Flip Flops and registers	15	Q3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Counters and Memories	10		Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8		8	8

COURSE CONTENTS

After completion of the course, the student should be able to know

UNIT1 – NUMBER SYSTEMS AND BINARY CODES

Duration: 10 Periods (L: 8– T: 2)

Binary, Octal, Hexadecimal Number systems –comparison with Decimal system-Conversion from one number system into another – performing arithmetic operations in binary- Binary Codes -Use of weighted and Un-weighted codes- importance of parity Bit.

UNIT2 – BOOLEAN ALGEBRA, LOGIC GATES & KARNAUGH MAP

Duration:15 Periods (L: 9 – T:6)

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 - 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).

UNIT3 – COMBINATIONAL CIRCUITS- I

Duration :15 Periods (L: 11– T: 4)

Concept of combinational logic circuits- Half adder circuit - Half-adder using NAND gates only & NOR gates only- Full adder circuit - Full-adder using two Half-adders and an OR – gate – half subtractor and full subtractor - 4 Bit parallel adder using full – adders- 2's compliment parallel adder/ subtractor circuit -Serial adder -Performance of serial and parallel adder.

UNIT4 –COMBINATIONAL CIRCUITS - II

Duration: 10 Periods (L: 8– T: 2)

Operation of 4 X 1 Multiplexers- Operation of 1 to 4 demultiplexer-applications- 8 X 3 encoder -Decimal to BCD encoder -3 X 8 decoder- BCD to decimal decoder- Applications - Tri-state buffer - Types of tri-state buffers-Applications - Digital comparator.

UNIT5 – FLIP FLOPS AND REGISTERS

Duration: 15 Periods (L: 10– T: 5)

Concept of Sequential logic circuits- NAND and NOR latches with truth tables-Necessity of clock - Clocked RS flip flop circuit using NAND gates- Need for preset and clear inputs – Edge triggered D flip flop - Circuit of Clocked JK flip flop -Race around condition- Master slave JK flip flop circuit - clocked T flip flops - Symbols of above Flip Flops-Applications for each type of flip flop- Need for a Register - Types of registers- 4 bit shift left and shift right registers - 4-bit bi-directional shift Register –SISO, SIPO, PISO, PIPO Shift Registers - Applications of shift registers.

UNIT6–COUNTERS AND MEMORIES

Duration: 10 Periods (L: 8– T: 2)

Synchronous and asynchronous counters - 4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter– asynchronous 4 bit up-down counter -Ring counter- applications - Types of memories - Memory read operation, write operation, access time, memory capacity, word length- ROM and RAM- Diode ROM - EEPROM and UVROM- Dynamic MOS RAM cell- static RAM and dynamic RAM- Applications of Flash ROM.

Reference Books

1. Digital Design by Morris mano
2. Digital Computer Electronics by Malvino and leach. 3rd edition Tata McGraw-Hill Education
3. Modern Digital Electronics By RP JAIN TMH
4. Digital Electronics: Principles & Applications by Roger L. Tokheim -McGraw-Hill Education, 2008
5. Digital Electronics by GK Kharate, Oxford University Press.

Suggested E-learning references

1. www.nptel.com
2. www.electronics4u.com

Suggested Learning Outcomes

Upon completing this course, the student will be able to

CO1: Comprehend Number Systems and Binary Codes

- 1.1 Explain Binary, Octal, Hexadecimal number systems.
- 1.2 Compare the above with Decimal system.
- 1.3 Convert a given decimal number into Binary, Octal, and Hexadecimal numbers and vice versa.
- 1.4 Convert a given binary number into octal and hexadecimal number system and vice versa.
- 1.5 Perform binary addition, subtraction, Multiplication and Division.
- 1.6 Write 1's complement and 2's complement numbers for a given binary number.
- 1.7 Perform subtraction of binary numbers in 1's complement method.
- 1.8 Perform subtraction of binary numbers in 2's complement method.
- 1.9 State the use of weighted and Un-weighted codes and list the types.
- 1.10 Write BCD code for the given Decimal number.
- 1.11 Write Excess – 3 codes for given Decimal number.
- 1.12 Convert a given binary number into Gray code and vice-versa.
- 1.13 Explain the use of alphanumeric codes (ASCII & EBCDIC)
- 1.14 State the importance of parity Bit.

CO2: Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map

- 2.1 State different postulates in Boolean algebra.
- 2.2 Explain the basic logic gates AND, OR, NOT gates with truth table.
- 2.3 Explain the working of universal logic gates (NAND, NOR gates) using truth tables.
- 2.4 Explain the working of an exclusive – OR gate with truth table.
- 2.5 Realize AND, OR, NOT operations using NAND, NOR gates.
- 2.6 Realize exclusive – OR gate using basic gates.
- 2.7 Realize exclusive – OR gate using NAND, NOR gates.
- 2.8 Realize exclusive – NOR gate using NAND, NOR gates.

- 2.9 State and prove De-Morgan's theorems.
- 2.10 Apply De-Morgan's theorems related postulates to simplify Boolean expressions (up to four variables).
- 2.11 Explain Standard forms of Boolean function (SOP, POS)
- 2.12 Write Boolean expressions for given truth table and draw the circuit.
- 2.13 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in SOP form.
- 2.14 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in POS form.

CO3: Design combinational circuits - I

- 3.1 Define combinational logic circuit.
- 3.2 Define half adder circuit and write its truth table.
- 3.3 Write the output expression and draw half adder circuit using basic gates.
- 3.4 Realize a Half-adder using i) NAND gates only and ii) NOR gates only.
- 3.5 Explain the operation of full adder circuit with truth table.
- 3.6 Realize full-adder using two Half-adders and an OR – gate.
- 3.7 Explain the operation of Half subtractor with truth table
- 3.8 Explain the operation of Full subtractor with truth table.
- 3.9 Explain the working of 4 Bit parallel adder circuit using full adders.
- 3.10 Explain 2's complement parallel adder/ subtractor circuit.
- 3.11 Explain the working of a serial adder circuit.
- 3.12 Compare the performance of serial and parallel adder.

CO4 –Design combinational circuits - II

- 4.1 Define multiplexer and de-multiplexer.
- 4.2 Draw the circuit of 4 X 1 Multiplexer and explain its operation.
- 4.3 Mention applications of multiplexer.
- 4.4 Draw the circuit of 1 X 4 de- Multiplexer and explain its operation.
- 4.5 Mention applications of De-multiplexer.
- 4.6 Draw the circuit of 8 X 3 encoder and explain its operation.
- 4.7 Mention applications of Encoder.
- 4.8 Draw the circuit of 3 X 8 decoder and explain its operation.
- 4.9 Draw the circuit of BCD to decimal decoder explain its operation.
- 4.10 Mention applications of decoder.
- 4.11 State the need for a tri-state buffer.
- 4.12 List the two types of tri-state buffers with IC numbers.
- 4.13 Draw the circuit of 1-bit digital comparator (Magnitude comparator) and explain its operation.
- 4.14 Write the IC numbers of 4 X 1 Multiplexer, 1 X 4 De-multiplexer, 3 X 8 Decoder, 8 X 3 Encoder.

CO5-Analyse flip flops and registers.

- 5.1 Define a Sequential logic circuit.
- 5.2 State the necessity of clock.
- 5.3 Distinguish between combinational and sequential circuits
- 5.4 Explain RS Latch using NAND gates only and NOR gates only with Truth Tables.
- 5.5 Explain different types of Triggering in Flip Flops
- 5.6 Explain clocked RS flip flop using NAND gates.
- 5.7 Explain the level clocked D flip flop using NAND gates

- 5.8 State the need for preset and clear inputs.
- 5.9 Explain the circuit of JK flip flop using NAND gates with truth table.
- 5.10 What is race around condition in JK flip-flop and give methods to avoid it.
- 5.11 Explain the working of master slave JK flip flop circuit with necessary diagrams.
- 5.12 Explain the operation of T flip flop using JK flip flop and give truth tables.
- 5.13 List commonly used IC numbers of flip flops of each type.
- 5.14 List applications for each type of flip flop.
- 5.15 State the need for a Register
- 5.16 Explain the working of 4-bit shift left and shift right registers with a circuit and timing diagram.
- 5.17 Explain the working of 4-bit bi-directional shift register with a circuit and timing diagram.
- 5.18 Explain the working of SISO, SIPO, PISO, PIPO shift registers.
- 5.19 List applications of shift registers.
- 5.20 List commonly used IC numbers of registers.

CO6 : Design counters and comprehend memories.

- 6.1 Define a counter and modulus of a counter.
- 6.2 Distinguish between synchronous and asynchronous counters.
- 6.3 Explain the working of 4-bit asynchronous up counter with a circuit and Timing diagram.
- 6.4 Explain the working of asynchronous 4 bit up-down counter with a circuit and Timing diagram
- 6.5 Explain the working of 4-bit synchronous counter with a circuit and Timing diagram.
- 6.6 Explain the working of decade counter with a circuit and Timing diagram.
- 6.7 List applications of counters.
- 6.8 List commonly used IC numbers of counters.
- 6.9 Explain the working of ring counter.
- 6.10 List applications of ring counter.
- 6.11 State the need for memory in digital circuits.
- 6.12 Define the terms memory read operation, write operation, access time, memory capacity and word length.
- 6.13 Classify various types of memories based on principle of operation, physical characteristics, accessing modes and fabrication technology.
- 6.14 Differentiate between ROM and RAM.
- 6.15 Explain the working of diode ROM.
- 6.16 Distinguish between EEPROM and UVPRAM.
- 6.17 Explain the working of basic dynamic MOS RAM cell.
- 6.18 Compare static RAM and dynamic RAM.
- 6.19 State the need for Flash ROM.
- 6.20 List the applications of Flash ROM.

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 ICs.
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, PSO Matrix:

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, and Sustainability Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2	-	-	-	-	-	1,2
CO2	2	2	2	-	-	-	1	1,2,3,7
CO3	1	2	2	-	-	1	-	1,2,3,6
CO4	1	3	2	-	-	1	1	1,2,3,6,7
CO5	2	1	2	-	-	1	1	1,2,3,6,7
CO6	1	3	2	-	-	1	2	1,2,3,6,7

C-24 III SEMESTER
EC-302 DIGITAL ELECTRONICS
MODEL PAPER MID-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. Define 1's complement of a binary number.
3. Draw the logic symbol of AND and OR gates.
4. Define minterm.

PART-B

Answer ALL questions.

4 x 1 = 4M

- 5(b) State the importance of parity bit.
- 6(a) State different postulates of Boolean algebra.

OR

- 6(b) Realize EX-OR gate using NAND gates only.

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.

$$A\bar{B}CD + B\bar{A}CD + CB\bar{A}D + ABCD + B\bar{C}AD$$

- 8(a) Explain the use of Alphanumeric codes ASCII and EBCDIC

OR

- 8(b) Compare different Number systems.

C-24 III SEMESTER

**EC-302: DIGITAL ELECTRONICS
MODEL PAPER MID- II**

TIME: 1 HOUR

MAX. MARKS: 20

PART-A

Answer ALL questions.

4 x 1 = 4 M

1. Define combinational logic circuit.
2. Draw the circuit of full adder using half adders.
3. Define a multiplexer.
4. Write IC numbers 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 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/subtract circuit.

- 8(a) Write the truth table of 4 X 1 multiplexer and draw its circuit.

OR

- 8(b) Explain the working of BCD to decimal decoder circuit.

C-24 II SEMESTER
EC-302: DIGITAL ELECTRONICS
MODEL PAPER- SEMESTER ENDEXAMINATION

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 demultiplexer.
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 2's complement of binary number.

PART-B

Answer ALL questions.

4x3=12M 9(a) State and

prove De Morgan's Theorems.

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

13(a) Simplify the Boolean expression $\sum M(1,3,6,8,14,15)$ 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 timing diagram.

OR

15(b) Explain the working of master slave JK flip-flop circuit with necessary diagrams.

16(a) Explain Dynamic RAM

OR

16(b) Explain Ring Counter with timing diagrams.

EE-303 : D.C MACHINES & BATTERIES

Course Title:	D.C Machines & Batteries	Course Code	EE-303
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	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

Upon completion of the course, the student shall be able 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 working of D.C Motors and Calculate efficiency
CO 4	Explain Starters, the performance characteristics of D.C Motors and different methods of control speed
CO 5	Determine the performance of DC Motors by conducting tests on DC Motor and enumerate braking methods of D.C Motor
CO 6	Use 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, Applications of D.C Motors and Speed control	13				
5	Testing and Braking of D.C Motors	12		Q3	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Batteries	10				
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, Formula for Demagnetization & Cross magnetization 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. - - 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-Simple Problems on losses and efficiency.

UNIT4 : Starters, Characteristics , Applications of D.C Motors And Speed control

Duration: 13 Periods (L: 11– 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, 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

UNIT 5 : Testing and braking of D.C Motors

Duration: 12 Periods (L: 10 – T:2)

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

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 - - Lithium-ion cell- applications - super capacitor - applications - maintenance free battery – applications - methods of disposing batteries.

Reference 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

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

CO1 - Describe the construction and working of D.C Generator

- 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.

CO2 - Compare the performance characteristics of D.C Generators

- 2.1 Define armature reaction.
- 2.2 Describe the armature reaction with sketches.
- 2.3 Describe the phenomenon of demagnetization & cross magnetization.
- 2.4 Write 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 Explain the necessity of parallel operation of DC generators.
- 2.14 List the conditions for parallel operation of generators.
- 2.15 State the use of equalizer ring in parallel operation.
- 2.16 List the applications of D.C generators.
- 2.17 Describe the working of welding generator with a sketch.

CO3 - Explain the working of D.C Motors and Calculate efficiency

- 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 Simple problems on losses and efficiency.

CO4 - Explain Starters , the performance characteristics of D.C Motors and different methods of control speed

- 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
- 4.11 State the need of speed control of DC Motors.
- 4.12 List the different methods of speed controls for D.C shunt motors.
- 4.13 Describe the speed control of D.C shunt motor by flux control method
- 4.14 Describe the speed control of D.C shunt motor by armature control method
- 4.15 Describe the speed control of D.C shunt motor by voltage control method
- 4.16 List the advantages and disadvantages of various speed control methods of D.C Shunt Motor.
- 4.17 Solve problems on speed control of DC shunt motor
- 4.18 List the different methods of speed control for D.C series motors.
- 4.19 Describe the speed control methods of D.C series motor.
- 4.20 List the advantages and disadvantages of speed control methods of D.C series motor.
- 4.21 Solve problems on speed control of DC series motor

CO5 - Determine the performance of DC Motors by conducting tests on DC Motor and enumerate braking methods of D.C Motor

- 5.1 Describe the method of conducting brake test on D.C shunt motor with neat sketch
- 5.2 Describe the method of conducting brake test on D.C series motor with neat sketch
- 5.3 Describe the method of conducting brake test on D.C compound motor with neat sketch
- 5.4 Explain different performance curves.
- 5.5 List the advantages and disadvantages of brake test on different types of D.C Motors.
- 5.6 Solve problems on brake test on different types of D.C Motors.
- 5.7 Describe the method of conducting Swinburne's test.
- 5.8 Solve problems on Swinburne's test
- 5.9 List the advantages and disadvantages of Swinburne's test.
- 5.10 State the necessity of braking
- 5.11 List the types of braking
- 5.12 State the advantages of electrical braking
- 5.13 List the types of electrical braking
- 5.14 Explain plugging in DC shunt motor and DC series motor
- 5.15 Explain rheostatic or dynamic braking in DC shunt and series motor
- 5.16 Explain the concept of regenerative braking in DC shunt and DC series motor

CO6 - Use different types of Batteries

- 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 Describe the construction of Lithium-ion cell.
- 6.17 Write chemical reaction during charging and discharging of Lithium-ion battery
- 6.18 Give the applications of Lithium-ion cell
- 6.19 State the importance of super capacitor
- 6.20 List the applications of super capacitor
- 6.21 Define maintenance free battery.
- 6.22 List the applications of maintenance free batteries
- 6.23 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	1					1	1,2,7
CO2	3	1		3			1	1,2,4,7
CO3	3	1					1	1,2,7
CO4	3	1	1	3			1	1,2,3,4,7
CO5	3	1		3			1	1, 2,4,7
CO6	3	1			3		1	1,2,5,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER MID -I EXAMINATION

Course Code: EE-303
Course Name: DC Machines & 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. Write the formula for AT_d and AT_c/Pole

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.

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MODEL QUESTION PAPER
DEEE III SEMESTER MID -II EXAMINATION

Course Code: EE-303
Course Name: DC Machines & 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) State the function of Hold on coil and over load release of a 3-point starter
OR
b) Draw the circuit diagram of speed control of DC shunt motor by field control method.

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) Explain the speed control methods of DC series motor
(a)Field Diverter,
(b)Tap changing.

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MODEL QUESTION PAPER
DEEE III SEMESTER
SEMESTER END EXAMINATION

Course Code: EE- 303
Course Name: DC Machines & 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 any two tests on DC motor.
- 4) State any two applications of DC series motor.
- 5) Define Plugging.
- 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) State the requirement of good braking system.

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 method of conducting Break test on DC Shunt motor.

14. a) Draw the connection diagram of a 3 point starter and indicate the parts.

OR

- b) Write the chemical reaction during charging and discharging of Lead –Acid cell.

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-304 : ELECTRICAL CIRCUITS

Course Title:	Electrical Circuits	Course Code	EE-304
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Basic electrical engineering.

Course Outcomes

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

CO 1	Apply Kirchhoff's laws and Star Delta transformations to Electrical circuits
CO 2	Apply network theorems to solve DC circuits
CO 3	Distinguish between the various terms pertaining to 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 circuits	10		2	10(a)	14(a)	
4	Single phase A.C. Series Circuits	15					
5	Single phase A.C. Parallel Circuits	14		3	5,6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)
6	Poly Phase Circuits	11					
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.-Solve Simple 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, - 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-expression of Q- factor- problems on series resonance.

UNIT 5 - Single phase A.C. Parallel Circuits**Duration: 14 Periods (L:11 – T: 3)**

Derive the current (RMS Values)and Power factor, State expressions for impedance (RMS Values)power in R-L, R-C, L-C and R-L&C parallel circuits including phasor diagrams. – Solve simple problems on parallel circuits by vector method, Admittance method–Parallel RL and C resonance circuit –Condition for resonance in parallel circuit- Q-factor and resonance frequency-expressions

UNIT 6 - Poly phase circuits**Duration: 11 Periods (L:9 – T: 2)**

Definition of Poly phase - Advantages of poly-phase systems over single-phase systems - Generation 3 phase EMF's – Representation of 3 phase EMF's by equations, waveforms and phasor - phase sequence - Current in neutral of 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

Reference 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 education, 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

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

CO1: Apply Kirchhoff's laws and Star Delta transformations to circuits:

- 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 Simple problems by applying KVL and KCL (no dependent sources)
- 1.9 Explain Mesh analysis
- 1.10 Solve simple problems on mesh analysis.
- 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

CO2: Apply network theorems to solve DC circuits

- 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.
 - a. (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

CO3: Distinguish between the various terms pertaining to Alternating quantities

- 3.1 Draw the different A.C waveforms.
- 3.2 Define alternating quantity
- 3.3 Define cycle of an alternating quantity
- 3.4 Define frequency of an alternating quantity
- 3.5 Define time period of an alternating quantity
- 3.6 Define amplitude of an alternating quantity
- 3.7 Define angular velocity of an alternating quantity
- 3.8 Define the instantaneous value of an alternating quantity
- 3.9 Define maximum value of an alternating quantity
- 3.10 Define Average value of an alternating quantity
- 3.11 Define R.M.S value of an alternating quantity
- 3.12 Define form factor of an alternating quantity
- 3.13 Define peak factor of an alternating quantity
- 3.14 Calculate the maximum value, average value, R.M.S value, form factor and peak factor of sine wave
- 3.15 State the expressions for maximum value, R.M.S value, form factor and Peak factor of Half wave rectified Sine wave, Full wave Rectified Sine wave, Triangular wave and Square wave.
- 3.16 Define the terms phase and phase difference (No problems).
- 3.17 Define j operator.
- 3.18 Convert polar quantities to rectangular quantities and vice-versa.

CO4: Solve problems on Single phase A.C. series circuits

- 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 Write the expression for Q-factor of single-phase series RLC circuit

CO5: Solve problems on single phase A.C. parallel circuits

- 5.1 List methods for solving Parallel Circuits
- 5.2 Draw phasor diagram of R-L parallel circuit
- 5.3 Derive the expression (RMS Values) for current and power factor in R-L parallel circuit by using Vector method.
- 5.4 State the expression for Impedance and Power in R-L parallel circuit
- 5.5 Solve simple problems on R-L parallel circuits using Vector method
- 5.6 Draw phasor diagram R-C parallel circuit
- 5.7 Derive the expression (RMS Values) for current and power factor in R-C parallel circuit by using Vector method.
- 5.8 State the expression for Impedance and Power in R-C parallel circuit
- 5.9 Solve simple problems on R-C parallel circuits using Vector method
- 5.10 Draw phasor diagram of L-C parallel circuit
- 5.11 Derive the expression (RMS Values) for current and power factor in L-C parallel circuit by using Vector method.
- 5.12 State the expression for Impedance and Power in L-C parallel circuit
- 5.13 Draw phasor diagram of R-L&C parallel circuit
- 5.14 Derive the expression (RMS Values) for current and power factor in R-L&C parallel circuit by using Vector method.
- 5.15 State the expression for Voltage and Power in R-L&C parallel circuit
- 5.16 Solve simple problems on R-L and R-C parallel circuits by Admittance Method
- 5.17 Solve simple problems on R and R-L parallel circuits by Admittance Method
- 5.18 Define resonance in parallel circuits
- 5.19 State the condition for resonance in parallel circuit
- 5.20 State the expression for resonant frequency of Single phase parallel RL&C circuit.
- 5.21 Define Q- factor of single phase parallel RL&C circuit
- 5.22 State the expression for Q-factor of single phase parallel RL&C circuit

CO6: Solve problems on Poly phase balanced circuits

- 6.1 Define the term 'Poly Phase'.
- 6.2 List the advantages of 3 phase system over single phase system.
- 6.3 Explain the method of generation of 3 phase emfs.
- 6.4 Write the expression 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 in 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.

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

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER MID SEMESTER-I EXAMINATION

Corse Code:EE-304

Course Name: Electrical Circuits

Duration:1 Hour

Max.Marks:20

PART-A

Answer all questions, Each Question carries one mark $4 \times 1 = 4$ 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 $2 \times 3 = 6$ 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 $2 \times 5 = 10$ 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.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER MID SEMESTER-II EXAMINATION

Corse Code: EE-304
Course Name: Electrical Circuits

Duration: 1 Hour
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 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 sine wave.

OR

- b) Convert rectangular to polar and vice-versa
i) $2 + j3$ ii) $6 - j6$ iii) $6 \angle 30^\circ$ iv) $2 \angle -90^\circ$

- 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-304
Course Name: Electrical Circuits

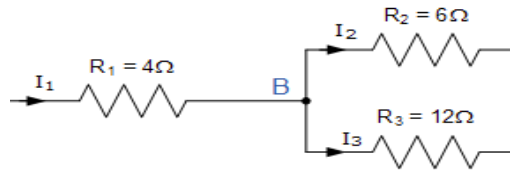
Duration: 2 hours
Max. Marks: 40 Marks

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 $I_3 = 7\text{ A}$.



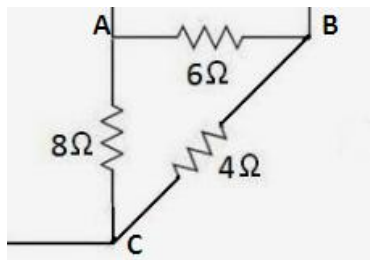
- 2) Define a) Average value and b) RMS value.
- 3) Write the voltage and current relationships in a three phase circuits for a star connected balanced load.
- 4) What is the current through a capacitor $C = 10\text{ nF}$ connected to a single phase 50 V , 50 Hz voltage source?
- 5) Define Q-factor.
- 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

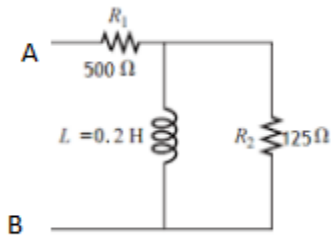
4 x 3 = 12 Marks

- 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 expression for current in RL parallel circuit using Vector method.

OR

- b) Derive 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.

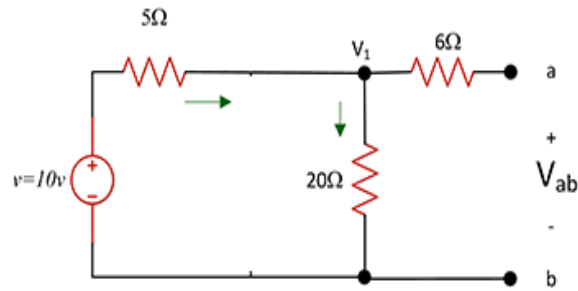
PART - C

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 Current and Power factor in RC parallel circuit using Vector method.
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.

EE-305 : ELECTRICAL POWER SYSTEMS-GENERATION

Course Title:	Electrical Power Systems - Generation	Course Code	EE-305
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of

- (i) Basic principle and working of generators, transformers
- (ii) Voltage and current calculations in the circuits using KCL, KVL

Course Outcomes

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

CO1 :	Classify various sources of Energy.
CO2 :	Explain the construction and working of Thermal power station
CO3 :	Explain the construction and working of Hydroelectric power stations.
CO4 :	Explain the construction and working of Nuclear Power station.
CO5 :	Importance of Solar and wind power generation
CO6 :	Outline the need for integrated Operation and economics of Power Generation

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Introduction to different sources of Energy	10	Q4	Q1		Q9(a)	Q13(a)
2	Thermal Power Stations	15					
3	Hydro Electric Power Stations	13		Q2		Q10(a)	Q14(a)
4	Nuclear Power Stations	12					
5	Solar and Wind Power Generation	15		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Integrated Operation and Economics of Power Generation	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Contents

UNIT 1 - Introduction to different sources of energy

Duration:10 Periods (L:8– T:2)

Different sources of energy - Conventional and Non-conventional sources - Need for Non-Conventional Energy based power generation - Merits and Limitations of Conventional and Non-conventional sources - Methods of generation of energy from different sources of power such as Bio-mass, Geo-Thermal and Tidal - Need for energy conservation and their methods

UNIT 2 - Thermal Power Station

Duration:15 Periods (L:12– T:3)

Thermal Power Station - Principle of working - Factors for selection of site - Block diagram of condensing type thermal power station - Thermal power station - Components and principles of working - pulverization, Condensation, Cooling towers and their types – advantages & limitations -Thermal power stations in telangana - Causes of pollution and methods to control them

UNIT 3 - Hydro Electric Power stations

Duration:13 Periods (L:11–T:2)

Hydro Electric Power Station – requirements for setting up of hydroelectric power stations – principle of working - Hydrograph -Classification of hydroelectric power stations based on head, duty, location and hydraulic considerations - Working of High Head, Medium Head, Low Head Power Stations - need of surge tank, fore bay, spill gates – advantages & limitations - Hydro power stations in telangana.

UNIT 4 - Nuclear power stations

Duration:12 Periods (L:10– T:2)

Nuclear energy, fission and fusion reactions –various nuclear fuels - Merits and limitations of nuclear power stations - Working of nuclear power station with a block diagram - Moderator in nuclear reactors - Need of coolant, reflector, control rods - Materials used for coolant, reflector, control rods – list the nuclear power stations in india.

UNIT 5 - Solar and Wind Power Generation

Duration:15 Periods (L:12– T:3)

Solar radiation - Principle of Conversion of solar radiation into heat - solar collectors - types - working principle of flat plate collector, concentrating collectors - methods of storing solar energy - Principle of photo voltaic conversion - Working principle of solar cell - VI- Characteristics of Solar cell - concept of solar panel - types - Power available in wind - Site selection for installing Wind mill-basic components, constructional details and working principle of wind mill

UNIT 6 - Integrated Operation and Economics of Power Generation

Duration:10 Periods (L:8– T:2)

Isolated operation and integrated operation of power stations - merits and limitations – cost of electrical energy – classify the cost as fixed and running - Load curve, load factor, diversity factor and maximum demand - Effects of load factor and diversity factor in power generation - Solve simple problems - Consumer tariffs –types - Effect of power factor on the electricity charges and methods to improve it

Reference Books

1. S.L.Uppal -Electrical Power
2. Soni, Guptha, Bhatnagar – Electrical Power Systems - Dhanpat Rai & Sons
3. A.T. Starr - Generation, Transmission and Utilisation
4. C.L.Wadhwa -Electrical Power Systems – New age international(P) limited
5. NEDC AP- Non Conventional Energy Guide Lines
6. JB 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

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

CO1 : Classify various sources of Energy

- 1.1 List different sources of energy
- 1.2 Classify the sources of energy into conventional and non-conventional.
- 1.3 State the necessity of developing non-conventional methods of power generation.
- 1.4 State the relative merits of Conventional types of sources.
- 1.5 State the limitations of Conventional types of sources.
- 1.6 State the relative merits of Non-Conventional types of sources.
- 1.7 State the limitations of Non-Conventional types of sources.
- 1.8 Explain the method of generating electrical energy from Biomass Power
- 1.9 Explain the method of generating electrical energy from Geo-thermal Power
- 1.10 Explain the method of generating electrical energy from Tidal Power
- 1.11 State the need of energy conservation
- 1.12 List different methods of energy conservation

CO2 : Explain the construction and working of thermal power station

- 2.1 State the principle of working of thermal power stations.
- 2.2 List the requirements for setting up of Thermal Power Station.
- 2.3 Draw the detailed line diagram of a condensing type thermal power station.
- 2.4 Explain the working of each component of thermal power station.
- 2.5 Define Pulverization.
- 2.6 State the advantages of Pulverization
- 2.7 Define Condensation.
- 2.8 State the advantages of Condensation
- 2.9 State the necessity of cooling towers in thermal power plant
- 2.10 List the types of cooling towers used in thermal power plants.
- 2.11 State the advantages of thermal power plants
- 2.12 State the limitations of thermal power plants
- 2.13 List the thermal power stations in telangana with their location and their capacity.
- 2.14 State the causes of pollution in thermal power station.
- 2.15 List the methods to control Pollution in thermal power station.

CO3 : Explain the construction and working of Hydroelectric power stations.

- 3.1 List the requirements for setting up of Hydro Electric Power Station
- 3.2 Explain the principle of working of Hydro power station.
- 3.3 Define Hydrograph.
- 3.4 Classify the Hydro Electric Power stations based upon head.
- 3.5 Classify the Hydro Electric Power stations based upon duty
- 3.6 Classify the Hydro Electric Power stations based upon location
- 3.7 Classify the Hydro Electric Power stations based upon hydraulic considerations.
- 3.8 Explain the working of High Head Power Station with layout diagram.
- 3.9 Explain the working of Medium Head Power Station with layout diagram.
- 3.10 Explain the working of low Head Power Station with layout diagram.
- 3.11 State the need of Surge Tank.
- 3.12 State the need of Forebay.
- 3.13 State the need of Spill gates.
- 3.14 State the advantages of Hydro Electric Power stations
- 3.15 State the limitations of Hydro Electric Power stations
- 3.16 List the Hydro power stations in Telangana with their location and their capacity

CO4 : Explain the construction and working of Nuclear Power station.

- 4.1 State the importance of nuclear energy
- 4.2 Explain fission reactions.
- 4.3 Explain fusion reactions.
- 4.4 List various nuclear fuels used in nuclear power station
- 4.5 State the merits of Nuclear power stations.
- 4.6 State the limitations of Nuclear power stations.
- 4.7 Explain the working of Nuclear power station with a block diagram.
- 4.8 State the use of moderator in nuclear reactor.
- 4.9 State the need for coolant.
- 4.10 State the need for reflector.
- 4.11 State the need for control rods.
- 4.12 State the materials used for coolant.
- 4.13 State the materials used for Reflector.
- 4.14 State the materials used for control rods
- 4.15 List the Nuclear power stations in india.

CO5 : Importance of Solar and wind power generation

- 5.1 State the amount of solar radiation reaching the earth's surface.
- 5.2 State the principle of conversion of solar radiation into heat.
- 5.3 Define solar collector.
- 5.4 List the types of solar collectors.
- 5.5 Explain the working of flat plate collector.
- 5.6 Identify different types of concentrating collectors.
- 5.7 Explain the working of focusing type concentrating collector.
- 5.8 Explain the working of parabolic trough type concentrating collector.
- 5.9 State the different methods of storing solar energy.
- 5.10 State the principle of photo-voltaic conversion
- 5.11 Define solar cell
- 5.12 State the working principle of solar cell.
- 5.13 Describe the current voltage characteristics of solar cell.
- 5.14 State the function of solar panel.
- 5.15 List the different types of solar panels.
- 5.16 Explain the method of generating electrical energy from solar Power
- 5.17 Mention the power available in the wind and the force caused by it on the blades.
- 5.18 State the different considerations for site selection for installing wind mill.
- 5.19 List the basic components of a wind mill.
- 5.20 Describe the constructional details of the wind mill.
- 5.21 Explain the working principle of the wind mill

CO6 : Outline the need for integrated Operation and economics of Power Generation

- 6.1 State the need for integrated operation of power stations.
- 6.2 Differentiate between isolated operation and integrated operation of power stations.
- 6.3 List the merits of integrated operation.
- 6.4 State the limitations of integrated operation.
- 6.5 Classify the cost as fixed and running.
- 6.6 Define Load curve and Maximum demand
- 6.7 Define Load factor and Diversity factor
- 6.8 Discuss the effects of load factor on the cost of generation
- 6.9 Discuss the effects of diversity factor on the cost of generation
- 6.10 Simple problems on the above.
- 6.11 Define tariff.
- 6.12 State different types of consumer tariffs.
- 6.13 Explain simple tariff
- 6.14 Explain Flat rate tariff
- 6.15 Explain Block rate tariff
- 6.16 Explain two part tariff
- 6.17 Explain Maximum demand tariff
- 6.18 Explain Power factor tariff
- 6.19 Explain Three part tariff
- 6.20 Discuss the effects of power factor on electricity charges
- 6.21 Mention the methods to improve Power Factor.

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 Group discussion.
- 10 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	2			2			PO 1, 2, 5
CO2	2	1			3			PO 1, 2, 5
CO3	3	1			1			PO 1, 2, 5
CO4	3	1			3			PO 1, 2, 5
CO5	2	2			1			PO 1, 2, 5
CO6	2	3			2			PO 1, 2, 5

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-305
ELECTRICAL POWER SYSTEMS – GENERATION

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 conventional energy.
2. State any two non conventional sources of energy.
3. Define Condensation.
4. State types of cooling towers

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks.

- 5.(a) State the need of energy conservation
OR
- 5.(b) State the relative merits of Conventional types of sources
- 6.(a) State the advantages of Pulverization
OR
6. (b) State the necessity of cooling towers

PART - C

Marks:

2 x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Explain the method of generating electrical energy from Biomass Power.
OR
- 7.(b). Explain the method of generating electrical energy from Geo-thermal Power
- 8.(a). Draw the simple line diagram of a condensing type thermal power station
OR
- 8.(b). Discuss the causes of pollution in thermal power station.

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.**

**SUB CODE: EE-305
ELECTRICAL POWER SYSTEMS - GENERATION**

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. Define Hydrograph.
2. Classify the Hydro Electric Power stations based upon duty
3. Define fission reactions.
4. State any nuclear fuels of energy.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

- 5.(a). State the need of Surge Tank.
OR
- 5.(b). List the Hydro power stations in Telangana with their location and their capacity
- 6.(a). State the need for coolant in nuclear power station.
OR
- 6.(b). State the materials used for control rods

PART - C

Marks: 2

x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Explain the working of High Head Power Station with layout diagram.
OR
- 7.(b). State the advantages and limitations of Hydro Electric Power stations
- 8.(a). Draw the block diagram of Nuclear power station.
OR
- 8.(b). State the necessity of moderator and reflector in nuclear power station.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-305
ELECTRICAL POWER SYSTEMS - GENERATION

SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks: $8 \times 1 = 8$

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define energy conservation.
2. Define fusion reactions.
3. Define solar collector.
4. State the need for control rods in nuclear power station.
5. List any two types of solar panels.
6. List any two types of concentrating collectors.
7. Define tariff.
8. Define Load curve.

PART – B

Marks: $4 \times 3 = 12$

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a) Compare conventional and non conventional energy sources in any three aspects
OR

9.(b) State the principle of photo-voltaic conversion

10.(a) Explain the working of low Head Power Station with layout diagram.
OR

10.(b) Define Load factor and Diversity factor

11.(a) List the basic components of a wind mill.
OR

11.(b) Draw the VI characteristics of solar cell.

12.(a) Explain simple tariff
OR

12.(b) List any three merits of integrated operation.

PART – C

Marks: $4 \times 5 = 20$

Instructions: (1) Answer all questions.

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

13.(a) Explain the method of generating electrical energy from Tidal Power.

OR

13. (b) Explain the working of parabolic trough type concentrating collector.

14. (a) Analyze the merits and limitations of Nuclear power stations.

OR

14.(b) Differentiate between isolated operation and integrated operation of power stations

15.(a) Explain the method of generating electrical energy from solar Power

OR

15.(b) Explain the working principle of the wind mill

16.(a) Discuss the effects of power factor on electricity charges

OR

16.(b) Explain Three part tariff

EE-306 : ELECTRICAL & ELECTRONICS MEASURING INSTRUMENTS

Course Title:	Electrical and Electronic Measuring Instruments	Course Code	EE-306
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic electrical quantities, its units and basic mechanical quantities.

Course Outcomes

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

CO 1	Define the terms of measuring instruments and classify the types.
CO 2	Apply the MC, MI and Dynamometer measuring instruments.
CO 3	Measure the Electrical power and energy
CO 4	Measure Resistance, Inductance and Capacitance.
CO 5	Analyze the basic principles of transducers and sensors
CO 6	Compare 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	Analog and Digital Electronic Instruments	13		7,8	10(b), 12(a), 12(b)	14(b), 16(a), 16(b)
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 - Electrical quantities and units - Measuring instruments used - Classification of instruments - Types of torques (deflection, controlling and damping torques) in indicating instruments- Types of errors.

UNIT 2 – Voltage and Current Measuring Instruments

Duration: 15 Periods (L: 12 – T:3)

M.C. and M.I ammeters and voltmeters- construction and working – errors – remedies – comparison- Concept of shunts and multipliers for M.C instruments - Dynamometer type ammeter, voltmeter and wattmeter–construction, working, and errors.

UNIT 3 – Power and Energy Measuring Instruments

Duration: 15 Periods (L: 12 – T:3)

Need for instrument transformers - measurement of power - single phase induction type energy meter - construction and working, error and adjustments – connections of a three phase energy meter - construction and working of Weston synchroscope.

UNIT 4 – Measurement of Basic Circuit Elements

Duration: 10Periods (L:8– T:2)

Classification of resistance- methods of resistance measurement - basic Ohmmeter circuit - series and shunt ohmmeters - construction and working of megger– measurement of earth resistance using Megger – Potentiometer - construction, working principle and applications - measurement of inductance – measurement of capacitance.

UNIT 5 – Transducers and Sensors

Duration: 12 Periods (L:9 – T:3)

Definition of transducer -classification of transducers - factors influencing selection of transducer - applications of transducers - thermocouple – thermister- strain gauge - LVDT - basic concept of sensors and its applications – Principle of semiconductor sensors.

UNIT 6 – Analog and Digital Electronic Instruments

Duration:13 Periods (L:10 – T:3)

Basic components of analog electronic instruments - Principle of working of rectifier type voltmeter and ammeter - basic components of 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 - use of tong tester - comparison between digital and electromechanical measuring instruments.

Reference 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

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

CO1: Define the terms of measuring instruments and classify the types.

- 1.1 Define the terms accuracy, precision, error, resolution and sensitivity.
- 1.2 List electrical quantities to be measured their units.
- 1.3 List electrical measuring instruments to measure electrical quantities.
- 1.4 Classify the 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 List the types of secondary instruments (indicating, integrating and recording) with examples.
- 1.9 Explain the purpose of obtaining deflecting torque in indicating instruments.
- 1.10 Illustrate the purpose of obtaining controlling torque in indicating instruments.
- 1.11 Explain the purpose of obtaining damping torque in indicating instruments.
- 1.12 List the methods of obtaining deflecting torque in indicating instruments.
- 1.13 Explain the methods of obtaining deflecting torque in indicating instruments.
- 1.14 List the methods of obtaining controlling torque in indicating instruments.
- 1.15 Elaborate the methods of obtaining controlling torque in indicating instruments.
- 1.16 List the methods of obtaining damping torque in indicating instruments.
- 1.17 Illustrate the methods of obtaining damping torque in indicating instruments.
- 1.18 Classify the errors according to its source (gross, systematic and random).

CO2: Apply the MC, MI and Dynamometer measuring instruments.

- 2.1 Explain the working of permanent magnet moving coil instrument (voltmeter/ammeter).
- 2.2 List the types of errors commonly occurring in moving coil (M.C.) instruments.
- 2.3 Illustrate the remedies for the commonly occurring errors in M.C instruments.
- 2.4 Outline the advantages and disadvantages of M.C instruments.
- 2.5 List the applications of M.C instruments.
- 2.6 Illustrate the working of moving iron (M.I) Attraction type Instrument with a legible sketch.
- 2.7 Explain the construction and working of moving iron (M.I) Repulsion type Instrument with a legible sketch.
- 2.8 List the errors commonly occurring in M.I. Instruments.

- 2.9 Outline the advantages and disadvantages of M.I. instruments.
- 2.10 Compare M.C. and M.I instruments.
- 2.11 Extend the range of moving coil ammeter using Shunt with a legible sketch.
- 2.12 Solve simple problems on extension of the range of MC ammeter using the shunt.
- 2.13 Extend the range of moving coil voltmeter using multiplier with a legible sketch.
- 2.14 Solve simple problems on extension of the range of MC voltmeter using multiplier.
- 2.15 Explain the construction of dynamometer type instruments with a neat diagram.
- 2.16 Illustrate the working of dynamometer type instruments.
- 2.17 List the common errors in the dynamometer instruments.
- 2.18 List the advantages of dynamometer instruments.
- 2.19 List the disadvantages of dynamometer instruments

CO3: Measure the Electrical power and energy

- 3.1 Discuss the need for instrument transformers (current transformer and potential transformer).
- 3.2 List the applications of instrument transformers
- 3.3 State the precaution to be taken before using current transformer.
- 3.4 Develop the circuit diagram for measuring power with wattmeter in single phase circuit in with instrument transformers.
- 3.5 Develop the circuit diagram for measuring power and power and power factor in 3 phase circuit using one wattmeter.
- 3.6 Develop the circuit diagram for measuring power and power and power factor in 3 phase circuit using two wattmeters.
- 3.7 Develop the circuit diagram for measuring power and power and power factor in 3 phase circuit using three wattmeters.
- 3.8 Explain the construction and working of a single phase induction type energy meter.
- 3.9 Define meter constant.
- 3.10 List the common errors and their remedies in single phase energy meter.
- 3.11 Outline the connections of a three phase energy meter.
- 3.12 Explain the construction and working of Weston synchroscope.

CO 4: Measure Resistance, Inductance and Capacitance.

- 4.1 Classify the resistances based on its value.
- 4.2 List the methods of measurements of low resistances.
- 4.3 List the methods of measurements of medium resistances.
- 4.4 List the methods of measurements of high resistances.
- 4.5 Show the circuit diagram of basic ohm meter.
- 4.6 Explain the working of basic ohmmeter.
- 4.7 Draw the circuit diagram of series type ohmmeter.
- 4.8 Develop the circuit diagram of shunt type ohmmeter.

- 4.9 Explain the construction and working of Megger.
- 4.10 Illustrate the method of measurement of earth resistance using earth megger with a legible sketch.
- 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.

CO5: Analyze the basic principles of transducers and sensors.

- 5.1 Define transducer.
- 5.2 State the need of transducers in measurement systems.
- 5.3 Classify Transducers.
- 5.4 List the applications of transducers.
- 5.5 Utilize Thermocouple for the measurement of temperature.
- 5.6 Make use of thermister for the measurement of temperature and in a bridge circuit.
- 5.7 Explain the working principle of strain gauge.
- 5.8 Describe the construction of Linear Variable Differential Transformer (LVDT).
- 5.9 Elaborate the working of LVDT.
- 5.10 Explain the concept of sensor.
- 5.11 List the applications of sensors.
- 5.12 List semiconductor sensors.

CO6: Compare Electronic and Digital instruments.

- 6.1 List the basic components of analog electronic instruments.
- 6.2 List various analog electronic instruments.
- 6.3 Discuss the working principle of rectifier type voltmeter with a neat diagram.
- 6.4 Discuss the working principle of rectifier type ammeter with a legible sketch.
- 6.5 List the basic components of digital electronic instruments.
- 6.6 Compare digital instruments and analog instruments.
- 6.7 List the types of digital voltmeters.
- 6.8 Mention the specifications of digital voltmeter.
- 6.9 Explain the working of digital multimeter with block diagram by giving its specifications.
- 6.10 Explain the working of single phase digital energy meter with block diagram.
- 6.11 State the uses of tong tester (clamp meter).

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	-	-	-	1,4
CO2	3	2	-	2	-	-	-	1,2,4
CO3	3	1	-	2	-	-	-	1,2,4
CO4	3	1	-	1	-	-	-	1,2,4
CO5	3	1		1	-	-	1	1,2,4,7
CO6	3	-		1	-	-	-	1,4

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE III SEMESTER MID SEMESTER-I EXAMINATION

Course Code: EE-306

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. List any four electrical quantities and their units.
3. List any two types of errors in moving coil instruments.
4. List any two advantages of dynamometer instruments.

PART-B

Answer **two** questions. Each question carries three marks

2x3 = 6 Marks

5. a) Classify and define the errors according to its source.

OR

- b) Classify the Electromechanical instruments based on working principle.

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

2x5 = 10

Marks

7. a) What are the different torques in indicating instruments? Explain the purpose of each.

OR

- b) Distinguish between absolute and secondary instruments.

8. a) Explain the working of permanent magnet moving coil instrument.

OR

- b) Explain the method of extending the range of moving coil ammeter with the help of shunt..

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MODEL QUESTION PAPER

DEEE III SEMESTER MID SEMESTER-II EXAMINATION

Course Code: EE-306

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) What is the need for instrument transformers
- 3) List the applications of potentiometer
- 4) List any two bridges used to measure capacitance

PART-B

Instructions: Answer **two** questions. Each question carries three marks

2x3 = 6 Marks

- 5) a) Mention the precaution to be taken before using CT.

OR

- b) Classify the common errors in 1-phase energy meter.

- 6) a) Draw the circuit diagram of basic ohmmeter.

OR

- b) Write the various methods of measuring high resistance.

PART-C

Instructions: Answer **two** questions. Each question carries five marks

2x5 = 10 Marks

- 7) a) Explain how synchronization of alternator is done using 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 measurement of unknown resistance with potentiometer with a legible sketch.

OR

- b) Distinguish between shunt and series ohmmeters in any five aspects.

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MODEL QUESTION PAPER DEEE III SEMESTER SEMESTER END
EXAMINATION

Corse Code: EE-306

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) C l a s s i f y the types of secondary instruments.

OR

- b) L i s t the applications of transducers.

- 10 a) L i s t 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 application of thermocouple for the measurement of temperature.

14. a) Explain the working of basic ohmmeter.

OR

- b) Explain the working of rectifier type voltmeter.

15. a) Describe the working of Linear Variable Differential Transformer.

OR

- b) Explain the factors influencing the choice of transducer.

16. a) Explain the working of digital multimeter with block diagram.

OR

- b) Explain the working of single phase digital energy meter with block diagram.

EC-307 : DIGITAL ELECTRONICS LAB

Course Title	Digital Electronics Lab	Course Code	EC-307
Semester	III	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.25
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

CO1	Familiarize with logic gates and Boolean functions
CO2	Realization of combinational logic circuits
CO3	Realization of sequential logic circuits

Course Content and Blue Print of Marks for SEE

CO1: Familiarize with logic gates and Boolean functions

- 1) Identify Digital ICs of logic gates and note down pin details from data sheets
- 2) Verify the truth tables of Logic gates (AND, OR, NOT, NAND, NOR, EX- OR, EX – NOR)
- 3) Implement AND, OR, NOT gates using NAND, NOR gates and verify the Truth Tables.
- 4) Verify the truth table of XOR gate using NAND and NOR gates.
- 5) Implement and verify the truth table of a given Boolean function using basic and universal logic gates

CO2: Realization of combinational logic circuits

- 6) Verify the truth table of halfadder using basic and universal logic gates
- 7) Verify the truth table of fulladder implemented with 2 half adders.
- 8) Verify the truth tables of 4 X 1 MUX and 1 X 4 DE-MUX.
- 9) Verify the function of 8 X 3 Encoder with truth table
- 10) Verify the function of 3 X 8 Decoder with truth tables.
- 11) Verify the function of BCD to Decimal Decoder and write the truth tables.

CO3 : Realization of sequential logic circuits

- 12) Construct clocked SR FF using NAND gates and verify its truth table.
- 13) Verify the functionality and truth table of SR, JK, D, T flip flops.
- 14) Construct and verify the working of decade counter with truth table
- 15) Verify the working of Ring Counter with truth table
- 16) Construct and verify the working of synchronous up/down counter truth table
- 17) Verify the working of shift register with truth table

EE-308 : DC MACHINES LAB

Course Title:	DC Machines Lab	Course Code	EE-308
Semester	III Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
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

Upon the completion of the course the students will have the ability to:

Course Outcomes	
CO1	Identify the terminals of DC Motors/Generators
CO2	Draw and interpret the performance characteristics of DC Generators by conducting suitable Tests.
CO3	List the parts of Starters and Evaluate the performance characteristics of DC Motors by Conducting suitable experiments.
CO4	Apply various speed control methods on DC motors

Suggested Learning Outcomes

CO-1 Identify the terminals of DC Motors/DC Generators

- 1.1 Identify the terminals of DC Shunt Motor/Generator
- 1.2 Identify the terminals of DC Series Motor/Generator
- 1.3 Identify the terminals of DC Compound Motor/Generator

CO-2 Draw and interpret the performance characteristics of DC Generators by Conducting suitable experiments.

- 2.1 Obtain OCC of a DC shunt Generator at rated speeds
- 2.2 Obtain Internal and External characteristics of DC Shunt Generator
- 2.3 Obtain Internal and External characteristics of DC Series Generator.
- 2.4 Obtain Internal and External characteristics of DC Compound Generator

CO-3 List the parts of Starters and Evaluate the performance characteristics of DC Motors by conducting suitable Tests.

- 3.1 Identify the parts of DC 3 point starter
- 3.2 Identify the parts of DC 4 point starter

- 3.3 Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
- 3.4 Obtain performance characteristics by conducting Brake Test on DC Series Motor.
- 3.5 Obtain performance characteristics by conducting Brake Test on DC Compound Motor.
- 3.6 Obtain performance of DC Shunt Motor by conducting Swinburne's Test.

CO-4 Apply various speed control methods on DC motors

- 4.1 Speed control of DC Shunt Motor by Armature control method
- 4.2 Speed control of DC Shunt Motor by Field control method

CO-PO Mapping Matrix

	Basic and Discipline specific knowledge	Problem Analysis	Design/Development of solutions	Learning Tools, Experimentation and Testing	Design 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	1		3		2		PO1,2,4,6
CO2	3	1		3		2		PO1,2,4,6
CO3	3	1		3		2		PO1,2,4,6
CO4	3	1		3		2		PO1,2,4,6

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MODEL QUESTION PAPER
DEEE IV SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-308

Duration: 1 Hour

Course Name: DC 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 of DC Shunt motor
2. Identify the terminals of DC Series motor
3. Identify the terminals of DC Compound motor
4. Obtain OCC of a DC shunt Generator at rated speeds
5. Obtain Internal and External characteristics of DC Shunt Generator
6. Obtain Internal and External characteristics of DC Series Generator.
7. Obtain Internal and External characteristics of DC Compound Generator

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MODEL QUESTION PAPER
DEEE IV SEMESTER
MID SEMESTER-II EXAMINATION**

Course Code: EE-308

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 parts of a 3 point starter
2. Identify the parts of a 4 point starter
3. Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
4. Obtain performance characteristics by conducting Brake Test on DC Series Motor
5. Obtain performance characteristics by conducting Brake Test on DC Compound Motor.

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MODEL QUESTION PAPER
DEEE IV SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-308

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. Obtain OCC of a DC shunt Generator at rated speeds
5. Obtain Internal and External characteristics of DC Shunt Generator
6. Obtain Internal and External characteristics of DC Series Generator.
7. Obtain Internal and External characteristics of DC Compound Generator
8. Identify the parts of a 3 point starter
9. Identify the parts of a 4 point starter
10. Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
11. Obtain performance characteristics by conducting Brake Test on DC Series Motor.
12. Obtain performance characteristics by conducting Brake Test on DC Compound Motor.
13. Obtain performance of DC Shunt Motor by conducting Swinburne's Test.
14. Speed control of DC Shunt Motor by Armature control method
15. Speed control of DC Shunt Motor by Field control method

EE-309:CIRCUITS&MEASUREMENTSLAB

Course Title:	Circuits and Measurements Lab	Course Code	EE-309
Semester	III Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Prerequisites

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 Volt meter, Am meter, Watt meter & CRO
- The knowledge of electrical circuits and fundamentals of various measuring instruments

Course Outcomes

Upon the completion of the course the students will have the ability to

Course Outcomes	
CO1	Apply Kirchhoff's laws and Network theorems to solve electric circuits
CO2	Illustrate the method for range extension in D.C meters and relationships in Single phase R and R-L loads
CO3	Compare calibrated meter readings with standard meters and Measure Power
CO4	Experiment various methods to measure unknown resistance

Suggested Learning Outcomes

1. Apply Kirchhoff's laws and Network theorems to solve Circuits

Verify Kirchhoff's laws(KCL&KVL) in a DC circuit

Verify Thevenin's theorem in a DC circuit

Verify Maximum power transfer theorem in a DC circuit

Verify Super position theorem in a DC circuit with two sources

2. Illustrate the methods of range extension in D.C. meters and Verify the voltage, current phasor relationship in 1- Φ AC circuits with R and R-L loads

Extend the range of D.C. am meter by using shunt resistances (low range to high range)

Extend the range of D.C. volt meter by using series multiplier (low range to high range)

Verify that the voltage and current in 1- Φ AC circuit are in phase using CRO and draw the phasor diagram.

Verify that the current in 1- Φ AC circuit with pure RL- load lags the voltage using CRO and draw the phasor diagram.

3 Compare calibrated meter readings with standard meters and Measure Power

Calibration and testing of single phase energy meter

Calibration of dynamo meter watt meter

Measurement of Power in a three-phase balanced circuit with two watt meter method

4 Experiment various methods to measure unknown resistance

Measurement of Low and Medium resistance by Volt-ampere method

Measurement of resistance by Kelvin's double Bridge.

Measurement of earth resistance using digital earth tester

CO-PO Mapping Matrix

	Basic and Discipline Specific know	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	2	-	2	1	1,2,3,4,6,7
CO2	3	-	2	2	-	2	1	1,3,4,6,7
CO3	-	1	3	2	-	2	1	2,3,4,6,7
CO4	-	1	2	2	-	2	1	2,3,4,6,7

**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: Circuits and 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. Verify Kirchhoff's current law in a DC circuit
2. Verify Kirchhoff's voltage law in a DC circuit
3. Verify Thevenin's theorem in a DC circuit
4. Verify Maximum power transfer theorem in a DC circuit
5. 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
MID SEMESTER-II EXAMINATION**

CorseCode: EE-309

Duration: 1 Hour

Course Name: Circuits and 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 D.C. am meter by using shunt resistances (low range to high range)
2. Extend the range of D.C. volt meter by using series multiplier (low range to high range)
3. Verify that the voltage and current in 1- Φ AC circuit are in phase using CRO and draw the phasor diagram.
4. Verify that the current in 1- Φ AC circuit with pure RL –load lags the voltage using CRO and draw the phasor diagram.

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: Circuits and 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. Verify Kirchhoff's current law in a DC circuit
2. Verify Kirchhoff's voltage law in a DC circuit
3. Verify Thevenin's theorem in a DC circuit
4. Verify Maximum power transfer theorem in a DC circuit
5. Verify Super position theorem in a DC circuit with two sources
6. Extend the range of D.C.am meter by using shunt resistances(low range to high range)
7. Extend the range of D.C.volt meter by using series multiplier(low range to high range)
8. 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.
9. Verify that the current in 1- Φ AC circuit with pure R L – load lags the voltage using CRO and draw the phasor diagram.
10. Calibration and testing of single-phase energy meter
11. Calibration of dynamo meter watt meter
12. Measurement of Power in a three-phase balanced circuit with two-wattmeter method
13. Measurement of low and medium resistance by Volt Ampere method
14. Measurement of resistance by Kelvin's double Bridge.
15. Measurement of earth resistance using digital earth tester

HU – 310-COMMUNICATION SKILLS & LIFE SKILLS LAB

Course Title	Communication Skills & Life Skills Lab	Course Code	HU-310
Semester	III	Course Group	Practical
Teaching Scheme in Periods-L:T:P	1 : 0 : 2	Credits	1.25
Methodology	Lecture + Practical	Total Contact Hours	45 Periods (3 Periods per Week)
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

1. Listening Skills - I

Duration:6(L2P4)

- A paragraph
- A song
- A recipe
- A dialogue

2. Life Skills- I

Duration:9(L3P6)

1. Attitude

- Features of attitude
- Attitude and behaviour
- Attitude formation
- Positive attitude
- Negativeattitude
- Overcoming negative attitude
- Attitude at work place

2. Adaptability

- Need for adaptability
- Willingness to experiment
- Fear of failure
- Think ahead
- Stay positive
- Curiosity
- Being in present

3. Listening Skills- II

Duration:6(L2P4)

- Biography
- Interview
- A Report
- Telephone Conversation

4. Life Skills-II

Duration:9(L3P6)

3. Goal setting
 - Importance of setting goals
 - What is goal setting
 - Short term goals
 - Long term goals
 - Achieve goals using SMART
4. Creativity
 - Flexibility
 - Curiosity
 - Determination
 - Innovative ideas

5. Life Skills – III

Duration:6(L2P4)

5. Time Management
 - Features of time
 - Secrets of time management
 - Time wasters
 - Prioritization
 - Productive time
 - Time Quadrant
6. Human Values
 - Honesty and integrity
 - Work Ethics
 - Ego and Respect
 - Trust and Truthfulness
 - Social Responsibility
 - Character formation
 - Designing Destiny

6. Life Skills- IV

Duration:9(L3P6)

7. Problem Solving and Decision Making

- Define the problem
- Generate Options
- Evaluate and choose an option
- Implement solution
- Monitoring and Seeking Feedback

8. Leadership Qualities and Team Work

- Significance of Leadership
- Factors of leadership
- Leadership styles
- Leadership Skills
- Importance of Team work
- Characteristics of a good team
- Benefits of team work
- Problems of team work
- Qualities of team player

Course Outcomes

CO	A the end of the course the students will have the ability to:
CO 1	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 2	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 3	Develop positive attitude to adapt oneself to all the situations to succeed in professional and personal life.
CO 4	Set goals using SMART features for life and get inspired to get success in professional and personal life. Create innovative things and think out of the box.
CO 5	Apply various time management techniques and prioritize tasks effectively, and learn to be creative and innovative in thinking and maintain core human values in personal life and professional life.
CO 6	Develop problem-solving skills, make timely decisions, develop trust, confidence, leadership skills and team qualities.

CO-POMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
CO 1	-	-	-	-	3	2	3	5,6 and 7
CO 2	-	-	-	-	3	2	3	5,6 and 7
CO 3	-	-	-	-	3	3	3	5,6 and 7
CO 4		-		-	2	2	3	5,6 and 7
CO 5					2	2	3	5,6 and 7
CO 6					2	2	3	5,6 and 7

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. ab record submission:	5 marks
II. Semester End Examination:	40 Marks
a. Listening:	10 Marks
b. Life Skills topics:	15 Marks
b. VivaVoce	15 Marks

References:

- a. Flint, Chris and Jamie Flockhart Is ending: A2 (CollinsEnglishforLife:Skills) Collins. 2013
- b. Brown, Stephen E. English in Everyday Life. McGraw-Hill Education. 2008
- c. Mohanraj, Jayashree. Let Us Hear Them Speak: Developing Speaking-Listening Skills in English. Sage. 2015
- d. Susan Earle—Carlin. Q Skills for Success: Listening and Speaking 5: Student Book with Online Practice. Oxford University Press. 2013
- e. Kumar, Sanjay and Pushpa Latha. Communication Skills: A Work Book. Oxford University Press. 2018
- f. Carnegie, Dale. The Leader in You. Simon & Schuster: 1995
- g. Carnegie, Dale. The Art of Public Speaking. Prabhat Prakashan. New Delhi. 2013
- h. Kaye, Martin. Goal Setting (Work book 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.
- i. West, Steven. Critical Thinking Skills: Practical Strategies for Better Decision making,
- j. Tracy, Brian. Goals. Berrett-Koehler Publishers Inc. San Francisco. 2017
- k. Tracy, Brian. Master your Time Master your Life. Penguin Random House Inc. New York. 2017
- l. Sean Covey. The 7 Habits of Highly Effective, Teens. Simon and Schuster, 2011

E-Learning Resources:

- a. <http://www.bbc.co.uk/worldservice/learningenglish/youmeus/learnit/learnitv39.shtml>
- b. https://www.examenglish.com/leveltest/listening_leveltest.htm
- c. <https://www.oxfordonlineenglish.com/listening?utmreferrer=https%3A%2F%2Fwww.google.co.in%2F>
- d. <https://takeielts.britishcouncil.org/prepare-test/free-ielts-practice-tests/listening-practice-test-1>
- e. <https://learnenglish.britishcouncil.org/en/listening>
- f. <https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=1listening>
- g. <https://www.businessenglishsite.com/business-english-listening.html>

BOARD DIPLOMA EXAMINATION (C-24)
MID SEMESTER EXAMINATION- I
HU-310 COMMUNICATION AND LIFE SKILLS

Time: One Hour

Total Marks: 20

Part – A

10 Marks

1. Listening Comprehension

(5 X 2 = 10)

Instruction: Questions shall be given before reading the passage.

Emperor Ashoka was an emperor in ancient India. He was also called Ashoka the Great. He lived a long time ago, around 304 BCE. When he was young, he became the king of a big part of India after a fight for power.

At first, Ashoka wanted to win more land and power. He fought many wars and won many battles. But one day, during a battle in a place called Kalinga, Ashoka saw a lot of people suffering and dying. This made him feel very sad and sorry for what he had done. He decided he didn't want to fight anymore.

After this, Ashoka became a follower of Buddhism, a peaceful religion. He started to teach people about being kind and not hurting others. He wrote down his ideas on big stone pillars and put them all over his kingdom. These were called the "Edicts of Ashoka."

Ashoka did many good things for his people. He built hospitals for sick people and shelters for travelers. He also helped spread Buddhism to other countries.

Ashoka's time as king was a peaceful and happy time for India. He is remembered as a great leader who wanted everyone to be happy and peaceful.

Questions:

- a. Who was Ashoka?
- b. Why did Ashoka stop fighting wars?
- c. What religion did Ashoka follow after he stopped fighting?
- d. What were the "Edicts of Ashoka"?
- e. Name one good thing Ashoka did for his people.

Part – B

10 Marks

2. How can maintaining a positive attitude in the face of challenges contribute to personal and professional growth?
3. Give an example of a situation where you had to adapt to unexpected changes or circumstances. How did your adaptability skills help you navigate through the situation effectively?

BOARD DIPLOMA EXAMINATION (C-24)
MID SEMESTER EXAMINATION- II
HU-310 COMMUNICATION AND LIFE SKILLS

Time: One Hour

Total Marks: 20

Part – A

10 Marks

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Prithviraj Chauhan was a courageous emperor who ruled parts of northern India during the 12th century. He was born into the Chauhan dynasty, a family known for its valor and leadership. Prithviraj ascended to the throne at a young age after the death of his father, Someshwar Chauhan.

Prithviraj's reign was marked by numerous military conquests and battles to defend his kingdom against rival Rajput clans and foreign invaders. He was renowned for his exceptional skill in warfare, especially archery and horse riding. His bravery and strategic prowess earned him the admiration of his allies and the fear of his enemies.

One of the most famous events in Prithviraj's life was his legendary rivalry with the Afghan ruler, Muhammad Ghori. The two clashed in a series of battles for supremacy in northern India. The most notable of these battles was the Battle of Tarain, fought in 1191 CE. Despite being outnumbered, Prithviraj displayed remarkable leadership and tactical brilliance, leading his forces to victory and capturing Muhammad Ghori. However, the tide turned in the subsequent battle at Tarain in 1192 CE. Due to a betrayal by one of his allies and underestimating Ghori's tactics, Prithviraj faced defeat and was captured. He was taken as a prisoner to Ghori's capital, where he met his tragic end.

Prithviraj Chauhan's legacy remains etched in the annals of Indian history as a symbol of bravery, resilience, and honor. His valorous deeds continue to inspire generations, and his name is remembered with reverence as one of India's greatest warriors and emperors.

Questions:

1. Who was Prithviraj Chauhan?
2. What dynasty did Prithviraj Chauhan belong to?
3. What were Prithviraj Chauhan's notable skills in warfare?
4. Describe the rivalry between Prithviraj Chauhan and Muhammad Ghori.
5. What happened to Prithviraj Chauhan after the Battle of Tarain in 1192 CE?

PART-B

10 Marks

1. ***Instruction: Answer any one of the following questions in 150 words.***
2. Why is it important to set clear and achievable goals in both personal and professional life? give an example of a goal you have set for yourself and explain how you plan to achieve it.
3. How do you use a 'pen' in ten different ways apart from using it for writing?

BOARD DIPLOMA EXAMINATION (C-24)
SEMESTER END EXAMINATION
HU-310 COMMUNICATION AND LIFE SKILLS

Time: Three Hours

Total Marks: 40

Part – A

10 Marks

1. Listening Comprehension

(5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Gautama Buddha, also known simply as the Buddha, was a spiritual leader who lived in ancient India around the 6th century BCE. Born into a noble family in Lumbini, now located in present-day Nepal, Siddhartha Gautama, as he was originally named, led a life of luxury and privilege.

However, Siddhartha's life took a profound turn when he encountered the realities of human suffering. Despite being sheltered from the harshness of the world, he witnessed old age, sickness, and death, which deeply troubled him. Determined to find answers to the mysteries of life and alleviate human suffering, Siddhartha renounced his princely status and embarked on a spiritual quest.

For years, Siddhartha wandered the forests of India, seeking enlightenment through meditation and ascetic practices. After undergoing rigorous self-discipline and introspection, he finally attained enlightenment under a Bodhi tree in Bodhi Gaya, Bihar. It was during this transformative moment that Siddhartha became the Buddha, meaning the "Enlightened One."

Following his enlightenment, the Buddha dedicated his life to teaching others the path to liberation from suffering. He expounded the Four Noble Truths and the Eightfold Path, which form the core teachings of Buddhism. The Four Noble Truths explain the nature of suffering, its causes, its cessation, and the path to its cessation, while the Eightfold Path outlines the ethical and spiritual practices necessary to achieve liberation.

The Buddha's teachings emphasized compassion, mindfulness, and inner peace. He encouraged his followers to cultivate wisdom and lead a virtuous life guided by right understanding, intention, speech, action, livelihood, effort, mindfulness, and concentration.

Throughout his lifetime, the Buddha traveled extensively across northern India, preaching his message of enlightenment and compassion to people from all walks of life. His teachings transcended social barriers and cultural boundaries, attracting followers from diverse backgrounds.

Gautama Buddha's legacy endures as one of the most influential spiritual figures in human history. His teachings continue to guide millions of people around the world on the path to inner peace, compassion, and liberation from suffering.

Comprehension Questions:

1. Who was Gautama Buddha, and when did he live?
2. What prompted Siddhartha Gautama to leave his life of luxury?
3. Where did Gautama Buddha attain enlightenment?
4. What are the Four Noble Truths and the Eightfold Path?
5. How did Gautama Buddha's teachings impact society?

PART-B

15Marks

Instruction: Answer any one of the following questions in 150 words.

2. Seminar on Life Skills Topics

PART- C

15Marks

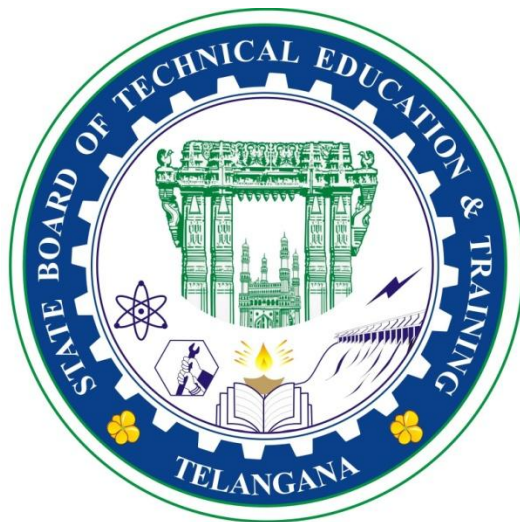
3. Viva Voice

C24_CURRICULUM

DIPLOMA IN

ELECTRICAL AND ELECTRONICS

ENGINEERING



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TRAINING

TELANGANA : HYDERABAD

IV SEMESTER

S. N O	Course		Teaching Scheme					Examination Scheme						
	Code	Course Name	Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-401	Advanced Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be $\geq 35\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade Minimum
2	EC-402	Microprocessors & Microcontrollers	4	1	0	75	2.5	20	20	20	40	14	100	
3	EE-403	Ac Machines	4	1	0	75	2.5	20	20	20	40	14	100	
4	EE-404	Electrical Estimation & Installation	4	1	0	75	2.5	20	20	20	40	14	100	
5	EE-405	Electrical Power Systems - T & D	4	1	0	75	2.5	20	20	20	40	14	100	
6	ME-416	Basic Mechanical Engineering	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be $\geq 50\%$ of Topper Marks and Subject Total Shall be $\geq$ D-Hybrid Grade Minimum
7	EE-407	Electrical Wiring & Installation Lab	1	0	2	45	1.25	20	20	20	40	20	100	
8	EE-408	Ac Machines Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	EE-409	Cad Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	HU-410	Employability Skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

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	2.5
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 (Cos):

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

CO 1	Solve Differential Equations of first order and first degree with appropriate method
CO 2	Solve the higher order Homogeneous Linear Differential Equations with constant coefficients.
CO 3	Solve the Higher order Non-Homogeneous Linear Differential Equations with constant coefficients.
CO 4	Expand given functions as a Fourier Series in the given intervals.
CO 5	Find the Laplace Transforms of simple functions using its properties.
CO 6	Solve Linear Differential Equations with constant coefficient by using Laplace and inverse Laplace Transformations.

Course Contents:

Unit – I

Duration: 15 Periods (L:12 – T:3)

Differential Equations of First Order and First Degree:

Definition of a Differential Equation - Order and Degree of a Differential Equations-Formation of Differential Equations - Solutions of Ordinary Differential Equations of first order and first degree: Variable Separable Method, Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations and Bernoulli's Equation-Problems leading to engineering applications by using above methods.

Unit – II

Duration: 10 Periods (L: 8– T:2)

Higher order Homogeneous Linear Differential Equations with constant coefficients:

Homogenous Linear Differential Equations with constant coefficients of second and higher order-
- Problems leading to engineering applications.

Unit-III

Duration: 12 Periods (L: 10 – T: 2)

Higher order Non-Homogeneous Linear Differential Equations with constant coefficients:

Complimentary Function (C.F), Particular Integral (P.I) and General Solution (G.S) of Non-Homogeneous Linear Differential Equations with constant coefficients- Second and Higher order Non-Homogenous Linear Differential Equations with constant coefficients of the form $f(D)y = X$, where $f(D)$ is a polynomial in D and X is in the form k (a constant), e^{ax} , $\sin(ax)$, $\cos ax$, x^n ($n= 1,2,3$)- Related engineering problems with emphasis on second order Non-Homogeneous Linear Differential Equations.

Unit – IV

Fourier Series:

Duration: 13 Periods (L:10 – T:3)

Periodic functions - Orthogonality Property of Trigonometric functions - Representation of a function as Fourier series over the interval $(c, c + 2\pi)$ - Euler's formulae - Sufficient conditions for existence of Fourier series for a function $f(x)$ - Fourier series of functions over the interval $(0, 2\pi)$ and $(-\pi, \pi)$ - Fourier series of odd and even functions in the interval $(-\pi, \pi)$.

Unit – V

Laplace Transformations:

Duration: 12 Periods (L: 10 – T: 2)

Definition of Laplace Transform -Sufficient conditions for Existence of Laplace Transform, Laplace Transform of some elementary functions -Linearity Property -First Shifting Theorem - Laplace Transforms of Derivatives - Laplace Transforms of Integrals - Multiplication t^n -Division by t - Related problems.

Unit – VI

Duration: 13 Periods (L:10 – T:3)

Inverse Laplace transforms and Applications of Laplace Transformations:

Definition of Inverse Laplace Transform- Inverse Laplace Transform of elementary functions – Linearity Property – First Shifting Theorem - Inverse Laplace Transforms by using Partial fractions -Inverse Laplace Transform of Derivatives - Inverse Laplace Transform of Integrals - Multiplication by s^n Division by s - Definition of Convolution of two functions –Convolution Theorem (without proof) and its Applications - Applications of Laplace Transforms in solving Second order Linear Differential Equations with constant coefficients under the Initial conditions-Problems leading to engineering applications.

Reference Books:

1. Advanced Engineering Mathematics-Erwin Kreyszig, John Wiley Publications.
2. Advanced Engineering Mathematics- R.K. Jain and S.R.K. Iyengar, Narosa Publications.
3. Higher Engineering Mathematics-B.S.Grewal, Khanna Publications.
4. Laplace Transforms - Murray R. Spiegel, Schaum's Outline Series, McGRAW-HILL.
5. Integral Transforms – A.R. Vasishtha and R. K. Gupta, Krishnan Prakashan Publications.

Suggested E-Learning references:

1. <https://www.khanacademy.org/>
2. <https://www.wolframalpha.com/>
3. <https://onlinecourses.swayam2.ac.in/>
4. <http://tutorial.math.lamar.edu/>

Suggested Learning Outcomes:

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

1.0 Solve Differential Equations in engineering problems

- 1.1 Explain the concept of Differential Equations.
- 1.2 Classify the Differential Equations.
- 1.3 Find the order and degree of Differential Equations.
- 1.4 Form a Differential Equation by eliminating arbitrary constants.
- 1.5 Solve the first order first degree Differential Equations by using Variables Separable Method.
- 1.6 Solve the first order first degree Homogeneous Differential Equations.
- 1.7 Solve the first order first degree Exact Differential Equations
- 1.8 Solve the first order Linear Differential Equation of the form $\frac{dy}{dx} + Py = Q$, where P and Q are functions in x alone or constants.
- 1.9 Solve the first order Bernoulli's equations of the form $\frac{dy}{dx} + Py = Qy^n$, where P and Q are Functions of x alone or constants.
- 1.10 Solve the problems leading to engineering applications by using above methods.

2.0. Solve the Higher order Homogeneous Linear Differential Equations with constant coefficients.

- 2.1 Solve Differential Equations of the type: $a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$, where a, b and c are constants, when the roots of the Auxiliary Equation are real & distinct.
- 2.2. Solve Differential Equations of the type: $a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$, where a, b and c are constants, when the roots of the Auxiliary Equation are real & equal.
- 2.3 Solve Differential Equations of the type: $a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$, where a, b and c are constants, when the roots of the Auxiliary Equation are complex conjugate pair.
- 2.4 Solve the Higher order Homogeneous Linear Differential Equations with constant coefficients.

3.0. Solve the Higher order Non-Homogeneous Linear Differential Equations with constant coefficients.

- 3.1 Explain the concept of Complementary Function and Particular Integral to get General Solution of Non-Homogeneous Linear Differential Equation with constant coefficients.
- 3.2 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)y = X$, where $f(D)$ is a polynomial in D and X is a function of the form: k (constant) and e^{ax} .
- 3.3 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)y = X$, where $f(D)$ is a polynomial in D and X is a function of the form: $\sin ax$ and $\cos ax$.
- 3.4 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)y = X$, where $f(D)$ is a polynomial in D and X is a function of the form x^n ($n = 1, 2, 3$).
- 3.5 Solve engineering problems with emphasis on second order Non-Homogeneous Linear Differential Equations by using above methods.

4.0 Expand given functions as a Fourier Series in the given intervals.

- 4.1 Define Periodic function with examples
- 4.2 Explain the Orthogonality Property of functions in an interval.
- 4.3 Define the Fourier series of a function in the interval $(c, c+2\pi)$ and state Euler's Formulae for determining the Fourier coefficients.
- 4.4 Write the sufficient conditions for the existence of Fourier series for a function.
- 4.5 Expand Fourier series of functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$.
- 4.6 Expand Fourier series for even and odd functions in the interval $(-\pi, \pi)$.

5.0. Understand the Laplace Transforms:

- 5.1 Define Laplace Transform.
- 5.2 Explain sufficient conditions for existence of Laplace Transform.
- 5.3 Obtain Laplace Transforms of some elementary functions.
- 5.4 State the Linearity Property of Laplace transforms.
- 5.5 State the First Shifting Theorem on Laplace Transforms.
- 5.6 Explain the Laplace transform of $f'(t)$ and $f^{(n)}(t)$ in terms of Laplace transform of $f(t)$.
- 5.7 Explain the Laplace transform of $\int_0^t f(u)du$ in terms of Laplace transform of $f(t)$.
- 5.8 Explain the Laplace transform of $t^n f(t)$ in terms of Laplace transform of $f(t)$.
- 5.9 Explain the Laplace transform of $\frac{f(t)}{t}$ in terms of Laplace transform of $f(t)$.
- 5.10 Solve problems on above methods.

6.0 Understand the Inverse Laplace transforms:

- 6.1 Define Inverse Laplace Transform and write Inverse Laplace Transforms of standard functions.
- 6.2 State the Linearity Property of Inverse Laplace transforms.
- 6.3 State the First Shifting Theorem on Inverse Laplace Transforms.
- 6.4 Solve problems on Inverse Laplace transforms using Partial fractions.
- 6.5 Explain Inverse Laplace transforms of the functions: $s^n f(s)$, $\frac{f(s)}{s}$, $f^{(n)}(s)$, $\int_s^\infty f(u)du$.
- 6.6 Solve the problems on 6.2, 6.3, 6.4 and 6.5.
- 6.7 Acquire the knowledge of convolution of two functions and state the convolution theorem.
- 6.8 Evaluate Inverse Laplace transforms of simple functions using Convolution Theorem.
- 6.9 Use Laplace and Inverse Laplace Transforms to solve second order Linear Differential Equations with constant coefficients under the initial conditions.
- 6.10 Solve the problems leading to engineering applications.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz.
3. Group discussion.
4. Group Tests.
5. Surprise tests.
6. Seminars.
7. Home Assignments.
8. 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	1				3	1,2,3, 7
CO2	3	2					3	1,2, 7
CO3	3	2					3	1,2, 7
CO4	3	2	1				3	1,2, 3,7
CO5	3	2	1				3	1,2, 3,7
CO6	3	2	1				3	1,2,3,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-401

SEMESTER IV, MID –I EXAM, MODEL PAPER

ADVANCED ENGINEERING MATHEMATICS

(Open Book System)

Duration : 1: 00 Hour

Max. Marks: 20

PART-A

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

2 Each question carries **ONE** mark.

1. Find the order and degree of the differential Equation $\left(\frac{d^3y}{dx^3}\right)^4 + 3\left(\frac{d^2y}{dx^2}\right)^3 - 5\frac{dy}{dx} + y = 0$.
2. Find the Integrating Factor of $(1 + x^2)\frac{dy}{dx} + 2xy = \frac{1}{1+x^2}$.
3. Find the roots of auxiliary equation of the differential equation $(2D^2 + 5D - 3)y = 0$.
4. Write the auxiliary equation of the differential equation $a_3\frac{d^3y}{dx^3} + a_2\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_0y = 0$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06

2. Each question carries **THREE** marks.

5(a) Form the differential equation by eliminating arbitrary constants A and B in the family of curves $y = A\cos mx + B\sin mx$, where m is a constant.

OR

5(b) Solve $\frac{dy}{dx} - y\tan x = 0$.

6(a) Solve $6\frac{d^2x}{dt^2} - \frac{dx}{dt} - 2x = 0$.

OR

6(b) Solve $(D^2 - 4)^2y = 0$.

PART- C

Instructions: 1. Answer **ALL** questions 02 × 05 = 10

2. Each question carries **FIVE** marks

7(a) Solve $xy^3dy = (x^4 + y^4)dx$.

OR

7(b) Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y)dy = 0$.

8(a) Solve $(D^3 + 3D^2 - 4)y = 0$.

OR

8 b) Solve $(D^3 - 8)y = 0$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-401

SEMESTER IV, MID –II EXAM, MODEL PAPER

ADVANCED ENGINEERING MATHEMATICS

(Open Book System)

Duration: 1: 00 Hour

Max. Marks: 20

PART-A

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

2. Each question carries **ONE** mark.

1. Find the Particular Integral of $(D^2 - 5D + 6)y = e^{-x}$.
2. Find the Complementary Function of $2 \frac{d^2y}{dx^2} + 3 \frac{dy}{dx} - 5y = 6 \sin 2x$.
3. Find a_0 for $f(x) = x \cos x$ in $-\pi < x < \pi$.
4. Find b_1 for $f(x) = x$ in $0 < x < 2\pi$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06

2. Each question carries **THREE** marks.

a) Find Particular Integral of $(D^2 - D - 6)y = e^x \cosh 3x$.

OR

b) Solve $(D^2 + 2025)y = \sin 45x$.

a) Calculate a_1 in the Fourier series expansion of $f(x) = x \sin x$ in the interval $(-\pi, \pi)$.

OR

b) Find the value of b_n in the expansion of Fourier series for the function $f(x) = e^{3x}$, where $0 < x < 2\pi$.

PART- C

Instructions: 1. Answer **ALL** questions 02 × 05 = 10

2. Each question carries **FIVE** marks

a) Solve $(D^2 - 3D + 2)y = e^x$ if $y = 3$ and $\frac{dy}{dx} = 3$, when $x = 0$.

OR

b) Solve $y'' + y = x, y(0) = y'(0) = 1$.

c) Obtain Fourier series expansion of $|x^3|$ in the interval $(-\pi, \pi)$.

OR

b) Obtain Fourier series expansion of $f(x) = \begin{cases} x & \text{if } 0 < x < \pi \\ 2 & \text{if } \pi < x < 2\pi \end{cases}$

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)

SC-401

SEMESTER IV, SEMESTER END EXAM, MODEL PAPER
ADVANCED ENGINEERING MATHEMATICS

(Open Book System)

Duration: 2: 00 Hours

Max. Marks: 40

PART-A

Instructions: 1. Answer **ALL** questions. 08 × 01 = 08
2 Each question carries **ONE** mark.

1. Find the order and degree of the Differential Equation $2y''' - 3y' = y$.
2. Find the Particular Integral of $(D^2 + 1)y = e^{\frac{x}{2}}$
3. Find $L(e^{-5t} + 7)$.
4. Verify the differential equation $(x + 2y - 2025)dy - (2x - y + 2024)dx = 0$ is homogeneous or not.
5. Find $L(5 \cos 3t + 7 \sinh 2t)$.
6. Find $L(te^{\omega t})$.
7. Find $L^{-1}\left(\frac{s}{s^2+81}\right)$.
8. Find $L^{-1}\left(\frac{3}{(s-3)^2}\right)$.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12
2. Each question carries **THREE** marks.

9(a) Solve $(9D^2 - 24D + 16)y = 0$.

OR

9(b) Evaluate $L(2 \cos^2 3t)$.

10(a) Solve $(D^2 + D - 2)y = 16$.

OR

10(b) Evaluate $L^{-1}\left(\frac{6}{s^2-4s+7}\right)$.

11(a) Evaluate $L(2 \cos^2 3t)$.

OR

11(b) Evaluate $L(5e^{3t} \cosh 2t)$.

12(a) Evaluate $L^{-1}\left(\log\left(\frac{s-2}{s+3}\right)\right)$.

OR

12(b) Evaluate $L^{-1}\left(\frac{1}{s^2(16+s^2)}\right)$.

PART- C

Instructions: 1. Answer **ALL** questions.

04 × 05 = 20

2. Each question carries **FIVE** marks.

13(a) Solve: $x \log x \frac{dy}{dx} + y = \frac{\log x}{x}$.

OR

13(b) Evaluate $L\left[e^{2t} \left(\frac{1-\cos 3t}{t}\right)\right]$.

14(a) Obtain the Fourier series expansion of the function $f(x) = |\sin x|$ in $(-\pi, \pi)$.

OR

14(b) Evaluate $L^{-1}\left(\frac{s}{(s+1)^2(s^2+1)}\right)$.

15(a) Evaluate $L(f(t))$, where $f(t) = \begin{cases} t & \text{if } 0 \leq t < 2 \\ 3 & \text{if } t \geq 2 \end{cases}$.

OR

15(b) Evaluate $L((t^2 + 2t + 3) \sin 2t)$.

16(a) Evaluate $L^{-1}\left(\frac{1}{(s+1)(s+3)}\right)$ using Convolution Theorem.

OR

16(b) Solve the Differential Equation $\frac{d^2x}{dt^2} + 4x = 0$, when $y(0) = y'(0) = 1$ by using Laplace Transform method.

EC-402: MICROPROCESSORS AND MICROCONTROLLERS

Course Title	Microprocessors and Microcontrollers	Course Code	EC-402
Semester	IV	Course Group	Core
Teaching Scheme in Hrs (L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

Prerequisites: This course requires the basic knowledge of Digital Electronics

Course Outcomes: Upon completion of the course the student shall be able to

CO	Course Outcome
CO1	Comprehend the Architecture of 8085
CO2	Comprehend the Architecture of 8051
CO3	Learn addressing modes and instruction set of 8051
CO4	Use 8051 microcontroller instruction set to write Assembly Programs
CO5	Use of various Interfacing devices
CO6	Use 8051 in various applications

Course content and Blue Print of marks for Semester End Examination (SEE)

Unit No	Unit Name	Periods	Questions to be set for SEE					
			R		U	A		
I	Architecture of 8085 Microprocessor	12	Q4	Q1		Q9(a)	Q13(a)	
II	Architecture of 8051 Microcontroller	17						
III	Addressing modes and Instruction set of 8051	12		Q2		Q10(a)	Q14(a)	
IV	Programming of 8051	12						
V	Interfacing Devices	12		Q3	Q5,Q6		Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Applications of 8051 Microcontroller	10			Q7,Q8			
	Total	75	8		8	8		

Course content:

UNIT –1: Architecture of 8085 Microprocessor

Duration: 10 Periods (L: 8 T:2)

Block Diagram of Microcomputer and functions of various blocks – Functional block diagram of 8085 Microprocessor and its working- Different types of buses in microprocessor system – Demultiplexing of Address/ Data Bus- Fetch Cycle, Execution Cycle, Instruction Cycle, Machine Cycle – Fetching and execution of an instruction

UNIT – 2:Architecture of 8051 Microcontroller

Duration: 15 Periods (L: 12 T:3)

Differences between Microprocessors and Microcontrollers -Features of 8051 Microcontroller – Functional block diagram of 8051 Microcontroller and its working – Organization of Program and Data memories –Operation of Timers, Serial Ports – Interrupt system of 8051 – Pin diagram of 8051 and function of each pin

UNIT– 3: Addressing modes and Instruction set of 8051

Duration: 12 Periods (L: 10 T:2)

Types of Computer Languages, High Level and Low Level – Machine Language and Assembly Language – Various addressing modes of 8051 – Assembly Instruction Format – Opcode and Operand – Instruction set of 8051- Data Transfer, Arithmetic, Logical, Boolean, Branch Group Instructions – Instruction size – How various instructions affect flags

UNIT – 4: Programming of 8051

Duration: 13 Periods (L: 9 T:3)

Flowcharts – Simple programs for 8051 involving addition, subtraction, multiplication, division, logical, boolean operations – Finding largest, smallest numbers in a series – programs using counter technique – Subroutine and its use – Types of subroutines – How 8051 handles subroutines – Various types of Debugging

UNIT – 5: Interfacing Devices

Duration: 12 Periods (L: 10 T:2)

Meaning and need for Interfacing – Non-Programmable and Programmable interfacing devices – Parallel Communication - Working of 8255 PPI – Serial Communication – Working of 8251 USART – DMA Concept – Working of 8257 DMA Controller – Need for interrupts

UNIT – 6: Applications of 8051 Microcontroller

Duration: 13 Periods (L: 7 T:3)

Interfacing various devices like Push Buttons, LEDs, Relays, 4X4 matrix Key Board, 7 Segment display unit, LCD

Recommended books

1. Microprocessor Architecture, Programming and Applications with 8085 By Ramesh S Gaonkar (Prentice Hall Publications)
2. Introduction to Microprocessors by A.P.Mathur
3. Fundamentals of Microprocessors and Microcontrollers by B.Ram
4. The 8051 Microcontroller and Embedded systems by Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay (Pearson Publications)
5. The 8051 Microcontroller by Kenneth J. Ayala (Thomson Delmar Publications)
6. 8051 Microcontroller – Internals, Instructions, Programming & Interfacing by Subrata Ghoshal
7. 8051 Microcontroller Architecture, Programming and Applications by M.Mahalakshmi (Mahalakshmi Publications)

Suggested e-learning resources

1. www.nptel.com
2. www.electronics4u.com
3. www.guvi.in/courses/robotics/micro-controllers-and-micro-processors/
4. www.electronics-tutorials.ws

Suggested Learning Outcomes

CO1: Comprehend the Architecture of 8085 Microprocessor

- 1.1 Draw the Block Diagram of a Microcomputer and explain the function of each block.
- 1.2 Define Microprocessor and know the evolution of various Microprocessors (Intel, Motorola, Zilog, AMD etc)
- 1.3 Define the terms Address Bus, Data Bus, Control Bus and know meaning of System Bus
- 1.4 Draw the functional Block Diagram of 8085 Microprocessor
- 1.5 Explain the functions of various units of 8085 μ p (Data Registers, Program Counter, ALU, PSW/ Flag Register, Instruction Register, Instruction Decoder, Timing & Control Unit, Interrupt Control, Serial I/O Control)
- 1.6 Explain the purpose of Stack in a μ p based system and use of Stack Pointer
- 1.7 Illustrate De-multiplexing of Address / Data Bus using a Latch
- 1.8 Understand the terms Fetch Cycle, Execution Cycle, Instruction Cycle, Machine Cycle, Bus Cycle
- 1.9 Explain the process of fetching and executing a program by 8085 μ p

CO:2 Comprehend the Architecture of 8051 microcontroller

- 2.1 Differentiate Microprocessors and Microcontrollers.
- 2.2 Compare various Intel Microcontrollers.
- 2.3 List features of 8051 Microcontroller.
- 2.4 Draw the functional Block Diagram of 8051 Microcontroller
- 2.5 Explain functions of various units of 8051 Microcontroller (General Purpose Registers, Oscillator, ALU, PSW, Instruction Register, Timing and Control Unit, Internal ROM & RAM, Program Counter, Stack Pointer, Data Pointer, Parallel Ports, Serial Port)
- 2.6 List various Special Function Registers (SFRs) and explain their purpose
- 2.7 Organization of Program Memory, Data Memory of 8051
- 2.8 Illustrate Demultiplexing of Address Bus/ Data Bus in 8051
- 2.9 List Timers of 8051 and explain their operating modes.
- 2.10 Explain Serial Port modes of operation.
- 2.11 Explain Interrupt system of 8051.
- 2.12 Draw the pin Diagram of 8051 Microcontroller.
- 2.13 List functions various pins of 8051.

CO3: Learn addressing modes and instruction set of 8051

- 3.1** Define High Level and Low-Level Languages and differentiate them.
- 3.2** Define the 2 types of Low-Level Languages (Machine Language and Assembly Language)
- 3.3** Define the term Addressing Mode.
- 3.4** List and explain various addressing modes of 8051 with examples
- 3.5** Write the instruction format of 8051
- 3.6** Define the terms Opcode, Operand
- 3.7** Define Instruction set and list various groups in the Instruction set of 8051
- 3.8** Explain Data Transfer Instructions used in 8051
- 3.9** Explain Arithmetic Instructions used in 8051
- 3.10** Explain Logical Instructions used in 8051
- 3.11** Explain Boolean Instructions used in 8051
- 3.12** Explain Branch Instructions used in 8051
- 3.13** Classify instructions of 8051 based on their size (1-byte, 2-byte, 3-byte instructions)
- 3.14** Describe how various instructions affect the Flags in 8051

CO4: Use 8051 microcontroller instruction set to write Assembly Programs

- 4.1** Write Assembly Language programs for 8051 like
 - i) Addition of Two 8-bit numbers (with various operands): Sum 8/ 16 bits
 - ii) Subtraction of Two 8-bit numbers (with various operands): Difference 8/ 16 bits
 - iii) Multiplication/ Division of Two 8-bit numbers
 - iv) AND/ OR/ XOR/ Complement operations on 8-bit data
 - v) Boolean operations
 - vi) Sum of a series of numbers
 - vii) Double byte/ multibyte addition/ subtraction
 - viii) Sum of 1st 'n' natural numbers
 - ix) To find Largest/ Smallest number in a series
 - x) Setting up time delay using counter technique
- 4.2** What is a Subroutine and write its need
- 4.3** Use of LCALL/ ACALL and RET instructions
- 4.4** Describe the sequence of things that happen when a subroutine is called and executed
- 4.5** Concept of Nesting, Multiple ending in subroutines
- 4.6** What is debugging of a program?
- 4.7** Explain about single step, break point debugging techniques

CO5: Use of various Interfacing devices

- 5.1 Define interfacing
- 5.2 State the need for interfacing devices
- 5.3 Classify various interfacing devices (Non-programmable and Programmable Interfacing devices)
- 5.4 Detail about Parallel Communication
- 5.5 Draw the Block Diagram of 8255 PPI and explain its working
- 5.6 Draw the control word format of 8255 and explain various modes of operation
- 5.7 Know the importance of serial communication and its types (Synchronous and Asynchronous)
- 5.8 Know RS 232 standard and function of various pins on 9 pin RS 232 connector.
- 5.9 Draw the Block Diagram of 8251 USART and explain its operation
- 5.10 What is Direct Memory Access (DMA) data transfer and its importance?
- 5.11 Draw the Block Diagram of 8257 DMA Controller and explain its operation
- 5.12 What is Interrupt and how it is handled by Microprocessor/ Microcontroller?

CO6: Use 8051 in various applications

- 6.1 Interface pushbutton switches to 8051
- 6.2 Interface LEDs to 8051
- 6.3 Interface relay to 8051
- 6.4 List the functions of various pins of LCD
- 6.5 Write command codes for programming an LCD
- 6.6 Interface LCD to 8051
- 6.7 Know key press and detect mechanism
- 6.8 Define Key bounce and Key de-bounce effect
- 6.9 List Key de-bounce techniques
- 6.10 Explain Key de-bounce techniques – Hardware and Software techniques
- 6.11 Interface 4X4 matrix keyboard to 8051
- 6.12 Interface 7-segment display to 8051
- 6.13 Write programs for above

Suggested student Activities:

- 1. Find out latest Microprocessors and Microcontrollers
- 2. Identify various architectural advancements in latest Microprocessors and Microcontrollers
- 3. Interface various I/O Devices to Microprocessor/ Microcontroller

CO-PO MAPPING

	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	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2		1					1, 3
CO2	2		2					1, 3
CO3	1	1	2	1				1, 2, 3, 4
CO4	1	3	1	2		2		1, 2, 3, 4, 6
CO5	2		2	2				1, 3, 4
CO6	2	2	2	3		1	1	1, 2, 3, 4, 6, 7

EE-403 AC MACHINES

Course Title:	AC Machines	Course Code	EE-403
Semester	IV Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires knowledge on working of different types of motors and switches.

Course Outcomes

CO1 :	Illustrate 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 :	Demonstrate the construction of three phase transformers and their applications
CO5 :	Illustrate the construction and working of alternators
CO6 :	Analyze the behavior 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 Contents

UNIT 1 : Fundamentals of single phase Transformer **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.

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.

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, Synchronization by lamp methods – Procedure to connect a –Load sharing -Effect of change in excitation and input of an alternator connected to infinite bus.

Reference 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

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

CO1: Illustrate the construction and working of single phase transformer

- 1.1 Define the word ‘Transformer’
- 1.2 Explain the working principle of single-phase transformer.
- 1.3 State the reasons 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 Demonstrate about core type transformer
- 1.8 Demonstrate about the shell type transformer.
- 1.9 Distinguish between core type and shell type of transformers.
- 1.10 Define an Ideal Transformer
- 1.11 Derive an E.M.F equation of a single phase transformer.
- 1.12 Solve problems on EMF equation
- 1.13 Define Turns Ratio of transformer
- 1.14 Define Voltage transformation Ratio of transformer
- 1.15 Define Current transformation Ratio of transformer
- 1.16 List the special transformers used in industry.
- 1.17 Define an Auto transformer
- 1.18 Write the expression for saving of copper in auto transformer
- 1.19 List the advantages of autotransformers.
- 1.20 List the disadvantages of autotransformers.
- 1.21 List the applications of transformers

CO2: Determine the Equivalent circuit parameters of a single phase transformer

- 2.1 Explain working of transformer on No-Load with the help of its vector diagram.
- 2.2 Demonstrate the working of transformer on Load with the help of vector diagram at
- 2.3 a) Unity power factor b) Lagging power factor c) leading power factor
- 2.4 List the losses that occur in a transformer.
- 2.5 Write the formulae for effective resistance and leakage resistance towards primary and secondary of a transformer.
- 2.6 State the significance of air gap
- 2.7 Draw the equivalent circuit of a transformer by approximation
- 2.8 Evaluate the equivalent circuit parameters by conducting No-load test on a single phase transformer.
- 2.9 Evaluate the equivalent circuit parameters by conducting short circuit test on a single phase transformer.
- 2.10 Solve simple problems on the computing the equivalent circuit parameters of a single phase transformer
- 2.11 Identify the terminals of a single-phase transformer by conducting the polarity test.
- 2.12 Evaluate the performance of a single phase transformer by conducting Sumpner's test.
- 2.13 Determine the break down voltage of transformer oil by conducting a relevant test.

CO3: Evaluate the performance of single phase transformers

- 3.1. Define Regulation
- 3.2. Derive the approximate equation to find regulation of a single-phase transformer.
- 3.3. Solve problems to calculate the regulation of a single-phase transformer for loads at
 - a) Unity power factor
 - b) lagging power factor
 - c) leading power factor.
- 3.4. State the reason for using KVA as unit for transformer rating.
- 3.5. Derive efficiency of a single phase transformer.
- 3.6. Determine the condition for maximum efficiency of a single phase transformer
- 3.7. Solve problems for calculating the efficiency of a transformer.
- 3.8. Define all day efficiency.
- 3.9. Solve numerical problems for calculating all day efficiency.
- 3.10. Define Distribution transformer.
- 3.11. Define Power Transformer.
- 3.12. Differentiate between distribution transformer and power transformer.
- 3.13. Mention the reasons for failures of a transformer
- 3.14. State the reasons for humming noise near a transformer and the methods to reduce the noise

CO4: Illustrate the construction of three phase transformers and their applications

- 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. List the applications of star-star transformer
- 4.4. List the applications of delta-star transformers

- 4.5. List the applications of star-delta transformers
- 4.6. List 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 of using amorphous core in a transformer
- 4.10. Mention the conditions for parallel operation and load sharing of transformers.
- 4.11. Draw a legible sketch of a power transformer
- 4.12. Explain the function of each part of a power transformer.
- 4.13. State the necessity of cooling of power transformers.
- 4.14. Explain the methods of cooling of power transformer.
- 4.15. Explain the 'ON load' and 'OFF load' tap changing.
- 4.16. Demonstrate the procedure for on load tap changing 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 in HVDC Transmission.
- 4.19. State the purpose of application of a transformer in traction.

CO5: Illustrate the construction and working of 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. Describe the construction and working of Cylindrical rotor alternator
- 5.5. Describe 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 of alternator at different load power factors

CO6: Analyze the behavior of alternators

- 6.1. Define regulation of an alternator.
- 6.2. List the different methods of finding the regulation of an 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 power factors.
- 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 lamp method for 3 phase alternator
- 6.11. Explain the procedure for synchronization of alternator by Bright lamp method for 3 phase alternator
- 6.12. Explain the procedure for synchronization of alternators by using Synchroscope
- 6.13. Explain the method for adjusting the loads shared by two alternators (or one alternator with Infinite bus bar).
- 6.14. Appraise of the effect of change in input and excitation of an alternator connected to infinite bus.

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 &	Engineering practices for society, sustainability and	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, 3, 7
CO2	3	1	2	1	-	-	1	1, 2, 3,4,7
CO3	3	-	-	-	1	-	1	1, 5, 7
CO4	3	-	2	-	1	-	1	1, 3, 5,7
CO5	3	1	2	2	-	-	1	1 2,3,4,7
CO6	3	-	-	2	-	-	1	1,4,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-403 **SUBJECT NAME :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
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
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.

5a) 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 OFFload tap changing method on a transformer

OR

b) Explain the methods of cooling of power transformer.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
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) Explain the procedure for synchronization of alternators by using Dark lamp method for 3 phase alternator

15a) Obtain the relation between No load EMF and terminal voltage in Alternator at leading powerfactor.

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 0.01Ω and an armature leakage reactance of 0.05Ω . 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

EE-404 ELECTRICAL ESTIMATION AND INSTALLATION

Course Title:	Electrical Estimation and Installation	Course Code	EE-404
Semester	IV Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic principles of electricity, domestic wiring, electrical workshop, types of loads in power and irrigation use, Earthing, Distribution substations, Over head lines, Department Procedures and Electricity Rules.

Course Outcomes

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

CO1	Infer various wiring systems and safety procedures
CO2	Estimate the material required for given domestic loads
CO3	Plan for the material required for power loads and irrigation pump sets
CO4	Develop Earthing Systems and Distribution substations.
CO5	Estimate material required for Over head lines
CO6	Make use of Department procedures and Electricity act 2003

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Wiring Systems and Safety Procedures	12	Q4	Q1		Q9(a)	Q13(a)
2	Estimation of Lighting loads	15					
3	Estimation of Power loads and Irrigation pump sets	14		Q2		Q10(a)	Q14(a)
4	Estimation of Earthing and Distribution substation	10					
5	Estimation of Over head Lines	12		Q3		Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Departmental Procedures, REC and Electrical act 2003	12					
	Total	75	8		8	8	

Course Contents

UNIT 1 - Wiring Systems and Safety Procedures

Duration: 12 Periods (L: 10 - T: 2)

Types of house wiring systems - Various types of cables – Various types of Main switches - Different types of fuses , fuse carriers and MCBs, ELCB and RCCB - Safety procedures - Electric shock and first aid, causes for fire hazards in Electrical installations.

UNIT 2 -Estimation of Lighting loads

Duration: 15 Periods (L: 12 - T: 3)

Estimation of domestic lighting installation service main - Types of service mains - specification - quantity of materials required for service main – estimation and selection of interior wiring system suitable to a given building - number of circuits - calculation of length of wire and quantity of accessories required - estimates of materials for execution of the domestic wiring installation as per National Electrical act 2003 - wiring layout for a office building, and a residential building with 2 bed room house.

UNIT 3 - Estimation of Power loads and Irrigation pump sets

Duration:14 Periods (L: 11 - T: 3)

Estimation and costing upto 20 KW, calculation of load current based on ratings of various equipment's to be installed - size of wire - length of wire , number of circuits - quantity of accessories for execution of work as per standard practice. Irrigation pump installation - Estimation upto 10 HP service main - type- calculation of size and quantity of wire and other components required - Type of starter and control panel - accessories quantity and estimation Estimate for the installation of submersible pump.

UNIT 4 - Estimation of Earthing and Distribution Substation

Duration:10 Periods (L: 8 - T: 2)

Quantity estimation for materials required in Electrical Earthing both for pipe earthing and plate Earthing suitable to the given equipment or transformer substation. HG fuse operating mechanism, isolators, lightening arrestors for pole mounted substation and plinth mounted substation.

UNIT 5 - Estimation of Over Head Lines

Duration: 12 Periods (L: 10 - T: 2)

Distribution lines of 11 kV and 400Volt OH lines - estimation only -quantity of materials required for lines of length 1 km - of number of poles - Cross arms clamps - insulators - conductor length and size for a given power transmission Distribution transformer erection- Estimation of quantity of materials required for structures, isolators .

UNIT 6 - Departmental Procedures , REC and Electrical Act 2003

Duration:12 Periods (L: 10 - T: 2)

Electrical installation testing - departmental procedure for testing before giving service connection - departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits - Tests for measuring insulation resistance - procedure for conducting insulation resistance test and continuity tests, earth continuity test

Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the economic feasibility of the scheme as per the procedure laid out in NEC, - Extracts from Indian Electricity rules 1956 and code of practice by NEC regarding - domestic power, agricultural industrial wiring installations, erection of 11 kV, 400 Volt distribution lines - pole mounted transformer – New I.E. Rules

Reference Books

1. S.L.Uppal-Electrical Wiring ,Estimating & costing Electrical wiring,
2. J.B.Gupta -Estimating & costing
3. Balbir Singh-Electrical Drawing
4. Arora -Electrical wiring
5. BVS Rao -Maintenance and Operation of Electrical Equipment –Vol-I-TMH
6. S.Rao -Testing, Commissioning Operation & Maintenance of Electrical equipment -TMH
7. CRDargar -Electrical Installation design and drawing -New Asian publishers.

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

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

CO1- Infer various wiring systems and safety precaution

- 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 Discuss about Surface conduit wiring system
- 1.7 Discuss about Concealed wiring system.
- 1.8 List the various types of Main Switches
- 1.9 Select MCB based on the specifications
- 1.10 List 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 for Rewirable (Kit Kat) fuses
- 1.14 Specify the fuse carrier material used for Open type fuse
- 1.15 Specify the fuse carrier material used for Cartridge fuses.
- 1.16 State the reasons for fire accidents in Electrical system.
- 1.17 Discuss the reasons for not using fuse in Neutral wire
- 1.18 Explain the effects of shocks and electrocution.
- 1.19 Demonstrate the procedure of first aid for shock treatment to an electrocuted person.

CO2 - Estimate the materials required for Domestic loads

- 2.1 Explain different types of service mains
- 2.2 Select the service main suited to the given Load.
- 2.3 Discuss the merits and demerits of different systems of interior wiring.
- 2.4 Select the type of wiring system suitable to the given Load
- 2.5 List the electrical material used in wiring the service mains.
- 2.6 Estimate the cost of material for the given domestic loads.
- 2.7 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a Single Room
- 2.8 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a 2-BHK House
- 2.9 Draw the single line wiring diagram for an office building.

CO3 – Plan for the material required for power loads and irrigation pump sets

- 3.1 Draw the single line wiring diagram of 3 phase induction motor with DOL starter.
- 3.2 Draw the single line wiring diagram of 3 phase induction motor with Y- Δ starter.
- 3.3 Prepare layout and draw single line wiring diagrams as per standard practices for a given set of machines in a workshop / electrical laboratory up to 3 motors.
- 3.4 Select the type of wiring system and lighting requirements for workshop.
- 3.5 Select the wire sizes for various circuits in the workshop.
- 3.6 Specify important material used in the workshop
- 3.7 Prepare the estimate of the complete installation of workshop as per standard practices.
- 3.8 Select the type of wiring and service mains used for the irrigation pump set.
- 3.9 Specify the material used in the execution of the irrigation pump set installation.
- 3.10 Prepare an estimate for electrification of the irrigation pump set.
- 3.11 Prepare an estimate for installation of submersible pump

CO4 - Develop Earthing Systems and Distribution substations

- 4.1 State the purpose of Earthing
- 4.2 List the types of Earthing
- 4.3 Select the suitable type of Earthing for a given installation as per IS3043.
- 4.4 Specify the different components used in electrical Earthing of a given installation
- 4.5 List the material that are to be used in the earth pit surrounding the earth Electrode
- 4.6 Prepare the estimate for Pipe Earthing.
- 4.7 Prepare the estimate for Plate Earthing
- 4.8 State the concept of maintenance free chemical gel earthing.
- 4.9 Explain the method of chemical gel earthing.
- 4.10 Estimate the quantity of material required for pole mounted substation.
- 4.11 Estimate the quantity of material required for plinth mounted substation

CO5 - Estimate material required for Over head lines

- 5.1 State the requirements of line supports used in overhead lines
- 5.2 List the factors influencing the selection of line supports
- 5.3 List the types of line supports
- 5.4 Discuss the need for cross arms
- 5.5 List the types of cross arms
- 5.6 Calculate the total number of insulators required for the given scheme
- 5.7 Select the type of insulators to be used for overhead lines.
- 5.8 Select the type, size and number of cross arms required for the overhead line
- 5.9 Determine the size and total length of overhead conductor required for the line giving due consideration for the sag.
- 5.10 Estimate the quantity of material required for given 11 KV overhead lines as per NEC standard practices.
- 5.11 Estimate the quantity of material required for a given 400V overhead Line as per NEC standard practice.

CO6 - Make use of Department procedures and Electricity act 2003.

- 6.1 Describe the departmental procedure for obtaining a service connection
- 6.2 Discuss insulation resistance desirable for a given electrical installation
- 6.3 Mention the value of earth resistance to be maintained for a given electrical Installation.
- 6.4 Describe the procedure to test the continuity of wiring in an electrical installation.
- 6.5 Explain the procedure for conducting insulation test of domestic wiring
- 6.6 Conduct the Load Survey in a village for
 - i) Domestic
 - ii) industrial
 - iii) agricultural loads.
- 6.7 Calculate the capacity of a transformer required assuming suitable diversity factor
- 6.8 Determine the location point of transformer and calculate the tail end voltage regulations as per the practice in NEC.
- 6.9 Determine the economic feasibility of the scheme as per the standard norms fixed by REC to execute the scheme.
- 6.10 State rules applicable to electrical installations as per Electrical act 2003
- 6.11 State the standards and code of practice followed by NEC in respect of electrical installations and OH lines of 11 KV and 400V pole mounted and Plinth mounted Substations.
- 6.12 State the function of Central Electricity Authority
- 6.13 State new I.E. Rules relating to safety and electric supply given by the Central Electricity Authority- 2010.

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 Substation 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. 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				1		1	PO1,5,7
CO2	3	2	2	1	1	2	1	PO1,2,3,4,5,6,7
CO3	3	2	2	1	1	2	1	PO1,2,3,4,5,6,7
CO4	3		2		1	2	1	PO1,3,5,6,7
CO5	3	3	3	2	2	2	1	PO1,2,3,4,5,6,7
CO6	3	1		2	2	1	1	PO1,2,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-404

ELECTRICAL ESTIMATION AND INSTALLATION

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 use of standard wire gauge.
2. State the reason for fire accidents in Electrical system
3. What is a service main?
4. Define interior wiring?

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5 a) List the different types of single phase and three phase cables

OR

- 5 b) List the types of MCBs

- 6 a) Draw the single line wiring layout for an office building.

OR

- 6 b) Find no of sub circuits of domestic load : 100 W lamps- 10 no ; Ceiling fans – 5 no;
florescent lamp – 5 no and 1 H.P motor of efficiency 85%. Assume missing data.

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

- 7 b) Explain the effects of shocks and electrocution.

- 8 a) Write the merits and demerits of interior wiring

OR

- 8 b) Explain different types of service mains

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
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SUB CODE: EE-404

ELECTRICAL ESTIMATION AND INSTALLATION

MID SEM – II MODEL PAPER

TIME : 1 HOUR

TOTAL MARKS: 20

PART-A

Marks : 4X1 = 4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Write step to solve estimation on power load
2. What are steps to solve estimation on irrigation pump set
3. State the purpose of earthing
4. State the different ratings of transformer used for pole mounted substation

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5a) Write starters used depends on rating and type of motors .

OR

5 b) Draw sketch of service line and irrigation pump set of 7.5 KW is to be installed at distance of 20 m from a 3-phase, 415 V distribution line.

6 a) List the types of earthing

OR

6 b) Estimate the materials required for plinth mounted substation

PART - C

Marks: 2 x 5 = 10

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

7 a) Draw wiring diagram of 5.5 kw, 3-phase, 400 V motor. The distance between the L.T pole and the pump set shed (5x3x3m) is 10 m.

OR

7 b) An agricultural pump set of 7.5kw, 3-phase, 415 V motor is to be installed at distance of 20 m distribution line. Find size of cable and length of cable.

8 a) Estimate the quantity of material required for pole mounted substation

OR

8 b) Estimate the quantity of material required for plate earthing

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-404

ELECTRICAL ESTIMATION AND INSTALLATION
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. State the purpose of earthing.
3. List the types of line supports
4. State the uses of standard wire gauge
5. State the need for cross arms
6. State the requirements of line supports used in overhead lines
7. State rules applicable to electrical installations as per Electrical act 2003
8. State the function of Central Electricity Authority

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.

Marks: 4 X 3 = 12

- 9a) State the merits and demerits of different systems of interior wiring

OR

- 9b) List the factors influencing the selection of line supports

- 10a) State the types of earthing in electrical installations

OR

- 10b) Describe the departmental procedure for obtaining a service connection

- 11a) List the type of insulators to be used for overhead lines

OR

- 11b) List the types of cross arms

- 12a) State the value of earth resistance to be maintained for a given electrical installations

OR

- 12 b) Write Survey the load particulars in a village

PART - C

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

Marks: 4 X 5 = 20

13a). List the reasons for not using fuse in Neutral wire

OR

13b) Estimate the materials required for erection 3 phase, 5 wire distribution line of length 2 km and assume the span between the two poles is 60 m over a 8 m long PSCC poles.

14 a) Estimate the materials for Plate Earthing

OR

14b) Explain the procedure for conducting insulation test of domestic wiring

15a) Estimate the quantity of material required for a 11kv, 3-phase over head line with 6/1x2.59 mm ACSR conductor for 1 km long on 8 m PSCC poles. The span between two poles is 75 m.

OR

15b) Write Eight main components of overhead lines

16a) Explain insulation resistance for a given electrical installation

OR

16 b) Explain the test procedure for continuity of wiring in an electrical installation

EE-405 ELECTRICAL POWER SYSTEMS -T&D

Course Title:	Electrical Power Systems – T & D	Course Code	EE-405
Semester	IV Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of transformers and Basic circuit analysis.

Course Outcomes

CO1 :	Analyze about transmission lines and its performance
CO2 :	Apply the concept of HVDC Transmission systems
CO3 :	Analyze Transmission and Distribution line structures and its constructional and performance features
CO4 :	Apply the concepts of cables in transmission and distribution
CO5 :	Detail the equipment in a substation
CO6 :	Classify and analyse the Distribution systems

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to beset for SEE					
			R		U	A		
1	Transmission lines	15	Q4	Q1		Q9(a)	Q13(a)	
2	HVDC Transmission systems	10						
3	Line structures for Transmission and Distribution	15		Q2		Q10(a)	Q14(a)	
4	cables	10						
5	Substations	10		Q3	Q5,Q6		Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Distribution systems& Introduction to Smart Grid	15			Q7,Q8		Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8		

Course Contents

UNIT1 – Transmission lines

Duration:15 Periods(L:12– T:3)

Need for transmission lines-AC & DC Transmission, Effect voltage and frequency, Types of conductors- current distortion effects- Transmission line conductors – Calculation of Transmission line Inductance and capacitance- Transposition of O.H. lines- Regulation - calculation of Regulation- Types of transmission lines - Ferranti's effect- Corona in transmission lines- Effects of corona.

UNIT2–HVDC Transmission Systems

Duration: 10Periods (L:8– T:2)

High voltage DC Transmission – Need- Basic Concepts – Basic block diagram- Types of HVDC transmission- HVDC projects in India - Advantages and disadvantages of HVDC transmission - Basics of protection of HVDC systems.

UNIT3–Line structures for Transmission and Distribution:

Duration: 15 Periods(L:12–T:3)

Components of overhead line- Line supports - Cross arms- Pole guys- Conductors spacing and ground clearance- Sag - Factors affecting sag - calculating sag.- Disadvantages of loose span -Insulators, Requirements of insulators- Types of Insulators- Voltage distribution across string of Insulators- string efficiency- Flashover, Puncture- improving string efficiency - Arcing horns and guard rings- Causes for failure of insulators

UNIT4-Cables

Duration: 10 Periods(L:8– T:2)

Cables - Comparison between over head lines and underground cables- Classification of cables - General construction of cables -Types of cables - Insulation resistance of cables

UNIT5 -Sub-stations

Duration: 10 Periods(L:8– T:2)

Definition and classification of sub-stations – Equipment in substations – Purpose of each –equipment - Substation auxiliary supply – Line diagram of 33KV/11KV and 11KV/400V substation

UNIT6 –Distribution Systems and Introduction to Smart Grid

Duration: 15Periods (L:12– T:3)

Primary and secondary distribution – Feeders- distributors -service mains, Classification of Distribution systems -Radial and Ring systems – Voltage drop calculations in DC and AC - Definition of Electric Grid - Concept of Smart Grid - Difference between conventional & smart grid.

Reference Books

1. S.L.Uppal-ElectricalPower
2. Soni,Guptha,Bhatnagar-ElectricalPowerSystems-DhanpatRai& Sons
3. A.T.Starr-Generation,TransmissionandUtilisation
4. C.L.Wadhwa -Electrical PowerSystems-Newageinternational(P)limited
5. NEDCAP-Non ConventionalEnergyGuideLines
6. JBGuptha-Electricalpowerplants
7. G.D. RoyNonconventionalenergysources
8. CLWadhwa-Electrical powerSystems -NewAgeInternational(P)limited.
9. KRPadiyar-HVDCPowerTransmissionsystemTechnology
10. S.N.Singh-ElectricalPower generation,transmissionanddistribution.

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

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

CO1: Analyze about transmission lines and its performance

- 1.1 Explain the need for transmission lines and distribution lines
- 1.2 Classify the transmission lines based on supply voltage and number of conductors used (AC and DC)
- 1.3 State the advantages of D.C and A.C. transmission systems.
- 1.4 Explain the effect of voltage on Transmission lines.
- 1.5 Explain effect of frequency on Transmission lines.
- 1.6 Explain the effect of voltage on line efficiency, voltage drop, line loss, active power and Reactive Power and volume of conductor material.
- 1.7 State the type of transmission line conductors
 - a) Solid
 - b) Stranded
 - c) Hollow
 - d) Bundled conductors
- 1.8 State the relative merits of different types of above conductors
- 1.9 Explain the current distortion effects
Skin effect, Proximity effect, Spirality effect and Kelvin's law
- 1.10 State the formula for inductance of
 - a) 1 phase system
 - b) 3 phase symmetrical and asymmetrically spaced round conductors (No derivation)
- 1.11 Determine the value of inductance of 1 phase and 3 phase for the given the diameter and spacing between conductors
- 1.12 State the formula for capacitance of
 - a) 1 phase system
 - b) 3 phase symmetrical and asymmetrically spaced round conductors (No derivation)
- 1.13 Determine the value of capacitance of 1 phase and 3 phase for the given the diameter and spacing between conductors.
- 1.14 State the need for transposition of overhead lines
- 1.15 Define short, medium and long lines.
- 1.16 Define 'regulation' and percentage regulation in transmission lines.
- 1.17 Express approximate formula for percentage regulation in short transmission lines
- 1.18 Calculate the regulation for short transmission line using the approximate formula.
- 1.19 State the reason for Ferranti' effect
- 1.20 What is corona in transmission lines.
- 1.21 List the factors affecting corona.

CO2 : Apply the concepts of HVDC transmission

- 2.1 State the need of HVDC
- 2.2 Explain the basic concepts of HVDC transmission
- 2.3 Detail the block diagram of HVDC.
- 2.4 List the types of HVDC transmission.
- 2.5 List the locations of HVDC Projects in India.
- 2.6 Outline the advantages and disadvantages of HVDC transmission
- 2.7 Analyze the protective measures to be adopted for HVDC system

CO3 : Analyze Transmission and Distribution line structures and its constructional and performance features

- 3.1 Identify the primary components of overhead lines.
- 3.2 List the requirements of line supports
- 3.3 List the factors influencing the selection of the line supports
- 3.4 List the types of line supports
- 3.5 Outline the advantages and disadvantages of the above line supports
- 3.6 What is the need for cross arms
- 3.7 State the necessity for pole guys
- 3.8 Explain types of fixing of guys (bow guy, fly guy and pole strut)
- 3.9 State the factors affecting the conductor spacing and ground clearance of transmission lines.
- 3.10 Define 'sag'
- 3.11 State the factors affecting the sag
- 3.12 State the formula for calculating sag.
 - a) for the supports are at the same level and b) the supports are at different levels in air and with the effect of wind and ice.
- 3.13 Solve the problems on above.
- 3.14 State the disadvantages of loose spans (sag more than prescribed value)
- 3.15 State the need of insulators in transmission and distribution lines
- 3.16 List the requirements of insulators
- 3.17 List applications of the Pin type, Strain type, Suspension type and Shackle type insulators
- 3.18 Explain the voltage across a string does not distribute uniformly across the individual discs
- 3.19 State the formula for voltage across individual insulator for a string of 3 insulators and also the formula for string efficiency
- 3.20 Define the terms Flashover, Puncture and String-efficiency
- 3.21 List the methods of improving string efficiency
- 3.22 State the need for arcing horns and guard rings
- 3.23 List causes of failure of insulators in transmission and distribution lines

CO4: Apply the concepts of cables used in transmission and distribution

- 4.1 Define cables
- 4.2 Compare overhead lines with underground cables
- 4.3 State the classification of cables based on
 - a) Number of conductors
 - b) Voltage
 - c) Insulation and lead sheathing
 - d) The methods of improving the dielectric stress
- 4.4 Explain the construction of different types of cables
 - a) Low voltage cables b) H.T cables c) Super tension cables and d) EHV cables
- 4.5 State the equation for the insulation resistance of a cable
- 4.6 Solve simple problems on insulation resistance

CO5: Detail the equipment in a substation

- 5.1 Explain the need for substations
- 5.2 List the types of substations.
- 5.3 List the equipment used in substation.
 - Busbars
 - Insulators
 - Transformers
 - Switchgear
 - Indicating and metering equipment
 - Protective relays
 - Lightning arrestors
 - Cables
 - Fire fighting equipment
- 5.4 Specify the function of each of the equipment listed above..
- 5.5 Explain about auxiliary supply in substation
- 5.6 Outline the line diagram of 33KV/11KV substation
- 5.7 Draw the line diagram of 11KV/400V substation

CO6: Classify and analyse the Distribution systems

- 6.1 Compare primary distribution and secondary distribution
- 6.2 Explain Feeder, distributors and service mains
- 6.3 Classify the type of distribution systems according to
 - i) Type of current ii) Construction iii) Service iv) No of wires v) Scheme of connection
- 6.4 List the type of distribution systems
- 6.5 State the advantages and disadvantages of radial, parallel and ring main systems
- 6.6 List the steps involved in the voltage drop calculations in A.C. distributors
- 6.7 Solve problems on voltage drop calculations in D.C & A.C. Distributors
- 6.8 Define Electric grid and smart grid
- 6.9 Need of smart grid
- 6.10 Compare conventional and smart grid.

Suggested Student Activities

- Student visits Library to refer to Electrical Manuals.
- Student prepares the models of the power plants
- Student visits Power generating stations familiarize with the equipment.
- Visit Power near by substations and gets familiar with the components.
- Students may be asked to prepare model project of the power system.
- Prepare charts on different Generating stations in our state mentioning their locations.
- Gather information of HVDC transmission projects in India and prepare a report
- Identify different insulators in your surroundings and prepare a report
- Watch You Tube videos on SMART GRID and MICRO GRID and prepare a summary report
- Group discussion.
- Surprise tests and Quiz.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/ Development of Solution	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						PO1,2
CO2	3	3					1	PO1,2,7
CO3	3	3						PO1,2
CO4	3	2						PO1,2
CO5	3	1						PO1,2
CO6	3	2					1	PO1,2,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MIDSEM-I EXAM MODEL PAPER

SUB CODE: EE-405
SUBNAME: ELECTRICAL POWER SYSTEMS (T&D)

TIME: 1 HOUR
TOTAL MARKS: 20

PART-A

Marks: 4X1=4

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the need of transmission lines.
2. State the types of transmission lines based on distance of transmission.
3. List the types of HVDC
4. State the need of HVDC

PART-B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5a) Illustrate the effect voltage on transmission lines

OR

5b) List the types of conductors in transmission lines.

6a) List the HVDC stations in India with specifications

OR

6b) Outline the line diagram of mono polar HVDC system

PART- C

Marks: 2x5=10

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

7a) A single phase transmission line has a resistance of 0.2 ohms and an inductive reactance of 0.4 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

7 b) In a 3-phase overhead line conductors are symmetrically spaced at a distance of 3 m. The diameter of each conductor is 1cm. Calculate the capacitance per km of each conductor.

8a) Discuss the protective measures used in HVDC..

OR

8 b) Distinguish different HVDC systems

STATE BOARD OF TECHNICAL EDUCATION&TRAINING, TELANGANA
MID SEM -II EXAM MODEL PAPER

SUB CODE: EE-405

SUB.NAME: ELECTRICAL POWER SYSTEMS (T&D)

TIME: 1 HOUR

TOTAL MARKS:20

PART-A

Marks: 4X1=4

Instructions:(1) Answer all questions
(2) Each question carries **one** mark.

1. State the components of transmission lines.
2. List the types of line supports.
3. List types of cables.
4. State the formula for insulation resistance of a cable.

PART-B

Marks:2 x3 = 6

Instructions:(1)Answer the following questions.
(2)Each question carries **three** marks.

- 5a) List the requirements of insulators.

OR

- 5b) List the factors affecting the sag.

- 6a) Distinguish between overhead lines and underground cables

OR

- 6b) List the methods to improve dielectric stress

.

PART- C

Marks:2x5=10

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

- 7a) Define string efficiency and write the formula for string efficiency of 3 disc insulator.

OR

- 7b) State the type of insulators and mention their applications.

- 8a) Sketch Super tension cable and mention the significance of each layer

OR

- 8b) Distinguish different types of cables

**STATE BOARD OF TECHNICAL EDUCATION&TRAINING,
TELANGANA
DIPLOMA IN ELECTRICAL& ELECTRONICS ENGG.
END SEM EXAM MODEL PAPER**

SUB CODE: EE-405

TIME:2 HOUR

SUB.NAME: ELECTRICALPOWERSYSTEMS (T&D)

TOTALMARKS:4

0

PART-A

Instructions:(1)Answer all questions
(2)Each question carries **one** mark.
8

Marks:8 X1 =

1. List the types of HVDC transmission.
2. List the components of overhead lines.
3. List the types of cables.
4. Define Sag
5. What is the need of substation
6. State the need of bus bar in substation.
7. State the type of distribution system according to number of wires.
8. State the purpose of Feeder.

PART-B

Instructions:(1)Answer the following questions
(2)Each question carries **three** marks.

Marks:4 X3 =12

9 a) Classify the current distortion effects.

OR

9 b) List the equipment used in substation

10 a) List the factors influencing the selection of line supports

OR

10 b) List the advantages of Radial system of distribution.

11a) State the purpose of Lightning arrestor

OR

11b) List the types of cables

12a) Distinguish between primary distribution and secondary distribution

OR

12 b) List out the steps to calculate voltage drop in AC distribution

PART- C

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

Marks:4 X5 = 20

13a) Distinguish DC and AC transmission systems

OR

13(b) Explain about the types of insulators used in substations.

14 a) Sketch HT cable and mention the significance of each layer.

OR

14b) Distinguish Feeder, Distributor and service mains.

15 a) Draw the Electrical line diagram of 11KV/400V substation.

OR

15b) Write the function of each component used in a substation.

16 a) Distinguish Parallel feeders and ring mains

OR

16 b) A single phase AC distributor AB 300 meters long is fed from end and is loaded as (i) 100 Amps at 0.707 p.f lagging 200 meters from point A (ii) 200amps at 0.8 lagging 300meters 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.

ME-416 BASIC MECHANICAL ENGINEERING

Course Title:	Basic Mechanical Engineering	Course Code	ME-416
Semester	IV Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	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 Level 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

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER MID SEMESTER-I EXAMINATION

Corse Code: ME-416
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-416

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-416
Course Name: Basic Mechanical Engineering

Duration: 2 hours
Max.Marks: 40 Marks

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-407 -ELECTRICAL INSTALLATION LAB

Course Title	: Electrical Installation Lab	Course Code	: EE-407
Semester	: IV	Course Group	: Practical
Teaching Scheme in Periods(L:T:P)	:15:0:30	Credits	: 1.25
Methodology	: Lecture + Practical	Total Contact /Periods	:45
CIE	: 60 Marks	SEE	: 40 Marks
(Continuous Internal Evaluation)		(Semester End Examination)	

Prerequisites

This course requires the skills of handling electrical tools, accessories and performing wiring connections

Course Outcome

CO1 :	Select necessary material and perform electrical wiring for circuits
CO2 :	Perform Earthing and measure earth resistance
CO3 :	Make use of smart control for home electrical appliances.
CO4 :	Make use of solar panels for lighting purpose.

Suggested Learning Outcomes

Upon completion of the course the student shall be able to

C01 - Identify and select necessary materials and perform electrical wiring for circuits

- 1.1 Connect three essential points through an inverter to which supply should be available all the time.
- 1.2 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.
- 1.3 Connect and test the given Public Address System
- 1.4 Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.

C02 - Perform Earthing and measure earth resistance

2.1 Demonstrate Pipe Earthing.

2.2 Demonstrate Plate Earthing.

2.3 Demonstrate the method to measure the value of Earth Resistance.

C03 - Make use of smart control for home electrical appliances.

3.1 Make use of Motion sensing switch to switch on a lamp

3.2 Remote controlled switching of Fan

C04 - Make use of solar panels for lighting purpose

4.1 Understand Solar Panels types, Specifications, Companies, Prices

4.2 Make use of Solar panels for charging the battery through inverter.

4.3 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	1	-	3	1	1	1	1,2,4,5,6,7
CO2	3	1	2	1	2	1	1	1,2,3,4,5,6,7
CO3	-	-	1	2	2	1	1	3,4,5,6,7
CO4	1	-	3	2	3	1	1	1,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-407

Duration: 1 Hour

Course Name: Electrical Installations Lab

Max.Marks: 20

Note: Answer allotted Question.

1. Connect three essential points through an inverter to which supply should be available all the time
2. Connect a CPU and Printer.
3. Connect a PA system.
4. Calculate D.G set rating for E.M Lab

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-II EXAMINATION

Course Code: EE-407

Duration: 1 Hour

Course Name: Electrical Installations Lab

Max.Marks: 20

Note: Answer allotted Question.

1. Demonstrate Pipe Earthing
2. Demonstrate Plate Earthing
3. Conduct the Earth Resistance

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-407

Duration: 2 Hour

Course Name: Electrical Installations Lab

Max. Marks: 40

Note: Answer allotted Question.

1. Demonstrate Pipe Earthing
2. Demonstrate Plate Earthing
3. Connect three essential points through an inverter to which supply should be available all the time
4. Connect a CPU and Printer.
5. Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.
6. Make use of Motion sensing switch to switch on a lamp
7. Remote controlled switching of Fan
8. Understand Solar Panels types, Specifications, Companies, Prices
9. Make use of Solar panels for charging the battery through inverter.
10. Understand the Pay back Calculation by using a Solar Scheme for any Installation.

EE-408 AC MACHINES LAB

Course Title:	AC Machines Lab	Course Code	EE-408
Semester	IV Semester	Course Group	: Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
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 :	Determine the relationship between Voltages and Currents of different types of Transformers
CO3 :	Determine the dielectric strength of transformer oil
CO4 :	Evaluate regulation of an Alternator by conducting suitable tests and Synchronise the given Alternator with Supply Mains

Reference 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. <https://www.siemens.com/content/dam/internet/siemens-com/global/products-services>
2. <https://electrical4u.com/www.nptel.ac.in>

Suggested Learning Outcomes

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

CO1 - 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.

CO2 – Determine the relationship between Voltages and Currents of different types of Transformers

- 2.1 Connect two identical 1-ph transformers in parallel and analyze the load sharing
- 2.2 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
- 2.3 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
- 2.4 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
- 2.5 Asses 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.

CO3 - Determine the dielectric strength of transformer oil

- 3.1 Obtain the Dielectric Strength of transformer oil using oil testing kit.

CO4 - Determine regulation of an Alternator by conducting suitable tests and Synchronise the given Alternator with Supply Mains

- 4.1 Obtain voltage regulation by conducting (direct) load test on Alternator.
- 4.2 Obtain the regulation of Alternator by using synchronous impedance method.
- 4.3 Synchronise the given Alternator with supply mains by using bright lamp method
- 4.4 Synchronise the given Alternator with supply mains by using dark lamp method

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	2	2	-	3	2	1	1	1,2,4,5,6,7
CO2	2	2	-	3	2	1	1	1,2,4,5,6,7
CO3	2	2	2	3	2	1	1	1,2,3,4,5,6,7
CO4	2	2	2	3	2	1	1	1,2,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - I

Course Code: EE-408

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.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - II

Corse Code: EE-408

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. Connect two identical 1-ph transformers in parallel and analyze the load sharing.
2. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
3. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
4. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
5. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SEMESTER END EXAMINATION**

Course Code: EE-408

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
15. Obtain the Dielectric Strength of transformer oil using oil testing kit.

EE-409 CADLAB

Course Title:	CAD Lab	Course Code	EE-409
Semester	IV Semester	Course Group	: Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic geometric shapes and Electrical Symbols

Course Outcomes

Upon completion of the course, the student shall be able to:

CO1 :	Make use of basic concepts of CAD to draw simple 2D geometric figures.
CO2 :	Draw different Layouts of Electrical wiring using various tools in CAD.
CO3 :	Apply the LAYER command to organize the objects as per requirement
CO4 :	Draw diagrams of various schematics related to Electrical power systems.

Course Contents

UNIT -1 Introduction to CAD

Duration: 15 periods (L: 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 drawing, setting up a drawing limits and units. Setting and changing the grid and snapping alignment, and the Entity snaps.

1.3 Use of viewing tools of CAD

Use of mouse, Scroll bar to move around within drawing, changing of magnification of drawing. PAN and ZOOM commands.

1.4 Creating simple 2 D Objects

Lines, circles, arcs, rectangles, Polygon and simple 2D objects

UNIT -2 Modifying Tools**Duration: 15 periods (T: 5 + P:10)****2.1 Use the Modifying tools to modify the properties of objects**

Object selection and de selection methods, Deletion of objects. Copying of objects within a drawing, between drawings, parallel copies Mirroring objects and arraying objects. Rearranging objects by Moving, Rotating and Reordering. Resizing objects by Stretching, Scaling, Extending, Trimming, and editing the length. Breaking and joining of objects. Chamfering and Filleting of objects.

2.2 Creating complex objects and symbols

Drawing of shapes like polylines, Splines, donuts, and adding of hatch pattern to object.

UNIT -3 Annotation & Layer Tools**Duration: 06 periods (L:2 + 4P)****3.1 Use the Text tool to create and format 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. Setting of Paragraph text style and its alignment, and modifying the text.

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

Creating linear, Angular, Diametric, Radial, Ordinate dimensions. creating leaders and annotations, making dimensions oblique.

3.3 Organize the objects in Drawing

Setting a current layer, layers color, line type, line weight, print style locking and unlocking of layers, the layer visibility and layer printing. Setting current line type. Loading additional line types,

UNIT – 4 Electrical Schematics**Duration: 09 periods (L:3 + P:6)**

Draw Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor iv) Relay v) Isolator vi) Battery.

Single Line diagram of 33/11 KV Substation-220 KV Double circuit Tower-Plate and Pipe Earthing.

Reference Books

1. AutoCAD 2024 –C dartifex, Sandeep Dogra& John Wills
2. AutoCAD –Linkan Sagar BPB Publications
3. Computer Aided Electrical Drawing- YOGESH, NAGARAJA, NANDAN PHI Publication
4. Electrical Drafting - S.F. DEVALAPUR EEPB
5. Electrical Drawing - K.L. NARANG
6. Electrical Engineering Drawing – S. K. BHATTACHARYA

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/iml332e/Fundamentals%20of%20CAD>
4. <https://www.youtube.com>

Suggested Learning Outcomes

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

CO1: Make use of basic concepts of CAD to draw simple 2D geometric figures.

- 1.0 Define Computer Aided Drafting
- 1.1 List the Advantages of CAD and also various CAD softwares
- 1.2 Explain the importance of CAD software
- 1.3 Explain the features of Graphic Work station
- 1.4 Explain CAD Screen, components, Various tool bars and menus
- 1.5 Explain the benefits of Templates.
- 1.6 Identify various CAD software's and their features.
- 1.7 Work with commands using toolbars, menus, command bar
- 1.8 Use commands: repeating, Nesting and modifying to draw 2D objects.
- 1.9 Use prompt history window and scripts
- 1.10 Work with mouse for zooming and pan
- 1.11 Create, save the drawing with .drawing extension and Open an existing drawing
- 1.12 Work with setting up a drawing area using limits command and drawing units
- 1.13 Use Ortho mode, grid and snapping alignment to draw the objects
- 1.14 Use the object snap feature to precisely locate the points in the drawing
- 1.15 Use Scroll bar, pan command and rotating view to move around within drawing
- 1.16 Draw simple 2D geometric shapes like lines, Circles, Rectangle, Arc & Polygon
- 1.17 Draw Simple 2D Drawings.

CO2: Draw different Layouts of Electrical wiring using various tools in CAD.

- 2.1 Use various methods of object selection like window, cross window, fence, last and previous methods and de-selection method
- 2.2 Draw geometries like Polylines, Splines, donuts
- 2.3 Add hatch to Objects with required pattern and adjusting line angle and line space.
- 2.4 Work with Deletion, breaking and trimming of objects
- 2.5 Use the copy command to Copy objects within a drawing & between drawings.
- 2.6 Create Chamfering and Filleting of objects.
- 2.7 Create concentric circles, parallel lines and parallel curves using appropriate command
- 2.8 Create a Mirrored copy of the object using appropriate command
- 2.9 Create an Rectangular and Polar array using appropriate commands.
- 2.10 Rearrange objects by using Moving, Rotating and Re-ordering commands.
- 2.11 Resize objects by using Stretching, Scaling, and Extending commands
- 2.12 Explode 2D object using appropriate command.
- 2.13 Draw wiring layout of single bedroom house.
- 2.14 Draw a simple wiring layout of workshop.

CO3: Apply the LAYER command to organize the objects as per requirement.

- 3.1 Practice naming and modifying text fonts.
- 3.2 Create line text, paragraph text
- 3.3 Work with Setting of line text style and its alignment
- 3.4 Work with Setting of Paragraph text style and its alignment
- 3.5 Work with Changing of line text and Paragraph text
- 3.6 Create linear, Angular, Diametric, Radial, Ordinate dimensions
- 3.7 Create leaders and annotations.
- 3.8 Practice making dimensions oblique
- 3.9 Discuss the need and importance of Layers
- 3.10 Creating new layer, naming the layer and assigning properties like Layer colour
Line type and line weight and setting the current layers
- 3.11 Manage layers by locking and unlocking layers
- 3.12 Manage layers Practice Freezing and thawing layers
- 3.13 Manage layers visibility and layer printing
- 3.14 Access loaded additional line types.
- 3.15 Change the line weight in drawing

CO4: Draw diagrams of various schematics related to Electrical power systems.

- 4.1 Draw Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor
iv) Relay v) Isolator vi) Battery.
- 4.2 Draw a single line diagram of 33kV / 11kV substation.
- 4.3 Draw a Sketch of 220 KV Double circuit tower
- 4.4 Draw a Dimensioned sketch of Pipe Earthing
- 4.5 Draw a Dimensioned sketch of Plate earthing

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Developme nt 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	1		1	1,4,5,7
CO2	2			3	1		1	1,4,5,7
CO3				3	1		1	4,5,7
CO4	3			3	1		1	1,4,5,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING , TELANGANA

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

MID SEM - I

Corse Code: EE-409

Duration: 1 hour

Course Name: CAD Lab

Max.Marks:20

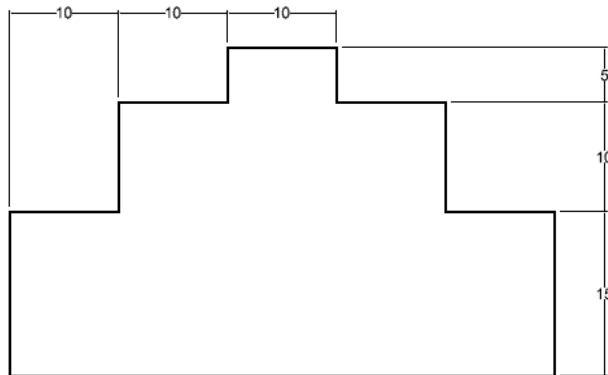
Note: Answer allotted Question.

Instructions to the Candidate:

(i) Record the results on a graph sheet if required, and conclude your observation of the experiment

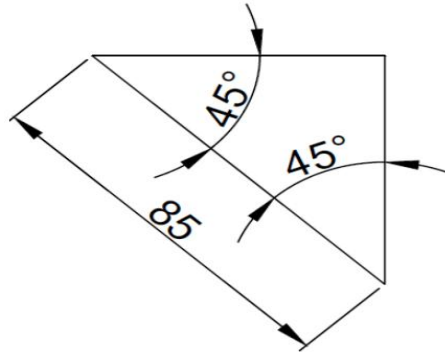
(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

- 1 Draw circle using 2P method and 3 P method
- 2 Draw a Rectangle given the area as 200 mm^2 with length as 20 mm
- 3 Draw 3 concentric circles with Diameters as 40mm, 60mm and 80 mm .
- 4 Draw an arc with radius 25 mm using 3 different options
- 5 Draw the following 2D object

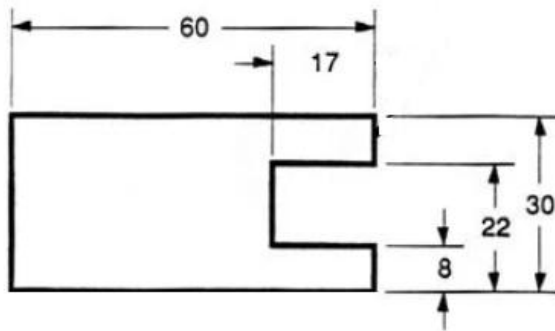


6. Draw a triangle whose side is 30 mm

7. Redraw the following figure using CAD Software without Dimensioning.



8. Redraw the following figure .



STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

MID SEM - II

Corse Code: EE-409

Duration: 1 hour

Course Name: CAD Lab

Max. Marks: 20

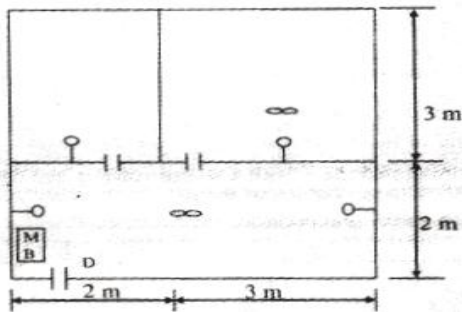
Note: Answer allotted Question.

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 Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor
2. Draw the Electrical symbols i) Relay ii) Isolator iii) Battery
3. Draw the following wiring layout



STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SEMESTER END EXAMINATION

Course Code: EE-409

Duration: 2 hours

Course Name: CAD Lab

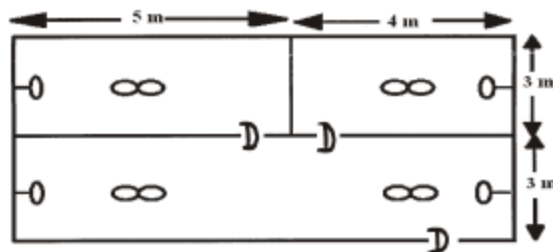
Max. Marks: 40

Note: Answer allotted Question.

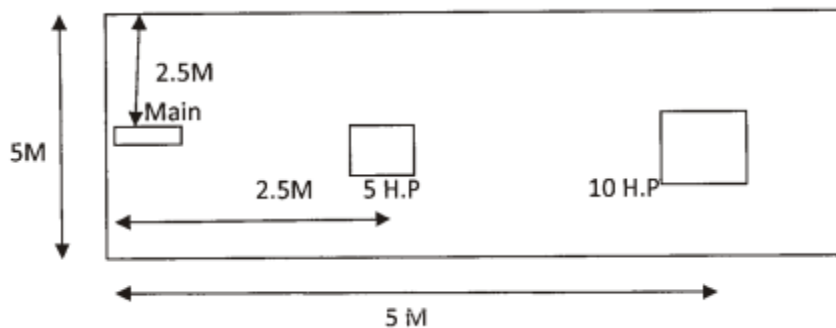
Instructions to the Candidate:

(i) Choose appropriate values when not mentioned in the question

1. Draw the Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor
2. Draw the Electrical symbols i) Relay ii) Isolator iii) Battery
3. Draw the wiring layout for a given Single bedroom house.



4. Draw the wiring layout of workshop



5. Draw the sketch of 220 KV steel towers of double circuit.
6. Draw the dimensioned sketch of Plate earthing.
7. Draw the dimensioned sketch of Pipe earthing

HU- 410 EMPLOYABILITY SKILLS LAB

Course Title	Employability Skills Lab	Course Code	HU-410
Semester	IV	Course Group	Practical
Teaching Scheme in periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Hours	45 (3 periods 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 Contents

Module 1: Presentation Skills:

Duration: 9 Periods (L 3 P 6)

- a) Significance of presentation
- b) What makes a good presentation?
 - i. Understand, Collect, Organize, Use presentational aids and Practice
- c) Tips for an effective presentation.
 - ii. Good Beginning – Greeting, Confidence, Body Language, Opening Ideas (Funny Videos, Ridicule. Asking Questions, Quote someone/Proverb or telling a story/referring an historical event)
 - iii. Unveiling – Develop systematically, usage of appropriate linkers or discourse markers. Eye contact and Effective usage of PPTs
 - iv. Conclusion – Summarize - Giving time to the audience for queries and Time management
- d) Guidelines for PPTs

Module 2: JAM**Duration: 6 Periods (L 2 P 4)**

- a) What is JAM?
- b) Significance of JAM
- c) Enhancing Speaking skills, fluency, usage, coherence, spontaneity, voice modulation, eye contact, body language, Creativity, Sense of humor, Confidence and Time management.
- d) Learn avoiding hesitation, deviation and repetition

Module 3: Group Discussion**Duration: 9 Periods (L 3 P 6)**

- a) Purpose of Group Discussion
- b) Types of Group Discussion
- c) Different expressions and phases and their effective usage
- d) Dos and Don'ts of a Group Discussion
- e) Practice.

Module 4: Interview Skills**Duration: 6 Periods (L 2 P 4)**

- i. Importance of interview skills
- ii. Types of interviews
 - a) Face to Face / One to Many,
 - b) Telephonic.
- 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. Body language, Grooming and Attire.

Module 5: Workplace Awareness and Professional Ethics**Duration: 9 Periods (L 3 P 6)**

- a) Workplace etiquette
- b) Knowledge, skills and attributes useful at workplace
- c) Workplace Relationships
- d) Gender sensitization
- e) Professional Ethics

a) Various writing formats useful at workplace

i) Emails

ii) Notice

iii) Agenda

iv) Minutes of meeting

v) Circular Memo

vi) Press release

Course Outcomes

CO1	Make effective presentation, develop public speaking skills and learn to make visually attractive PPTs.
CO2	Converse fluently and accurately accordingly in JAM sessions.
CO3	Group Discussions will enhance the willingness to take the Initiative, accept adaptability in turn developing leadership qualities and Communication Skills
CO4	Understand purpose and process of interview in turn knowing how to prepare and succeed in interview
CO5	Build strong workplace relationships by learning workplace etiquette, professional ethics and gender sensitization.
CO6	Learn various writing formats useful at workplace and to develop an ability to apply technical information in documentation.

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mappin g POs
CO1					2	2	2	5,6,7
CO2					2	2	3	5,6,7
CO3					1	3	2	5,6,7
CO4					2	2	3	5,6,7
CO5					2	2	3	5,6,7
CO6					2	3	3	5,6,7

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><http://www.bbc.co.uk/worldservice/learningenglish/radio/specials/15>

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION – I

HU-410 EMPLOYABILITY SKILLS LAB

Time: One Hour

Total Marks: 20

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. Write the guidelines of making a PPT?
2. What are some common mistakes which should be avoided during presentation?
3. How can you use audio -visual aids effectively to enhance your presentation?

Part – B

10 marks

Instruction: Answer any one of the following questions.

1. What are the tips to be followed to start a JAM session?
2. What are the do's and don'ts of presenting JAM?
3. What is JAM? Write significance of JAM in communication skills.

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION – II

HU-410 EMPLOYABILITY SKILLS LAB

Time: One Hour

Total Marks: 20

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. List the abilities required by a person to succeed in a Group Discussion.
2. Explain how to initiate, continue and conclude a Group Discussion and mention some suitable phrases to be used in each step.
3. Mention the guidelines to be followed in a Group Discussion.

Part – B

10 marks

Instruction: Answer any one of the following questions.

1. What precautions do you take for a telephonic interview?
2. How do you prepare for an interview?
3. Explain interview process and suitable attire for an interview?

BOARD DIPLOMA EXAMINATION (C-24)

SEMESTER END EXAMINATION

HU-410 EMPLOYABILITY SKILLS LAB

Time: Three Hours

Total Marks: 40

Part – A

10 marks

Instruction: Pick any one question from the given lot.

1. Write the guidelines involved in making a good presentation?
2. Describe the steps involved in JAM.
3. Mention different types phrases used in Group Discussion.
4. List few professional ethics useful at workplace.
5. Write a notice, agenda and minutes of meeting on any occasion.

Part – B

15 marks

6. Interview / Group Discussion

Part – C

15 marks

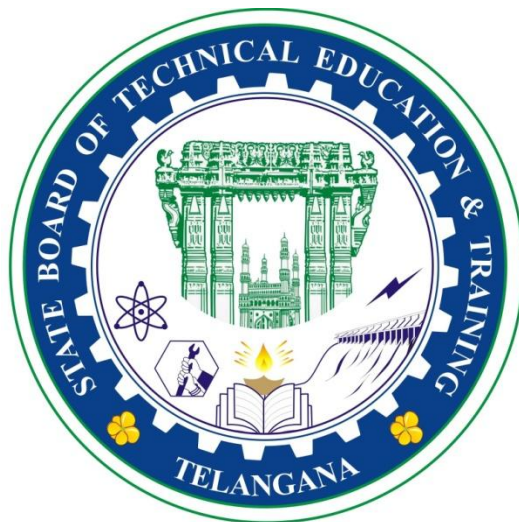
7. Viva Voce

C24-CURRICULUM

DIPLOMA IN

ELECTRICAL AND ELECTRONICS

ENGINEERING



Offered By

STATE BOARD OF

TECHNICAL EDUCATION AND TRAINING

TELANGANA HYDERABAD

TEACHING AND EXAMINATION SCHEME

DEEE-V 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 Sem1	Mid Sem2	Internal evaluation	Max Marks	Min Marks	Total Marks	Min marks for Passing including internal
1	EC-501	Entrepreneurship & Startups	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be ≥35% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
2	EE-502	Power Electronics	4	1	0	75	2.5	20	20	20	40	14	100	
3	EE-503	AC Motors	4	1	0	75	2.5	20	20	20	40	14	100	
4	EE-504	Electrical Utilization and Traction	4	1	0	75	2.5	20	20	20	40	14	100	
5	EE-505A	Industrial Motor Controls	4	1	0	75	2.5	20	20	20	40	14	100	
	EE-505B	Electric Vehicles												
6	EE-506A	Switchgear and Protection	4	1	0	75	2.5	20	20	20	40	14	100	
	EE-506B	Advanced Protection of Power Systems												
7	EE-507	Power Electronics & Power Systems Lab	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be ≥50% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
8	EE-508	A.C Motors LAB	1	0	2	45	1.25	20	20	20	40	20	100	
9	EE-509	Programmable Logic Controllers & MAT Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	EE-510	Project Work	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

EC-501 – ENTREPRENEURSHIP AND STARTUPS

Course Title	Entrepreneurship And Startups	Course Code	EC-501
SEMESTER	V SEMESTER	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1: 0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Knowledge of Basic finance and business knowledge

Course Outcomes

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

Course Outcomes	
CO1	Comprehend different management practices like Leadership and Ownership, resource Institutes
CO2	Identify the dynamic role of entrepreneurship and Startups in India and Telangana State by Acquiring Entrepreneurial spirit and resourcefulness, quality, competency, and motivation
CO3	Identify Business Ideas and Develop plans to implement
CO4	Comprehend basic concepts of financial management and their application
CO5	Identify and Assess the effectiveness and suitability of various support agencies and incubators in India and Telangana State
CO6	Build Project Proposal and Understand CSR, Ethics, Ex-Im and Exit strategies

Course Contents

UNIT- 1 Management Practices

Duration: 12 Periods (L: 9 – T:3)

Explain the concept and differences between Industry - Commerce and Business - Describe various types of ownerships in the Organization - Explain different types of leadership models - Analyze the nature and importance of various functions of management.

UNIT-2 Introduction to Entrepreneurship and Start – Ups **Duration: 13 Periods (L: 10 – T:3)**

Define Entrepreneurship- Discuss characteristics and functions of Entrepreneurship- Identify different types of Entrepreneurships-Compare the concepts of entrepreneur and intrapreneur and find out the motivation behind it -Distinguish between Entrepreneur and Managers - Identify 7-M Resources - Know MSME & Startup India –Startup Telangana, Start up Scheme- types, Importance, Features, Eligibility for Startup registration, Benefits

UNIT- 3 Business Ideas and their implementation

Duration: 13 Periods (L: 10 – T:3)

Finding Ideas and making an activity map - Develop the plans for creating and starting the business - Identify business using the ideation canvas and the business model canvas- Discuss market research related terms- Outline market mix related terms - Define Product related terminologies - Emphasize on Innovation - Explain concept of Risk and SWOT.

UNIT-4 Finance Management

Duration: 12 Periods (L: 10 – T:2)

Introduction – Objectives of Financial Management – Types of capitals – sources of raising capital – Start-ups funding types-venture capital funding-crowd funding-series funding- Types of budgets – production budgets – labour budgets – Concept of Profit and loss Account – Concept of balance sheet – proforma – types of taxes – brief concepts of – Excise Tax, Service Tax, Income Tax, GST and custom duty.

UNIT-5 Support Agencies and Incubators

Duration: 13 Periods (L: 10 – T:3)

State level and National level sources of information- various central Government institutions and their functions (like NSIC,SIDO,SISI and SSIB)- Telangana State industry policy-Demographic merits of Telangana state to set up SSIs-Names of state level institutions and their functions(Like SSIDC,DIC,APIITCO)-Banks that support SSIs like SIDBI,APSFC-Thrust areas and core sector as per Telangana state industry policy-Classification of the projects as per TSIP-Special assistance schemes for women and SC/ST entrepreneurs Features of TS-IPASS. Legal Issues – Contracts- Copyrights – Insurance- IPR- Licensing- Patents- Trade Secrets- Trademarks.

UNIT-6 - Project Proposal & Exit Strategy**Duration: 12 Periods (L: 10 – T:2)**

To work on the development of a project proposal - Describe social responsibility and relate with economic Performance. - Explain managerial ethics - To know Ex-Im Policies - Identify suitable strategies of succession and harvesting

Reference Books

S. No	Title of Book	Author	Publication with place, Year and ISBN
1	Entrepreneurship in Action	Coulter	PHI2 nd Edition
2	Entrepreneurship Development	E.Gordon &K. Natarajan	Himalaya
3	Entrepreneurship	Robert D. Hisrich& Mathew J. Manimala	McGraw Hill Education; ISBN978-1259001635
4	Entrepreneurial Development	SS Khanka	S Chand & Company;ISBN:978-8121918015
5	Entrepreneurship Development and Management	A. K. Singh	Jain Book Agency(JBA) publishes, NewDelhi
6	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K&S Ranch ISBN– 978-0984999392
7	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	EricRies	Penguin UK ISBN– 978-0670921607
8	Entrepreneurship	Roy Rajeev	Oxford University Press; ISBN:978-0198072638
9	Industrial Engineering and Management	O.P.Khanna	Dhanpat Rai and Sons, Delhi
10	Industrial Organization and Management	Tara Chand	Nem Chand and Brothers; Roorkee
11	Industrial Management and Entrepreneurship	V.K. Sharma.	Scientific Publishers, New Delhi
12	Entrepreneurship Development and Small Business Enterprise	Poornima M Charantimath	Pearson Education;ISBN:978-8131759196
13	Entrepreneurship Development	S Anil kumar	NEWAGEIntern.Pvt Ltd;ISBN:978-8122414349

Suggested E-learning resources

Sr. No.	Topic Key Word	Link
1	MoCI	https://www.india.gov.in/website-ministry-commerce-and-industry
2	MSME	1) https://msme.gov.in/ 2) https://www.msme.in/learn/government-schemes-for-startups-and-msmes-in-india/
3	Start-up, Stand-up India & start-up Telangana	1) https://www.startupindia.gov.in/ 2) https://www.standupmitra.in 3) https://udyamimitra.in/page/standup-india-loans 4) https://www.ssipgujarat.in/
4	Make in India	https://www.makeinindia.com/
5	Atmanirbhar Bharat Abhiyan Vocal for Local	https://indiancc.mygov.in/uploads/2021/08
6	Skill India	https://skillindia.gov.in
7	Start-ups telangana	https://startup.telangana.gov.in/government-policies/
8	MSDE	https://www.msde.gov.in/

Suggested Learning Outcomes

Upon completion of the course the student shall be able to

CO-1:- Select suitable Management practices like leadership and Ownership, resource institutes :-

- 1.1 Differentiate industry, Commerce and business,
- 1.2 Demonstrate various types of ownerships in the organization,
- 1.3 Illustrate different types of leadership models,
- 1.4 List various functions of management
- 1.5 Explain the nature and importance of various functions of management.
- 1.6 State the need for Planning in management
- 1.7 Explain Staffing- Recruitment and management of talent.
- 1.8 List merits and Demerits of various functions of management.
- 1.9 Differences between Management and Administration

CO-2 :- Identify the dynamic role of entrepreneurship and Startups in India and Telangana State by Acquiring Entrepreneurial spirit and resourcefulness, quality, competency, and motivation:-

- 2.1 Define Entrepreneurship
- 2.2 Explore characteristics and functions of entrepreneurship
- 2.3 Identify different types of Entrepreneurships
- 2.4 Compare the concepts of entrepreneur and intrapreneur and find out the motivation behind it
- 2.5 Distinguish between entrepreneur and managers
- 2.6 Identify 7-M Resources
- 2.7 Understand MSME & Start-up India
- 2.8 Identify Start-up schemes in Telangana
- 2.9 Interpret the importance of Start up Schemes
- 2.10 List the important features of Start-up schemes in Telangana State
- 2.11 Determine the Eligibility for start-up registration and understand the process
- 2.12 Explore the Benefits of Start-up registration

CO-3:- Identify Business Ideas and Develop plans to implement:-

- 3.1 List the steps in new business idea generation.
- 3.2 List the major steps involved in idea generation
- 3.3 Define brain storming, divergent thinking, creative Problem- solving.
- 3.4 Illustrate SCAMPER Technique.
- 3.5 List various steps involved in product Identification
- 3.6 Explain various phases of creating and starting the business
- 3.7 Explain marketing plan
- 3.8 List key components of Financial Plan.
- 3.9 List various Sources of Capital
- 3.10 Identify Business opportunity and evaluation.
- 3.11 Define market research related terms- Questionnaire design ,Sampling ,Market survey, Data analysis & interpretation
- 3.12 Outline Marketing Mix (4Ps- product, price, promotion, place)
- 3.13 Define Product Terms like PLC, Mortality Curve, New product Development Steps, Inventory, Supply Chain Management
- 3.14 State the Importance of Innovation,
- 3.15 Define concept of innovation
- 3.16 Describe the process of innovation.
- 3.17 Explain Risk analysis and mitigation by SWOT Analysis

CO-4:-Comprehend basic concepts of financial management and their application

- 4.1 Define Finance Management
- 4.2 List Objectives of Financial Management,
- 4.3 List Types of capitals,
- 4.4 Identify Sources of raising capital
- 4.5 List Start-ups funding types
- 4.6 Explain Venture capital funding
- 4.7 Explain Series funding
- 4.8 Explain Crowd funding
- 4.9 List Types of budgets-production budget – labour budget
- 4.10 Explain Concept of Profit loss Account,
- 4.11 Illustrate Concept of balance sheet– proforma
- 4.12 List Types of taxes imposed by Central Government and State Government
- 4.13 Detail concepts of – Excise Tax, Income Tax, GST and custom duty.

CO-5:- Overview of Support Agencies and Incubators:-

- 5.1 Identify State level and national level sources of information on Start-ups
- 5.2 Detail functions of Various central Government institutions (like NSIC,SIDO,SISI and SSIB)
- 5.3 Detail important features of Telangana State industry policy.
- 5.4 List Demographic merits of Telangana state to set up SSIs.
- 5.5 List the Names of state level institutions that support SSIs
- 5.6 Explain the role of institutions like SSIDC, DIC, APIITCO in setting up SSIs.
- 5.7 Explain role of Banks that support SSIs like SIDBI, APSFC.
- 5.8 Identify Thrust areas and core sector as per Telangana state industry policy.
- 5.9 Classify the projects as per TSIP.
- 5.10 Explain Special assistance schemes for women and SC/ST Entrepreneurs.
- 5.11 List Features of TS-IPASS.
- 5.12 Explain Legal Issues –Contracts-Copyrights –Insurance – IPR – Licensing-Patents-Trade Secrets-Trademarks.

CO-6:-Building Project Proposal & Understand CSR, Ethics, Ex-Im, & Exit strategies

- 6.1 Outline the steps involved in Project Planning and report
- 6.2 Explain Feasibility study of project
- 6.3 Explain the process of Project cost estimation
- 6.4 Define and explain Breakeven analysis
- 6.5 Define the terms Return on investment and Return on sales
- 6.6 Describe social responsibility and relate with economic Performance.
- 6.7 Explain Business Ethics
- 6.8 Describe Ex-Im Policies
- 6.9 Identify suitable strategies of succession and harvesting.
- 6.10 Explain Bankruptcy and avoidance

Suggested Student Activities

Other than the classroom learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course. Students should make a portfolio i.e. perform at least FIVE from following list of activities individually or in group (not more than 2 students). They should prepare reports of about 2-5 pages for each activity and collect/ record physical evidence for their portfolio which may be useful for their placement interviews:

- i. Develop two products from household waste (attach photographs).
- ii. Download product development and innovative films from internet
- iii. Prepare a collage for “Traits of successful entrepreneurs.”/ “Motivation & Charms of Entrepreneurship”.
- iv. Invite entrepreneurs, industry officials, bankers for interaction. Interview atleast four entrepreneurs or businessman and identify
- v. Identify your hobbies and interests and convert them into business idea.
- vi. Mock Business Model- Choose a product and design a unique selling preposition, brand name, logo, advertisement (print, radio, and television), jingle, packaging, and labelling for it.
- vii. Develop your own website. Share your strengths and weakness on it. Declare your time bound goals and monitor them on the website.
- viii. Choose any product / advertisement and analyse its good and bad points/ cost sheet/ supply chain etc. (individuals should select different ads).
- ix. Compare schemes for entrepreneurship promotion of any bank.
- x. Prepare sign boards representing safety measures.
- xi. Prepare a project report on following policies implemented by Telangana under Start-ups
ELECTRONICS POLICY-2016
Innovation policy-2016
Industrial policy-2014 etc.,

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom’s revised taxonomy)

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, and Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	1					1		1,6
CO2	1	1			1	2	1	1,2,5,6,7
CO3	1	2	2		1	1	2	1,2,3,5,6,7
CO4	1					2	1	1,6,7
CO5	2				1		2	1,5,7
CO6	1				2	2	1	1,5,6,7

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD
EC-501- ENTREPRENEURSHIP AND STARTUPS
V SEMESTER MID SEMESTER – I MODEL PAPER

Time: 1 hour

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. What is merits of managements ?
2. List the functions of management?
3. Define Entrepreneurship
4. Define start-ups.

PART-B

2X3M=6 Marks

NOTE: 1) Answer all questions and each carries **three** marks.

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

5. (a) List out the element of cost?

OR

(b) Explain about staffing and need for recruitment .

6. (a) Discuss characteristics of entrepreneurship.

OR

(b) Illustrate about MSME?

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) Describe various types of ownerships in the organization,

OR

(b) Explain different types of leadership models,

8. (a) Compare the concepts entrepreneur and intrapreneur

OR

(b) Identify 7-M Resources

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD
EC-501- ENTREPRENEURSHIP AND STARTUPS
V SEMESTER MID SEMESTER – II MODEL PAPER

Time: 1 hour

Max. Marks:20

PART-A

4X1=04 Marks

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. What is the full form SWOT?
2. State need for business plan?
3. Full form of GST?
4. List types of budget ?

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 the need for planning?

OR

- (b) What is mean by market planning?

6. (a) explain series funding?

OR

- (b) List types of taxes imposed by Central Government and State Government

PART-C

NOTE: 1) Answer all questions and each carries five mark.

2X5M=10 Marks

2) Answers should be comprehensive and the criterion for valuation is the content but not length of the answer.

7. (a) Identify different marketing mix and illustrate their importance

Or

- (b) Examine different business opportunities

8. (a) Explain the concept of profit loss account

OR

- (b) Explain briefly types of budgets .

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD
EC-501- ENTREPRENEURSHIP AND STARTUPS
V SEMESTER END SEMESTER MODEL PAPE

Time: 2 Hours

Max. Marks:40

PART-A

Instructions: 1. Answer **ALL** questions.

8 X 1 = 8

2. Each question carries **ONE** mark.

1. What is mean by Marketing plan?
2. Define crowd funding.
3. What is mean by balance sheet?
4. List any two support agencies promoting entrepreneurship ?
5. Mention any two features of TS-IPASS?
6. What is mean by project planning
7. What is mean by breakeven?
8. Mention any two business ethics?.

PART-B

Instructions: 1. Answer **ALL** questions.

4 X 3 = 12

2. Each question carries **THREE** marks.

9. (a) List any six Telangana Start-ups schemes.

OR

9. (b) List functions of management

10. (a) explain about crowd funding.

OR

10. (b) Explain about return on investment .

- 11.(a) Outline the Telangana state industry policy.

OR

- 11.(b) Classification of the projects as per TSIP

- 12 (a) Mention the importance of Business Ethics?

OR

12. (b) Illustrate briefly about bankruptcy?

PART-C

Instructions: 1. Answer **ALL** questions.

4 X 5 = 20

2. Each question carries **FIVE** marks.

- 13.(a) Explain Marketing Mix (4Ps- product, price, promotion, place)

OR

- 13.(b) Evaluate different types of budgets?

14 (a) Explain various phases of creating and starting the business

OR

14(b) Explain Ex-Im policies

15 (a) Explain the Telangana state industry policy

OR

15.(b) Illustrate the special assistance schemes for women and SC/ST Entrepreneurs

16(a) What is Break Even analysis? Illustrate graphically the concept of Break -Even point.

OR

16.(b) Illustrate suitable strategies of succession and harvesting.

EE-502- POWER ELECTRONICS

Course Title:	Power Electronics	Course Code	EE-502
Semester	V Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Electronics Engineering (Semiconductor devices) Electrical Circuits and Electrical Machines (DC and AC).

Course Outcomes

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

CO1:	Compare different power electronic devices and select the device based on the requirement
CO2 :	Analyze the different Converters circuits and to select suitable converters based on applications field.
CO3:	Acquire the knowledge to construct AC Controllers 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 the 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 Controllers 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					
Total		75	8		8	8	

Course Contents

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- 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 Controllers and Choppers**Duration: 13 Periods (L: 10 – T: 3)**

Single phase half wave and full wave AC voltage controller with R load - Applications of AC voltage controller - 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: 13 Periods (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.

Reference Books

1. Power Electronics– Jameel Asghar 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

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

CO1: Compare different power electronic devices and select the device based on the requirement

- 1.1 Introduction to Power Electronic Devices and their Importance
- 1.2 Difference between Electronic and Power Electronic Devices
- 1.3 Applications of Power Electronic Devices in Power Systems, Smart grids etc
- 1.4 List different devices of thyristor family.
- 1.5 Draw the ISI circuit symbols for each device in thyristor family.
- 1.6 Explain the constructional details of SCR
- 1.7 Explain the two transistor analogy of SCR.
- 1.8 Explain the static Volt – Ampere characteristics of SCR with the help of a diagram.
- 1.9 Draw the Gate characteristics of SCR
- 1.10 Explain SCR triggering by UJT.
- 1.11 Mention the ratings of SCR.
- 1.12 Give the advantages of SCR as a switch.
- 1.13 Explain the static Volt-ampere characteristics of DIAC with the help of diagram.
- 1.14 Explain the static Volt-ampere characteristics of TRIAC with the help of diagram.
- 1.15 Explain the working of Insulated gate Bipolar transistor (IGBT) by giving their static V-I Characteristics.
- 1.16 List applications of SCR, DIAC, TRIAC, IGBT, LASCR

C02: Use different Converters circuits as per requirement.

- 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

CO3: Acquire the knowledge to construct AC Controllers and Choppers circuits.

- 3.1 Define AC voltage Controller.
- 3.2 Explain the working of single phase half wave AC voltage Controller.
- 3.3 Explain the working of single phase full wave AC voltage Controller.
- 3.4 List the applications of AC voltage Controller.
- 3.5 Define Chopper.
- 3.6 Classify choppers.
- 3.7 Explain the working principle of chopper (Step Down Chopper).
- 3.8 State the expression for R.M.S value of Voltage of Stepdown Chopper.
- 3.9 Describe the voltage control modes of chopper
- 3.10 Explain the operation of chopper in all four quadrants.
- 3.11 List the applications of choppers.

CO4: Acquire the knowledge to construct and use Inverters and Cyclo-converters circuits.

- 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.

C05: Apply the power electronic drives for speed control of DC / AC Motors and compare specific power electronics drives.

- 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.

C06: Apply Power electronic circuits for specific applications

- 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	Linked PO
CO1	3		1		3		2	1,3,5,7
CO2	3		3		3		2	1,3,5,7
CO3	3		3		3		2	1,3,5,7
CO4	3		3		3		2	1,3,5,7
CO5	3		3		3		2	1,3,5,7
CO6	3		3		3		2	1,3,5,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-502

POWER ELECTRONICS
MID SEM -I 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. List different devices of thyristor family
2. Draw the ISI symbols for a) SCR, b) SBS
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 controller.
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 Controllers.

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 Controller.

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 controller.
3. List any two applications of choppers.
4. Classify inverters based on any one aspect.
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 Controllers

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-503- AC MOTORS

Course Title:	AC Motors	Course Code	EE-503
Semester	V Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Principles of Motors and starters.

Course Outcomes

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

CO1 :	Describe the construction, working and performance of Synchronous motor
CO2 :	Examine various types of starting methods and select a suitable synchronous motor for a particular application.
CO3 :	Describe the construction, working and performance of 3 phase induction motors
CO4 :	Evaluate the characteristics of 3 phase induction motors.
CO5 :	Identify different starting and speed control methods of 3- phase Induction Motors
CO6 :	Describe the construction, working and applications of Single-phase and special purpose 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	Starting Methods and Applications of Synchronous Motors	10					
3	3 phase Induction Motors	15		Q2	Q10(a)	Q14(a)	
4	Characteristics of 3 phase Induction Motor	10					
5	Starters and Speed Control of 3 phase Induction Motor	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Single phase and Special purpose Motors	15					
Total		75	8		8	8	

Course Contents

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 change of Excitation at constant Load, Ph as or 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 on EMF- V – Curves and inverted V–curves, constant power lines.

UNIT-2 :Starting Methods and Applications of Synchronous Motors

Duration: 10 Periods(L:8 -T: 2)

Starting methods -necessity- phenomenon of hunting and its undesirable effects–
Methods to prevent hunting - Speed control methods synchronous motor - synchronous condenser-Applications of synchronous motor.

UNIT–3:Three phase Induction Motors

Duration:15 Periods(L:12-T:3)

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 – equivalent circuit of Induction motor - Losses and Power transfer stages - efficiency – derive a relation between rotor copper losses, rotor output and rotor input and simple problems

UNIT–4 : Characteristics of 3phase Induction Motor Duration:10 Periods(L:8- T: 2)

Torque equation –Starting torque - Torque slip curves - condition for maximum torque – Relation Between full load torque, starting Torque and maximum torque - effects of rotor resistance and reactance on starting, full load and maximum torque - problems - Types of tests - No load and blocked rotor tests.

UNIT- 5: Starters and Speed Control of 3-phase Induction Motor

Duration: 10Periods(L:8-T: 2)

Starters for Induction motor – necessity of starters - Direct Switching - D.O.L starter - Star / Delta starter- Auto Transformer starter -rotor resistance starters- Speed variation of induction motors - Application of induction motors

UNIT- 6: Single phase and Special purpose Motors

Duration:15Periods(L:12- T: 3)

Necessity of single phase motors –reason for not self starting–starting methods- types of single phase motors-split phase-capacitor start - capacitor run - shaded pole induction motor- A.C series motor - Universal motor-principle of working–applications of single phase motors - Stepper motor- principle of working - applications of special purpose motors

Reference 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

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

CO1 : Describe the construction, working and performance of synchronous motor

- 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 List the parts of synchronous motor
- 1.4 State the functions of all parts of synchronous motor
- 1.5 Explain the principle of working of synchronous motor.
- 1.6 Derive an expression for Back EMF of synchronous motor
- 1.7 State the effects of change of Excitation at constant Load with the help of Phasor diagrams at
(a) Normal (b) Under (c) Over excitation conditions
- 1.8 Explain the effects of excitation on armature current and power factor.
- 1.9 State the relation between Back EMF and applied voltage.
- 1.10 Solve simple problems on Back EMF.
- 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.

CO2: Examine various types of starting methods and select a suitable synchronous Motor for a particular application.

- 2.1 Discuss the necessity of starting methods for synchronous motor.
- 2.2 Demonstrate the starting of synchronous motor by Auxiliary motor method.
- 2.3 Demonstrate the starting of synchronous motor by Damper winding method.
- 2.4 Describe the phenomenon of HUNTING.
- 2.5 State the effects of HUNTING.
- 2.6 State “How HUNTING is prevented”?
- 2.7 Discuss how asynchronous motor can be used as asynchronous condenser.
- 2.8 List the applications of synchronous motor.

CO3: Describe the construction, working and performance of 3 phase induction motors

- 3.1 Discuss the advantages of Induction Motors over synchronous motor.
- 3.2 List the types of 3 phase induction motors.
- 3.3 Describe the construction of slip ring Induction motor.
- 3.4 Describe the construction of squirrel cage Induction motor.
- 3.5 State the working principle of 3 phase induction motor.
- 3.6 Define slip
- 3.7 Explain the working of 3phase induction motor on no-load.
- 3.8 Explain the working of 3phase induction motor on Load.
- 3.9 Describe the impact of loading on slip.
- 3.10 Describe the impact of slip on EMF of rotor.
- 3.11 Describe the effect of slip on reactance of rotor.
- 3.12 Solve simple problems on frequency of rotor, EMF and reactance of rotor.
- 3.13 Derive a relation between rotor copper losses, rotor output and rotor input.
- 3.14 Solve simple problems on rotor copper losses, rotor output and rotor input.
- 3.15 Draw the equivalent circuit of an induction motor.
- 3.16 Draw the Power flow diagram of induction motor.
- 3.17 Define rotor efficiency and overall efficiency.
- 3.18 Solve simple problems on power and Efficiency.

CO4: Evaluate the characteristics of 3 phase induction motors.

- 4.1 Derive Torque Equation
- 4.2 Draw Torque-Slip characteristics of induction motor.
- 4.3 Explain the effect of resistance on Torque slip characteristics.
- 4.4 List various modes of operation of induction machine.
- 4.5 Derive the expression for full load torque.
- 4.6 Explain the expression for starting torque.
- 4.7 Derive the expression for maximum torque.
- 4.8 Derive the relation between full load torque and starting Torque.
- 4.9 Derive the relation between full load torque and maximum torque.
- 4.10 Derive the relation between starting Torque and maximum torque.
- 4.11 Solve simple problems on Torque.
- 4.12 Types of tests on induction motor
- 4.13 Explain No-load test on induction motor
- 4.14 Describe blocked rotor test on induction motor

CO5: Identify different starting and speed control methods of 3 phase induction motors

- 5.1 List different types of starters used for induction motors.
- 5.2 Describe the working of D.O.L. starter with the help of circuit diagram.
- 5.3 Explain the working of Star / Delta starter with the help of circuit diagram.
- 5.4 Explain the working of Auto-Transformer starter with the help of circuit diagram.
- 5.5 Explain the working of Rotor resistance starter with the help of circuit diagram.
- 5.6 List the types of speed control of induction motor.
- 5.7 Describe the speed control of inductor motors by Frequency changing method.
- 5.8 Describe the speed control of inductor motors by Pole changing method.
- 5.9 Describe the speed control of inductor motors by Injecting voltage in rotor circuit.
- 5.10 Explain the speed control of inductor motors by Cascading method.
- 5.11 State the applications of inductor motors

CO6: Describe the construction, working and applications of single phase and special purpose motors

- 6.1 State the necessity of single phase induction motors
- 6.2 Compare single phase with three phase induction motors
- 6.3 Discuss Why a Single-phase Induction motor is not Self starting.
- 6.4 Explain the principle of working of single phase induction motor by double field revolving theory.
- 6.5 Describe the principle of working of single phase Induction motor by cross field theory.
- 6.6 State the types of single phase induction motors.
- 6.7 State the purpose of auxiliary winding.
- 6.8 Describe the working of split phase motor
- 6.9 Describe the working of capacitor start motor
- 6.10 Describe the working of capacitor run motor
- 6.11 Describe the working of shaded pole motor
- 6.12 Describe the working of single phase AC Series motor.
- 6.13 Explain the methods to eliminate sparking in AC series motor.
- 6.14 Explain the working of universal motor.
- 6.15 List the applications of single phase motors.
 - (i) split phase motor (ii) Shaded pole motor (iii) Capacitor start (iv) Capacitor run motor (v) AC series motor (vi) Universal motor
- 6.16 Explain the principle of working of Stepper motor.
- 6.17 List the applications of special purpose single phase motors.
 - (i) Stepper Motor (ii) Servo motor (iii) BLDC (iv) PMDC

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	2	2		3		2	1,2,3,5,7
CO4	3	3	3		2		3	1,2,3,5,7
CO5	3	3	2		3		2	1,2,3,5,7
CO6	3	2	3		3		3	1,2,3,5,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-503

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 inverted 'V' curve.
2. Define on which parameters 'V' curve is drawn.
3. Which motor is called as constant speed motor.
4. Why damper winding is used

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks.

5.(a) Draw the constant power lines of synchronous motor.

OR

5.(b) State the parts of synchronous motor

6.(a) Explain the necessity of starting methods for synchronous motor.

OR

6. (b) State the effects of HUNTING?

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

7.(a). Derive an expression for Back EMF of synchronous motor.

OR

7.(b). Explain the principle of working of synchronous motor.

8.(a). Explain the starting of synchronous motor by Damper winding method.

OR

8.(b). Explain how a Synchronous motor can be used as a Synchronous condenser.

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SUB CODE: EE-503

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. Define slip.
2. Write the types of three phase induction motors.
3. What is the slip value at the time of starting for three phase induction motor.
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). Define the rotor efficiency of three phase induction motors.

OR

- 5.(b). Draw the Power flow diagram of induction motor.

- 6.(a). Derive the expression for starting torque.

OR

- 6.(b). Draw the Torque - Slip characteristics of induction motor

PART - C

Marks: 2 x 5 = 10

Instructions: (1) Answer **all** questions.
(2) Each question carries **five** marks.

- 7.(a). Derive the relation between rotor copper losses, rotor output and rotor input.

OR

- 7.(b). Explain working of 3 phase induction motor on no-load.

- 8.(a). Explain the procedure to conduct No-load test on induction motor.

OR

- 8.(b). Explain the effect of resistance on Torque slip characteristics.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
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SUB CODE: EE-503

AC MOTORS

SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART - A

Marks: $8 \times 1 = 8$

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the types of starting methods for synchronous motor.
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. Write the necessity of starter for a three-phase induction motor.
6. List any two methods of speed control of three-phase squirrel cage induction motor.
7. Write the purpose of auxiliary winding in single phase induction motor.
8. State any two applications of Stepper motor.

PART - B

Marks: $4 \times 3 = 12$

Instructions: (1) Answer all questions.
(2) Each question carries **three** marks.

9.(a) State the relation between Back EMF and applied voltage for synchronous motor

OR

9.(b) Write the types of speed control of three phase induction motor

10.(a) Write any three advantages of three Induction Motors

OR

10.(b) Why a single-phase induction motor is not self starting.

11.(a) Draw the diagram of D.O.L starter

OR

11.(b) Write the types of speed control of three phase induction motor

12.(a) Describe the working of split phase motor

OR

12.(b) State the applications of A.C series motor.

PART – C

Marks: $4 \times 5 = 20$

Instructions: (1) Answer all questions.
(2) Each question carries **five** marks.

13.(a) Explain the effects of excitation on armature current and power factor of synchronous motor.

OR

13. (b) Explain the speed control of inductor motors by Pole changing method.

14.(a) Derive the relation between full load torque, starting Torque and maximum torque.

OR

14.(b) Explain the working of capacitor run motor.

15.(a) Explain the speed control of induction motor by Pole changing method.

OR

15.(b) Explain the working of Star / Delta starter with the help of circuit diagram.

16.(a) Explain the methods to eliminate sparking in single phase AC Series motor

OR

16.(b) Explain the working of universal motor.

EE-504 -ELECTRICAL UTILIZATION AND TRACTION

Course Title:	Electrical Utilization and Traction	Course Code	EE-504
Semester	V Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic principles of electricity.. It also requires fundamental understanding of types of lamps, heating devices, welding meaning, various motors and their characteristics.

Course Outcomes

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

CO1 :	Design lighting systemsfor indoor and outdoor applications
CO2 :	Apply an electric heating method specific to industrial applications
CO3 :	Categorize the electric welding processes according to different engineering purposes.
CO4 :	Analyze theservices of traction system based on speed-time curves.
CO5 :	Compute the energy requirements of an electric locomotive
CO6 :	Explain the Overhead equipment used in Traction

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Electrical Lighting	13	Q4	Q1		Q9(a)	Q13(a)
2	Electrical Heating	12					
3	Electrical Welding	10		Q2		Q10(a)	Q14(a)
4	Electric Traction Properties	15					
5	Tractive effort , Mechanics of Traction and specific energy consumption	13		Q3	Q5, Q6	Q9(b), Q11(a),Q11(b)	Q13(b), Q15(a), Q15(b)
6	Traction Equipment	12					
Total		75	8		8	8	

Course Contents

UNIT – 1 Electrical Lighting

Duration: 13 Periods (L:10 – 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 -2 Electrical Heating

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.

UNIT - 3 Electrical Welding

Duration: 10 Periods (L: 8 – T: 2)

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 -4 Electric Traction Properties**Duration: 15 Periods (L:12 - 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

UNIT -5 Tractive effort, Mechanics of Traction and specific energy consumption**Duration: 13 Periods (L: 10 – T: 3)**

Mechanics of train movement Coefficient of adhesion-factors affecting the coefficient of adhesion-Tractive effort -Derivation -Problems-Specific energy consumption- Problems on specific Energy consumption.

UNIT - 6 Traction Equipment**Duration: 12 Periods (L: 10 – T: 2)**

Traction motors A.C&D.C—control of traction motor by auto transformer-overhead equipment-Current collecting gears-Catenary-Droppers- Trolley wires-Bow collector-Pantograph collector-Booster transformer– Train lighting Systems-Types of Generators in Railways-MAGLEV

Reference Books

Applications of magnetic Levitation.

1. Electrical power by S.L.Uppal
2. Electrical power by J.B.Gupta
3. Electrical utilisation by-Gupta
4. Utilization of Electrical Energy by –R.K Garg
5. Electrical Technology VolIIIbyBLTheraja
6. Electric Traction by H.Partab
7. Electric Traction A.T. Dover
8. Electric Traction Hand Book Sir Isqqc Pitman & sons ltd., London
9. Utilisation of Electrical Energy.(in SI units) E.O. Taylor (Indian Edition)

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

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

CO1: Design lighting systems for indoor and outdoor applications

- 1.1 Explain the nature of light and its propagation
- 1.2 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
- 1.3 List the types of lamps used for illumination for different situations such as domestic, industrial, decoration, advertisement and street lighting schemes.
- 1.4 Define Glare.
- 1.5 Mention the methods to reduce glare.
- 1.6 State the requirements of good lighting
- 1.7 Explain different types of lamp fittings.
- 1.8 State the uses and advantages of each type of fitting
- 1.9 State and explain the laws of illumination
- 1.10 Solve problems on laws of illumination.
- 1.11 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
- 1.12 Calculate the number of lamps required for simple indoor lighting scheme
- 1.13 State the purpose of lux meter
- 1.14 Mention the illumination levels for indoor and outdoor applications
- 1.15 State the advantages of LED lighting over CFL lamps

CO2: Apply an electric heating method specific to industrial applications

- 2.1 State the advantages of electric heating
- 2.2 List the requirements of good heating material
- 2.3 State the materials employed for heating
- 2.4 Explain Direct Resistance heating
- 2.5 Explain indirect resistance heating .
- 2.6 List the industrial applications of resistance heating
- 2.7 Explain different methods of temperature control of resistance heating with diagrams
- 2.8 Explain direct arc heating
- 2.9 Explain indirect arc heating
- 2.10 List the industrial applications of arc heating.
- 2.11 Explain core type of induction heating
- 2.12 Explain coreless type of induction heating
- 2.13 Explain the principal of dielectric heating
- 2.14 List the industrial applications of dielectric heating

CO3: Categorize the electric welding processes according to different engineering purposes

- 3.0 State different types of electric welding.
- 3.1 Explain with sketches the principles of the following welding processes
 - i) Resistance welding
 - ii) Spot welding
 - iii) Seam welding
 - iv) Butt welding
 - v) Arc welding
 - vi) Metal Arc welding
 - vii) Carbon arc welding
- 3.2 List the conditions of successful welding
- 3.3 Write the characteristics of a welding generator.
- 3.4 Explain with legible sketch the principle of operation of welding transformer with a reactance coil.
- 3.5 Explain different types of electrodes used in welding
- 3.6 Explain electronic circuits used in welding
- 3.7 Explain the 'Sequence Weld' with a block diagram.

CO4: Analyze the services of traction system based on speed-time curves

- 4.1 List different types of traction systems.
- 4.2 State the advantages of electric traction.
- 4.3 State the disadvantages of electric traction.
- 4.4 List types of Track electrification systems.
- 4.5 Describe arrangement of D.C., A.C. 1-phase, AC 3-phase, Composite systems for track electrification systems.
- 4.6 Mention the Present scenario of Indian Railways High speed traction & Metro rail
- 4.7 List the latest trends in Electric traction.
- 4.8 List the types of services(main line, suburban and urban).
- 4.9 Sketch the speed time curves for i) Main Line ii) sub urban services iii) Urban services
- 4.10 State each stage of the speed time curve with appropriate speed used
- 4.11 State the importance of speed time curves
- 4.12 Define Maximum speed, Average speed and Scheduled speed
- 4.13 List the factors affecting the Scheduled Speed
- 4.14 Sketch the simplified Speed Time Curves.
- 4.15 Explain the practical importance of the simplified Speed Time Curves
- 4.16 Write the expression for Maximum Speed, Acceleration and Retardation for TrapezoidalSpeed - Time Curve
- 4.17 Solve simple problems on Trapezoidal Speed Time Curve

CO5: Compute the energy requirements of an electric locomotive

- 5.1 Explain the Tractive Effort
- 5.2 Write the expression for Tractive Effort for Acceleration, to overcome gravity pull and train resistance
- 5.3 Calculate the Tractive effort under given conditions.
- 5.4 Explain the mechanics of transfer of power from motor to driving wheel.
- 5.5 Define 'Coefficient of Adhesion'.
- 5.6 List the factors affecting the Coefficient of Adhesion.
- 5.7 State the methods of improving the Coefficient of Adhesion.
- 5.8 Explain the term specific energy consumption.
- 5.9 Derive the formulae for energy output of drive
 - To Accelerate
 - To overcome friction
 - To overcome gradient.
- 5.10 List the factors affecting specific energy consumption.
- 5.11 Solve simple problems on Specific energy calculation under given conditions.

CO6: Explain the Overhead equipment used in traction

- 6.1 State the desirable features of traction motors.
- 6.2 Explain Significance of D.C. series motor as traction motor over D.C. Shunt motor.
- 6.3 Explain the suitability of AC motors for Traction.
- 6.4 Compare and contrast different traction motors.
- 6.5 Explain with neat sketch the control of traction motor by autotransformer method in Single phase 25 kV systems.
- 6.6 State the purpose and material used for catenary
- 6.7 State the purpose and material used droppers
- 6.8 State the purpose and material used trolley wires
- 6.9 State the purpose and material used bow collector
- 6.10 State the purpose and material used pantograph collector
- 6.11 State the Need of Booster Transformer
- 6.12 Draw the Connection diagram of booster transformer
- 6.13 State the requirements of train lighting.
- 6.14 Compare End-On Generation system with Mid-on Generation System
- 6.15 Explain the Concept of MAGLEV
- 6.16 State the applications of Magnetic Levitation

Suggested Student Activities

1. 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
2. Prepare a report on illumination required for both indoor and outdoor applications
3. Student visits Industries where Electrical heating methods are employed and their purpose of heating
4. Visit to a nearby Welding shop and also to industries which make use of Electric welding process
5. Visit to Traction workshop of Railway and understand its operation
6. Visit to nearby traction substation and prepare the observation report
7. Group Discussion
8. Surprise Test
9. Quiz

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	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	1		2		2		1	1,3,5,7
CO2	1				2		1	1,5,7
CO3	1				1		1	1,5,7
CO4	1				2		1	1,5,7
CO5	1		2		2		1	1,3,5,7
CO6	1		2		2		1	1,3,5,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-504

ELECTRICAL UTILIZATION TRACTION

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. Define MSCP.
2. Define glare.
3. State any two advantages of Electric Heating
4. Write any two applications of Dielectric heating

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5a) Define i) Solid Angle ii) Illumination

OR

- 5 b) State the requirements of good lighting

- 6 a) Draw a neat sketch of Resistance Heating

OR

- 6 b) List the industrial applications of Arc Heating

PART - C

Marks: 2 x 5= 10

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

- 7 a) State and explain Lambert's cosine law of illumination

OR

- 7 b) State the uses and advantages of each type of fitting

- 8 a) Explain temperature control of resistance heating

OR

- 8 b) Explain the principle of working of indirect Arc heating with legible sketch

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-504

ELECTRICAL UTILIZATION AND TRACTION

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. Define welding
2. List any two applications of Welding
3. Mention any two advantages of Electric traction
4. Write the expression for scheduled speed.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5a) Write the principle of i) spot welding .

OR

- 5 b) Write the principle of i) Butt Welding

- 6 a) Draw the speed time curve of Main line service

OR

- 6 b) Define maximum speed and average speed.

PART - C

Marks: 2 x 5= 10

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

- 7 a) Explain Spot welding

OR

- 7 b) Write the differences between Metal arc welding and carbon arc welding

- 8 a) Draw the speed time curves for 1) Urban services ii) Sub urban and iii) Main line service

OR

- 8 b) An electric Locomotive is travelling a distance of 3 km. The time taken is 120 seconds and the time taken for each stop is 30 Seconds .calculate i) Average speed
ii) Scheduled Speed.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-504

ELECTRICAL UTILIZATION AND TRACTION
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. Define glare
2. Write any two advantages of electric heating
3. What is the purpose of welding?
4. Define schedule speed of an electric locomotive
5. Define Tractive effort
6. Write the expression for tractive effort when the locomotive is descending
7. List two applications of magnetic levitation
8. Mention the current collection devices used in traction.

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.

Marks: 4 X 3 = 12

9a) Write Five advantages of Electric Heating

OR

9b) Define specific energy consumption and mention its unit

10a) Write the working principle of welding generator with a neat sketch

OR

10b) what is the need for booster transformers in Traction systemss.

11a) Define tractive effort.

OR

11b) What are the factors affecting specific energy consumption?

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) Two lamps of 100 CP are hung at height of 10 m from the ground level. The distance between the posts is 25 m. calculate the Illumination a) Exactly below the lamp post b) Midway between the posts

OR

13b) Derive the formulae for energy output of drive to accelerate, to overcome friction and to overcome gradient

14 a) 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

OR

14b) Explain the Concept of Magnetic levitation MAGLEV

15a) Explain the Tractive Effort

OR

15b) Define coefficient of adhesion? Write the factors affecting coefficient of adhesion.

16a) Explain with neat sketch the control of traction motor by autotransformer method in Single phase 25 kV systems.

OR

16 b) Compare and contrast current collectors used in Traction.

EE-505A- INDUSTRIAL MOTOR CONTROLS

Course Title:	Industrial Motor Controls	Course Code	EE-505A
Semester	V Semester	Course Group	Elective
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires knowledge on working of different types of motors and switches.

Course Outcomes

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

CO1	Use the general principles for installing motors and its control equipment.
CO2	Select the type of Relays and Contactors for given industrial applications.
CO3	Select switches and sensors for various applications.
CO4	Select valves and detectors used for given real time applications.
CO5	Develop control circuits of motor that are used for simple applications.
CO6	Apply various types of controls for different types of motors.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	General principles of Motor control and Control transformer.	10	Q4	Q1		Q9(a)	Q13(a)
2	Different types of Relays and Contactors.	15					
3	Switches & Sensors	10		Q2		Q10(a)	Q14(a)
4	Valves & Detectors	15					
5	Basic control circuits & Wiring diagrams	10		Q3	Q5, Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Automatic controls, Forward-Reverse controls, Sequence controls, Jogging & Inching	15			Q7, Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Contents

UNIT I: General principles of Motor control and Control transformer

Duration: 10 Periods (L: 8 - T: 2)

Installation of Motors – factors to be considered – Types of Motor Control systems – Functions of Motor Control – Surge protection of control system - Difference between manual and automatic motor control - Use of Control transformers in control circuit- power rating of Control transformer– Grounded & floating control systems.

UNIT II: Different types of Relays and Contactors

Duration: 15 Periods (L: 12 - T: 3)

Overload relays –Thermal Overload relays – Magnetic Overload relays – Motor relays – Electromagnetic relays –Solid state relays - Mercury relays – Timing relays: Different types – Advantages of Pneumatic relays & Clock timers– Capacitor time limit relay – Contactors.

UNIT III: Switches & Sensors

Duration: 10 Periods (L: 8 - T: 2)

Pressure Switch & sensors - Mercury Bulb Float Switch -Bubbler system- Flow switch & sensors- Limit switch – types of limit switches & Limit switch applications - Hall Effect– principles of operation of Hall generator & its applications.

UNIT IV: Valves & Detectors

Duration: 15 Periods (L: 12 - T: 3)

Valves: Two – Way Solenoid Valves-Motor operated Valves-Different methods of sensing Temperature - Smart temperature transmitter – Proximity detectors: Applications & operation of simple and tuned tank circuit of proximity detectors – Capacitive proximity detectors – Ultrasonic proximity detectors-Photo detectors – Types & Applications.

UNIT V: Basic control circuits & Wiring diagrams

Duration: 10 Periods (L: 8 - T: 2)

Symbols of different switches, contacts, overloads, circuit breakers, fuse, buzzer, Two wire and three wire basic motor control circuits – schematic diagram & Wiring diagram of start stop push button station - Alarm silencing circuit– Timed starting of three motors- Float switch control of pump and pilot lights.

UNIT VI: Automatic controls, Forward-Reverse controls, Sequence controls, Jogging & Inching

Duration: 15 Periods (L: 12 - T: 3)

Operation of hand-off-automatic control switch –forward-reverse control – Interlocking method- Sequence control circuits-Operation of simple Jogging circuits & Inching circuits

Reference Books

1. INDUSTRIAL MOTOR CONTROL by Stephen L. Herman, Cengage Learning.
2. UNDERSTANDING MOTOR CONTROLS by Stephen L. Herman, Cengage Learning.
3. INDUSTRIAL ELECTRICITY AND MOTOR CONTROLS by Rex Miller.
4. ELECTRIC MOTOR CONTROLS by Rex Miller.
5. ELECTRICAL MOTOR CONTROL by Gary Rockis.

Suggested E-learning references

1. <http://electrical4u.com/>
2. www.nptel.ac.in
3. <https://youtube.com>
4. https://www.mouser.in/applications/industrial_motor_control_overview/
5. <https://www.c3controls.com/white-paper/industrial-control-basics-motor-starters/>
6. <https://costrainingcenter.com/wp-content/uploads/2022/12/Industrial-Motor-Controls.pdf>

Suggested Learning Outcomes

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

CO1 - Use the general principles for installing motors and its control equipment.

- 1.1 State the purpose of Motor control.
- 1.2 Discuss the factors to be considered while installing motors and its control equipment.
- 1.3 Summarize the functions of motor control system.
- 1.4 Explain the types of motor control systems.
- 1.5 Discuss the Surge protection of control system.
- 1.6 Compare manual and automatic motor control.
- 1.7 Make use of Control transformers in control circuit.
- 1.8 State the importance of the power rating of Control transformer.
- 1.9 Explain the Grounded & floating control systems.

CO2 - Select the type of Relays and Contactors for given industrial applications.

- 2.1 Compare Fuses and Overloads.
- 2.1 List different types of Overload relays.
- 2.2 Describe the construction of Solder melting type thermal overload relay.
- 2.3 Explain the working of Solder melting type thermal overload relay.
- 2.4 Describe the construction of Electronic type magnetic overload relay.
- 2.5 Summarize the working of Electronic type magnetic overload relay.
- 2.6 Describe the construction of Dashpot type magnetic overload relay.
- 2.7 Discuss the working of Dashpot type magnetic overload relay.
- 2.8 Develop the schematic diagram of supplying power to Single phase motor control with single overload relay.
- 2.9 Explain the working of clapper type Electromagnetic motor relay with the help of legible sketch.
- 2.10 Discuss the working of Solid-state relays.
- 2.11 Explain the working of Mercury relays with the help of legible sketch.
- 2.12 List the primary types of timing relays.
- 2.13 Draw the symbols for
 - a. On-delay timers and
 - b. Off-delay timers.
- 2.14 Explain the working of Capacitor Time limit relays.
- 2.15 List the advantages of Pneumatic timers.
- 2.16 Write the advantages of Clock timers.
- 2.17 Define contactor and load contacts.
- 2.18 Explain the working of Vacuum contactors.

CO3 - Select switches and sensors for various applications.

- 3.1 State the difference between Switch and Sensor.
- 3.1 Discuss the working of Diaphragm type pressure switch.
- 3.2 Explain the working of Bellow type pressure switch.
- 3.3 Demonstrate the working of Piezo-resistive pressure sensor.
- 3.4 Summarize the working of Mercury bulb float switch.
- 3.5 Explain the working of Bubbler system.
- 3.6 Describe the operation of flow switches.
- 3.7 Explain the operation of Liquid flow sensor.
- 3.8 Discuss the operation of Electromagnetic flow sensor.
- 3.9 Describe the operation of Limit switches.
- 3.10 List the types of Limit switches.
- 3.11 List the applications of Limit switches.
- 3.12 State Hall Effect.
- 3.13 Explain the principle of operation of Hall generator and state its applications.

CO4 - Select valves and detectors used for a given real time applications.

- 4.1 State the purpose of Valves.
- 4.1 Discuss the working of 2-way Solenoid valves.
- 4.2 Explain the operation of Motor operated Valves.
- 4.3 List different methods of Sensing temperature.
- 4.4 Define Smart temperature transmitter.
- 4.5 State the uses of Smart temperature transmitter.
- 4.6 Define Proximity detector.
- 4.7 State the applications of Proximity detector.
- 4.8 Summarize the working principle of Simple proximity detector.
- 4.9 Discuss the working principle of Tuned tank circuit.
- 4.10 Detail the working of Capacitive proximity detectors.
- 4.11 Demonstrate the principle of operation of Ultrasonic proximity detectors.
- 4.12 List types of Photo operated devices.
- 4.13 Write the applications of Photo detectors.

CO5 - Develop control circuits of motor that are used for simple applications.

- 5.1 Draw the symbols of the following switches
 - a) Normally open switch
 - b) Normally closed switch
 - c) Float switch
 - d) Pressure switch
 - e) Limit switch
 - f) Normally open push button
 - g) Normally closed push button
 - h) Push-pull button.
- 5.2 Draw the symbol for
 - a) Fuse
 - b) Overload
 - c) Control transformer
 - d) Buzzer
 - e) Thermostat
 - f) Emergency stop
 - g) Circuit breaker.

- 5.3 Draw the symbol of the following contacts
 - a) On-delay normally open contact
 - b) On-delay normally closed contact
 - c) Off-delay normally open contact
 - d) Off-delay normally closed contact.
- 5.4 Discuss the operation of 2-wire control circuit of motor used for a simple application with schematic and circuit diagrams.
- 5.5 Demonstrate the operation of 3-wire control circuit of motor used for a simple application with schematic and circuit diagrams.
- 5.6 Explain the operation of circuit for start stop push button station to control a motor with schematic and wiring diagrams.
- 5.7 Describe the operation of circuit for Alarm silencing circuit using schematic diagrams.
- 5.8 Summarize the operation of circuit for Timed starting for three motors with schematic diagrams.
- 5.9 Explain the operation of circuit for Float switch control of a pump and pilot lights with schematic diagrams.

CO6 - Apply various types of controls for different types of motors.

- 6.1 Discuss the operation of Hands-off automatic control switch that provides manual control or auto control of motor with schematic diagrams.
- 6.1 Make use of interlocking for Forward reverse control of a motor.
- 6.2 List different methods of Interlocking.
- 6.3 Demonstrate the circuit used for Forward and reverse control of 3phase motor with schematic diagrams.
- 6.4 State the purpose for starting motors in a predetermined sequence.
- 6.5 Discuss the operation of Sequence control of three motors using a schematic diagram.
- 6.6 Explain the operation of Automatic sequence control of three motors using a schematic diagram.
- 6.7 Discuss the operation of stopping three motors in a sequence using a schematic diagram.
- 6.8 Define the term Jogging.
- 6.9 State the purpose of Jogging.
- 6.10 Distinguish between Jogging and Inching.
- 6.11 Explain the operation of simple Jogging circuit with schematic figure.
- 6.12 Demonstrate the operation of simple Inching circuit with schematic figure.

Suggested Student Activities

1. Visit nearby industry and analyse the type of motor control equipment used in the industry.
2. Visit to nearby field/house and understand the Irrigation/Water pump's control equipment.
3. Visit to small industry or workshop and estimate the load and rating of the accessories required
4. Group discussion
5. Surprise test
6. Quiz

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3				1		1	PO1,5,7
CO2	3	2		1			1	PO1,2,4,7
CO3	3	2		1			1	PO1,2,4,7
CO4	3	2		1			1	PO1,2,4,7
CO5	3	3	3		2		1	PO1,2,3,5,7
CO6	3	3	3		2		1	PO1,2,3,5,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-505 A
INDUSTRIAL MOTOR CONTROLS
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. List different types of motor control systems.
2. Compare manual and automatic motor control in any two aspects.
3. List different types of Overload relays.
4. Write any two advantages of clock timers.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5 a) State the importance of the power rating of Control transformer.

OR

- b) Draw schematic diagram of start-stop push button control of a Three phase motor.

- 6 a) What is the use of Control transformers in control circuit?

OR

- b) Describe the working of Vacuum contactors.

PART - C

Marks: 2 x 5= 10

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

- 7 a) Explain the factors considered while installing motors and its control equipment.

OR

- b) Explain the Grounded & floating control systems with the help of neat circuit diagram.

- 8 a) Explain the construction and working of Mercury relays.

OR

- b) Explain the construction and working of clapper type Electromagnetic motor relay.

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SUB CODE: EE-505 A
INDUSTRIAL MOTOR CONTROLS
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 difference between Switch and Sensor
2. List the types of Limit switches
3. State the purpose of Valves.
4. List types of Photo operated devices.

PART - B

Marks: 2 x 3 = 6

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

- 5 a) Describe the operation of Limit switches.

OR

- b) Explain the operation of Electromagnetic flow sensors.

- 6 a) Define Proximity detector and state its applications.

OR

- b) Write the applications of Photo detectors.

PART - C

Marks: 2 x 5= 10

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

- 7 a) Explain the working of Piezo-resistive pressure sensor.

OR

- b) Explain the principle of operation of Hall generator with a neat diagram.

- 8 a) Explain the working of 2-way Solenoid valves.

OR

- b) Explain the principle of operation of Ultrasonic proximity detectors.

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
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SUB CODE: EE-505 A

**INDUSTRIAL MOTOR CONTROLS
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. Draw the symbols of Normally open and normally closed switches
- 2.State the Hall Effect.
- 3.Draw the symbol of Fuse and emergency stop.
- 4.Define Jogging of motor.
- 5.Draw the symbol of control transformer and buzzer.
- 6.Draw the symbol of pressure switch and limit switch.
- 7.What is the meaning of forward-reverse control of a motor.
- 8.List different methods of Interlocking.

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks.

Marks: 4 X 3 = 12

9a) Write the advantages of Pneumatic and Clock timers.

OR

9b) Draw the schematic diagram for start stop push button station to control a motor.

10a) List the difference between Jogging and Inching in any three aspects.

OR

10b) Draw the schematic diagram of Hands-off automatic control switch that provides manual control of motor.

11a) Draw the schematic diagram of 2-wire control circuit of motor used for a simple application.

OR

11b) Draw the schematic diagram of Alarm silencing circuit.

12a) Draw schematic diagram of simple Inching circuit.

OR

12b) Draw schematic diagram of Automatic sequence control of three motors.

PART - C

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

Marks: 4 X 5 = 20

13a) Explain the functions of motor control system.

OR

13b) Explain the operation of circuit for Timed starting for three motors with schematic diagrams.

14 a) Explain the working of Mercury bulb float switch

OR

14b) Explain the operation of stopping three motors in a sequence using a schematic diagram.

15a) Explain the operation of circuit for Float switch control of a pump and pilot lights with schematic diagrams.

OR

15b) Explain the operation of 3-wire control circuit of motor used for a simple application with schematic and circuit diagrams.

16a) Explain the operation of simple Jogging circuit with schematic figure

OR

16 b) Explain the operation of Hands-off automatic control switch that provides auto control of motor with schematic diagrams.

EE-505B- ELECTRIC VEHICLES

Course Title:	Electric Vehicles	Course Code	EE-505B
Semester	V Semester	Course Group	Elective
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of electrical machines, electric circuit, analysis, power electronic converters Battery technology, drive train, engines working principles of automobiles.

Course Outcomes

Upon 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 :	Analyze and troubleshoot basic faults in different EV components and charging system.
CO4 :	Design/size the drive train for EV, Battery and charging station
CO5 :	Understand the necessities of installing of a Charging Station and Electric Vehicle to Grid Integration
CO6	Analyze the impact of EV integration with renewable energy sources and the battery troubleshooting.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Introduction to Electric Vehicles	10	Q4	Q1		Q9(a)	Q13(a)
2	EV Components	15					
3	Drive Train in EV & HEV	10		Q2		Q10(a)	Q14(a)
4	Battery charging Technologies and EV charging infrastructure	15					
5	Electric Vehicle Grid Integration	10		Q3	Q5, Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	EVs and renewable energy (RE) integration, Troubleshooting	15			Q7, Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8		8	8	

Course Contents

UNIT-1 : Introduction to Electric Vehicles

Periods 10 (L: 08 – T: 02)

Introduction to Electric Vehicle(EV) – Hybrid Electric vehicle(HEV) – Plug-in Hybrid Electric vehicle (PHEV) - Types of Electric vehicles based on drive train configuration – 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 - Differences between series hybrid and parallel HEV - Benefits of EV including environmental impacts – Single speed transmission - single and multi motor drives in electric vehicles- Concept of ‘In Wheel Drives’ in EV.

UNIT-2 :EV Components

Periods 15 (L: 12 – T: 03)

Various components of EV and their purpose - Introduce Electric motor as Propulsion unit - types of Electric motors AC/DC - advantages of DC motors over AC - construction and working of Induction motor - Permanent magnet motor - Switched reluctance motor - 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 - Definition of different battery parameters - effect of Temperature on battery performance - C-Rate parameter - main types of batteries used in EVs - Hybridization of different energy storage devices - types of fuel cells - Difference between Cell monitoring Controller and battery monitoring Controller - protective measures for EV batteries

UNIT-3 : Drive train in EV and HEV

Periods 10 (L: 08 – T: 02)

Definition and purpose of charging station - Understand AC and DC Charging -Difference between level 1, level 2 and level 3 Chargers - domestic and Public charging equipment - EV acceptance rate - on board and off board charging - power factor correction in an On-Board Charger (OBC) - types of Level 3 Chargers - bidirectional charging - Type-1, type-2 and type-3 connector - CHAdeMO connector - Combined charging system(CCS) Combo-1 and combo-2 connectors - charging time and charging cost - peak shaving - difference between charging station (EVCS) and charging point (EVSE) - Open Charge Point Protocol (OCPP) - Electric Vehicle Supply Equipment (EVSE) - battery swapping - Wireless charging- Indian Standards for AC and DC Charging

UNIT-4 : Battery charging Technologies and EV Charging Infrastructure

Periods 15 (L: 12 – T: 03)

general configuration of an electric vehicle - Difference between power train, drive train, and drive line - understand control philosophy of an EV - EV transmission - differentials used in EVs - difference between 4WD and AWD - components in a motor controller - Field Oriented Control (FOC) - components in an electric drive unit (EDU) - Differentiate between a mild hybrid and full hybrid - operating modes of power flow control in a Series HEV. Parallel HEV , ICE dominated power flow control modes in a Series Parallel HEV - mechanical coupling in Parallel HEV - Types of mechanical coupling – Dual transmission- Applications of different sensors , valves and actuators - cables used for various purposes inside and outside of an EV - pyrotechnic safety switch

UNIT-5: Electric vehicle grid integration

Periods 10 (L: 08 – T: 02)

Load calculation of a charging station - effect of charging stations on the local grid - requirements for locating a charging station - International Electro technical Commission(IEC) - single and multiple charging station output - various modes of charging communication - wall and floor charging installation - charging station with and without cable - fast charging station and its advantages and limitations - Residual current devices and Over current protective devices - impact of EV charging on maximum power demand - different types of power management for EV charging station - smart charging and various options V2Xtech (V1G,V2G, V2V,V2H, V2B) - elements of an EV charging station.

UNIT-6 EVs and renewable energy (RE) integration, Troubleshooting

Periods 15(L:12 -T: 03)

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://www.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](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_VChTcMGK8
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

Upon completion of the course the student shall be able to

C01 - Analyze the architecture of electric vehicle

- 1.1 Introduce Electric vehicles and latest technology.
- 1.2 Know BEV, HEV, and FCEV
- 1.3 List the three main types of HEVs
- 1.4 Calculate the MPGe of an EV.
- 1.5 Name 3 EV regulatory agencies.
- 1.6 List the advantages of BEV, HEV and PHEV
- 1.7 List disadvantages and limitations.
- 1.8 Know the effect of EV on the environment.
- 1.9 Compare BEV and ICE
- 1.10 Compare BEV and HEV.
- 1.11 Differentiate between series hybrid and parallel hybrid.
- 1.12 Classify an EV based on Drive train Configuration.
- 1.13 Contrast the Alternatives in EV Based on Power Source Configuration.
- 1.14 Explain the concepts of Single and Multi-motor Drives in EV.
- 1.15 Summarize the concept of 'In Wheel Drives' in EV.

2. C02 - Explain the working concept of different components of EV and charging station

- 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
 - 2.10.6 State of health
 - 2.10.7 Calendar life
 - 2.10.8 Charge cycle
 - 2.10.9 Cycle life
 - 2.10.10 Battery capacity
 - 2.10.11 Internal resistance
- 2.11 Know the effect of Temperature on battery performance
- 2.12 Understand the C-Rate parameter
- 2.13 List three main types of batteries used in EVs
- 2.14 Name three types of cathode materials in a lithium-ion battery
- 2.15 Know the advantages/Merits of Lithium battery as a energy source for EV.
- 2.16 Know the need and concept of Hybridization of various energy sources
- 2.17 List five types of fuel cells.
- 2.18 Describe the main components in a battery management system.
- 2.19 Differentiate between Cell monitoring Controller and battery monitoring Controller
- 2.20 Name five protective measures for EV batteries

3. CO3 - Analyze and troubleshoot basic faults in different EV components and charging system.

- 3.1 Definition and purpose of charging station
- 3.2 Understand AC and DC Charging
- 3.3 Differentiate between level 1, level 2 and level 3 Chargers.
- 3.4 Summarize the domestic and Public charging equipment
- 3.5 Define the term EV acceptance rate.
- 3.6 Know on board and off board charging.
- 3.7 Explain the purpose of power factor correction in an On-Board Charger (OBC)
- 3.8 Understand Indian Standards for AC and DC Charging (ex. IS17017).
- 3.9 Describe the principle of bidirectional charging.
- 3.10 List the five basic types of EV connectors.

- 3.11 Types of connectors to plug the charging cable to the vehicle inlet like Type-1, type-2 and type-3 connector.
- 3.12 Understand CHAdeMO connector , Combined charging system(CCS) Combo-1 and combo-2 connectors
- 3.13 Calculate charging time and charging cost.
- 3.14 Define the term peak shaving.
- 3.15 Know the difference between charging station (EVCS) and charging point (EVSE)
- 3.16 Explain the purpose of Open Charge Point Protocol (OCPP)
- 3.17 Identify the various parts and working of Electric Vehicle Supply Equipment (EVSE)
- 3.18 Understand Manual and automated battery swapping.
- 3.19 List merits and demerits of battery swapping.
- 3.20 Understand the Wireless charging.

4. CO4 - Design/size the drive train for EV, Battery and charging station.

- 4.1 Explain the general configuration of an electric vehicle.
- 4.2 Differentiate between powertrain, drivetrain, and driveline.
- 4.3 Describe the control philosophy of an EV.
- 4.4 Differentiate between Electronic Control Unit and Vehicle Control Unit.
- 4.5 Describe the operation of an EV transmission.
- 4.6 List the three types of differentials used in EVs.
- 4.7 Explain the difference between 4WD and AWD.
- 4.8 Name the main components in a motor controller.
- 4.9 Describe the purpose of Field Oriented Control in EV applications.
- 4.10 Explain how field weakening is used for regenerative braking.
- 4.11 Name the three main components in an electric drive unit (EDU).
- 4.12 Describe how unsprung weight affects in-wheel motors.
- 4.13 Differentiate between a mild hybrid and full hybrid.
- 4.14 Infer four operating modes of power flow control in a Series HEV.
- 4.15 Explain the operating modes of power flow control in a Parallel HEV.
- 4.16 Interpret the ICE dominated power flow control modes in a Series Parallel HEV.
- 4.17 Explain the basic concepts of mechanical coupling in Parallel HEV.
- 4.18 Outline concept of torque coupling in Parallel HEV.
- 4.19 Summarize the concept of speed coupling in Parallel HEV.
- 4.20 Summarize the concept of Dual transmission in Parallel HEV.

- 4.21 Name the applications for the following in EVs
 - 4.21.1 Pressure sensors.
 - 4.21.2 Ultrasonic sensors
 - 4.21.3 Actuators
 - 4.21.4 Solenoid valves
 - 4.21.5 Temperature sensors
- 4.22 Describe the cables used for various purposes inside and outside of an EV.
- 4.23 Explain the operation of a pyrotechnic safety switch.

5. C05 - Understand the necessities of installing of a Charging Station and Electric Vehicle to Grid Integration

- 5.1 Know AC and DC Charging station and their specifications.
- 5.2 Know the load calculation of a charging station.
- 5.3 Analyze the effect of charging stations 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 V2Xtech (V1G,V2G, V2V,V2H, V2B)
- 5.15 Identify various elements of an EV charging station.

6. C06 - Analyze the impact of EV integration with renewable energy sources and the battery 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 Overcharge 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

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-505B

ELECTRIC VEHICLES

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. What is Electric Vehicle?
2. Write any two advantages of EV.
3. Define an on-board charger.
4. List three main types of batteries used in EV.

PART – B

Marks: 2Q X 3= 06

Instructions: (1) Answer all questions. (2) Each question carries Three marks.

5(a) Explain the concept of In-wheel drives in EV

----OR----

5(b) Write the advantages of PHEV over HEV.

6(a) Which motor is commonly found in EV and why do manufacturers prefer them.

----OR----

6(b) Explain C-rate parameter of a battery.

PART – C

Marks: 2Q X 5= 10

Instructions: (1) Answer all questions. (2) Each question carries Five marks.

7(a) Explain the concepts of Single and Multi-motor Drives in EV.

----OR----

7(b) Explain different Drive train Configurations in EV.

8(a) Explain the following battery charging parameters

- I. Depth of discharge
- II. Battery state of charge
- III. Self discharge rate
- IV. Charge equalization
- V. Daily depth of discharge

----OR----

8(b) Explain the need and concept of hybridization of various energy sources.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-505B
ELECTRIC VEHICLES
MID SEM -II 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. Classify EV based on motor drives
2. Define the term EV acceptance rate.
3. What is FOC in Electric Vehicle?
4. Write any two applications of temperature sensor.

PART – B

Marks: 2Q X 3= 06

Instructions: (1) Answer all questions
(2) Each question carries **Three** marks.

5(a) Write about Onboard and Off Board charging
-----OR-----

5(b) Write the merits of battery swapping.

6(a) Explain the operating modes of power flow control in a Parallel HEV.
-----OR-----

6(b) List the Three different types of differentials used in EVs.

PART – C

Marks: 2Q X 5= 10

Instructions: (1) Answer all questions
(2) Each question carries **Five** marks.

7(a) Explain the working of Electric Vehicle Supply Equipment(EVSE).
-----OR-----

7(b) Explain various methods of AC charging for EV,

8(a) Differentiate between torque coupling and speed coupling in parallel HEV in any five aspects

-----OR-----

8(b) Describe the operation of an EV Transmission.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-505B
ELECTRIC VEHICLES
SEMESTER END EXAM MODEL PAPER
TIME: 2 HOURS TOTAL MARKS: 40

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: 8Q X 1= 08

Instructions: (1) Answer all questions
(2) Each question carries One mark.

1. What is differential in EV?
2. What is Power factor correction in EV..
3. Define the term smart charging.
4. Draw the symbol of CCS Combo-2 connector
5. List two IEC standards for establishing EV charging station.
6. Write any three different modes of charging communication
7. Write any two advantages of integrating Electric vehicle with solar energy
8. What are the primary types of software problems that occur in electric vehicle

PART – B

Marks: 4Q X 3= 12

Instructions: (1) Answer Any **Four** questions
(2) Each question carries **Three** marks.

- 9(a) What are the advantages of switched reluctance motor over other types of electric motors in EV

----OR----

- 9(b) Write about wall and floor charging installation.

- 10(a) Write the differences between charging station and charging point.

----OR----

- 10(b) Explain the importance of integrating EV with renewable energy for grid stability

- 11(a) List different types of power management methods in EV

----OR----

- 11(b) Describe the key requirements for locating a EV charging station effectively

- 12(a) Describe the challenges associated with integrating Electric vehicles with renewable energy sources

----OR----

- 12(b) How an over charging and overheating impact the performance and safety of EV

PART –C

Marks: 4Q X 5= 20

Instructions: (1) Answer Any **Four** questions

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

13(a) List and explain various components of EV.

----OR----

13(b) Explain the charging station with and without cable.

14(a) Write the difference between mild hybrid and full hybrid.

----OR----

14(b) Explain the OBD (On-board diagnostics) scanning tools and Remote diagnostics

15(a) Differentiate between AC and DC charging station

----OR----

15(b) “Accurate load calculations contribute to the efficient operation and management of charging infrastructure”, justify the statement and discuss various factors involved in load calculations

16(a) Explain how integrating EV with renewable resources increases grid stability

----OR----

16(b) Explain environmental impacts of dead battery disposal and importance of recycling the dead batteries of EV.

EE-506A -SWITCHGEAR AND PROTECTION

Course Title:	Switchgear and Protection	Course Code	EE-506A
Semester	V Semester	Course Group	Elective
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	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

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

CO1:	Select Switchgear and Fuses for various applications
CO2:	Make use of Circuit breakers for Protection of power systems
CO3:	Use Relays as Protective equipment
CO4:	Illustrate the Schemes of Protection for Alternators and Transformers
CO5:	Apply various Protection Schemes for Transmission Lines and Feeders
CO6:	Elaborate 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						
Total		75	8		8	8		

Course Contents

UNIT I: 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-Application of fuses

UNIT II: Circuit Breakers& Reactors

Duration: 15 Periods (L: 12–T: 3)

Circuitbreakers-phenomenonofarc–PrinciplesofArcExtinction– MethodsofArcExtinction-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 .-Reactors –their necessity – Scheme of Reactor connections– Percentage Reactance and Base KVA-Equation for short-circuit KVA.

UNIT III: Protective Relaying

Duration: 12Periods (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 IV: 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 V: Protection of Transmission Lines and Feeders Duration:12Periods (L:9 – T: 3)

Bus bar protection-Necessity-causes of faults-Transmission line and feeder protection-Pilot wires – Differential pilot wire protection, - 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 VI: Lighting Arresters and Neutral Grounding Duration:13Periods (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.

Reference Books

1. Principle of Power systems -V.K. Mehta
2. Electrical power systems -S.L.Uppal
3. Textbook of Electrical power systems-SONY, Gupta Bhatnagar
4. Electrical power systems- JB Gupta
5. Electrical power Systems-CLWadhwa
6. Switchgear and Protection by Sunil S. Rao
7. Power System Protection And Switch gear by Buvanesh A Oza, Nirmalkumar C Nair, Rases P Mehtaand Vijay H Makwana, McGraw HILL Education (India Pvt.Ltd) New Delhi
8. J.B.Gupta “Switchgear & Protection”, (edition), Katson Publisher, 2008
9. Madhava Rao 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

CO1: Select Switchgear and Fuses for various applications

- 1.1 Classify the types of faults in power system and their effects.
- 1.2 Explain symmetrical and Unsymmetrical faults
- 1.3 Identify 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 fuse as protective device.
- 1.8 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
- 1.9 Draw and explain cut-off characteristics of fuse
- 1.10 Draw and explain Time-current characteristics of a fuse
- 1.11 List types of fuses
- 1.12 Illustrate the working principle of HRC cartridge fuse
- 1.13 Explain the working principle of Liquid power fuse.
- 1.14 Applications of fuses.

CO2: Make use of Circuit breakers for Protection of power systems

- 2.1 State the phenomenon of Arc.
- 2.2 State factors responsible for arc formation and principle of Arc Extinction
- 2.3 Explain the methods of Arc Extinction.
- 2.4 Define the following terms (i) Arc Voltage ii) Restriking Voltage iii) Recovery Voltage
- 2.5 Classify the circuit breakers based upon medium of arc quenching.
- 2.6 Explain 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 Air blast circuit breakers.
- 2.9 List the properties of SF₆ gas
- 2.10 Draw and explain the working principle 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 Draw and Explain the different types of reactor connections.
- 2.16 State the expressions of percentage reactance and Base KVA
- 2.17 State the importance of short circuit KVA .
- 2.18 Solve simple problems on short circuit KVA

CO3: Use Relays as Protective equipment

- 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 (i) Operating principles and (ii) Time of operation
- 3.5 Discuss the working of solenoid plunger type relay
- 3.6 Discuss the working of attracted armature relays.
- 3.7 Explain the construction and working of induction type over current relay.
- 3.8 Explain the principle of obtaining directional property in induction relays.
- 3.9 Discuss the working of directional over current induction relay.
- 3.10 State the important terms used in relays i) pick-up current ii) Current setting iii) Plug setting multiplier-PSM iv) Time setting multiplier-TSM
- 3.11 Explain the block diagram the working of numerical over current relay
- 3.12 Explain the principle of working of impedance relay.
- 3.13 List the applications of impedance relay.
- 3.14 Explain the current differential protection.
- 3.15 Discuss about voltage differential protection

CO4: Illustrate the Schemes of Protection for Alternators and Transformers

- 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.
- 4.5 Explain the earth fault protection for rotor and stator.
- 4.6 Discuss the split phase protection of alternator against interturn 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.

CO5: Apply various Protection Schemes for Transmission Lines and Feeders

- 5.1 State the necessity of bus bar protection
- 5.2 State the causes of bus bar faults
- 5.3 Explain the Differential Protection for Busbars
- 5.4 Explain the different schematic arrangements for single and duplicate bus bars.
- 5.5 State the necessity of transmission line and feeder protection.
- 5.6 Define pilot wire protection.
- 5.7 Explain the Differential Pilot wire protection for Merz-price voltage balanced 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

CO6: Elaborate the importance of Lightning Arresters and necessity of Neutral Earthing

- 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 Explain the following methods of neutral grounding
(i) Solid grounding ii) Resistance grounding iii) Reactance grounding

Suggested Student Activities

1. Student visits Library to refer to Switchgear and Protection subject related books
2. Visit near by substation and prepare a report
3. Quiz
4. Group discussion
5. Surprise test
6. Register for MOOCs courses

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	PO1	PO2	PO3	PO4	PO5	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

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUBCODE: 506A
SWITCH GEAR AND PROTECTION
MID SEM-I MODEL PAPER

TIME:60MIN

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 X1= 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 x3 = 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 x5= 10

Instructions:(1) Answer all questions
(2) Each question carries five marks.

- 7(a) Explain the purpose of Isolators, Airbreak 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-506A SWITCH
GEAR AND PROTECTION**

MID SEM-II MODEL PAPER

TIME: 60 MIN

TOTAL MARKS: 20

PART- A

Marks: 4Q X1= 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 x3 = 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 x5= 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) Elaborate the working principle of Buchholz relay with neat sketch.
- 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-506A SWITCH GEAR AND PROTECTION
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART- A

Marks: 8Q X1=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) Elaborate 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) Draw and explain 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) Enumerate the working principle of expulsion type lightning arrester with diagram.

EE-506B- ADVANCED PROTECTION OF POWER SYSTEMS

Course Title:	Advanced Protection of Power Systems	Course Code	EE-506B
Semester	V Semester	Course Group	Elective
Teaching Scheme in Periods (L:T:P)	60:15:0	Credits	2.5
Methodology	Lecture + Tutorials	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 :	Enumerate the operation and application of various circuit breakers
CO3 :	Classify protective relays
CO4 :	Analyse the protection schemes of alternator and transformers
CO5 :	Explain the protection schemes for transmission lines and feeders
CO6 :	Construct and explain 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	Q5, Q6	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 I - 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 II - 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 III - 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 IV - 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 V - 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 - Lightning phenomena - over voltage due to lightning - Types of lightning arresters and surge absorbers- Construction and principle of operation

UNIT VI - 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

Reference 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

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

C01 - Recall the fundamentals of protection

- 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

C02 - Enumerate the operation and application of various circuit breakers

- 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

C03 - Classify protective relays

- 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

C04 - Analyse the protection schemes of alternator and transformers

- 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.

C05 - Explain the protection schemes for transmission lines and feeders

- 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.

C06 - Construct and explain operation of basic elements needed for digital protection

- 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 Draw and Explain 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 Discuss analogue filtering
- 6.9 Write about 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	2	1	1		1		1	PO1,2,3,5,7
CO2	1	2	3	-	1	1	-	PO1,2,3,5,6
CO3	1	1	1	2	2	-	-	PO1,2,3,4,5
CO4	2	1	3	1	1	-	1	PO1,2,3,4,5,7
CO5	2	1	2		1	1		PO1,2,3,5,6
CO6	1	-		1	1	1	-	PO1,4,5,6

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-506B

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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SUB CODE: EE-506B

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.

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SUB CODE: EE-506B

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 arrester.

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-507-POWER ELECTRONICS AND POWER SYSTEMS LAB

Course Title:	Power Electronics and Power Systems Lab	Course Code	EE-507
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Power electronics and Power Systems

Course Outcomes

CO1	Analyze various switches in Thyristor family by drawing their characteristics.
CO2	Build Power electronic converters.
CO3	Make use of power electronic converters to control speed of various motors.
CO4	Protect the Power system Equipment

Suggested Learning Outcomes

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

C01 - Analyze various switches in Thyristor family by drawing their characteristics.

- 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.

C02 - Build Power electronic converters.

- 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.
- 2.3 Invert DC supply to AC supply using Series Inverter.

C03 - Make use of power electronic converters to control speed of various motors.

- 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.
- 3.3 Control the speed of 1 Φ induction motor using AC Voltage controller.

C04 - Protect the Power System Equipment

- 4.1 To study the performance of current and potential Transformers.
- 4.2 To study the Operation of a Non- Directional electromechanical type over current (I D M T relay) and plot the inverse time current characteristics.
- 4.3 To study the differential protection scheme for a single phase transformer.

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	1	PO 1,4,6,7
CO2	3	2	2	3		2	1	PO 1,2,3,4,6,7
CO3	3	2	2	3		3	1	PO 1,2,3,4,6,7
CO4	3	3	2	3	3	3	1	PO 1,2,3,4,5,6,7

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DEEE V SEMESTER
MID SEM I MODEL QUESTION PAPER

Course Code: EE-507

Duration: 1 Hour

Course Name: Power Electronics and Power Systems 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 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

Duration: 1 Hour

Course Name: Power Electronics and Power Systems 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 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. Invert DC supply to AC supply using Series Inverter.
4. Control the speed of DC shunt motor using single phase fully controlled full wave converter.
5. Control the speed of DC shunt motor using Chopper.
6. Control the speed of 1Φ induction motor using AC Voltage controller.

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING,
TELANGANA MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION**

Course Code: EE-507

Duration: 1 Hour

Course Name: Power Electronics and Power Systems 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. 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. Invert DC supply to AC supply using Series Inverter.
8. Control the speed of DC shunt motor using single phase fully controlled full wave converter.
9. Control the speed of DC shunt motor using Chopper.
10. Control the speed of 1 Φ induction motor using AC Voltage controller.
11. To study the performance of current and potential Transformers.
12. To study the Operation of a Non- Directional electromechanical type over current (IDMT relay) and plot the inverse time current characteristics.
13. To study the differential protection scheme for a single phase transformer.

EE-508- AC MOTORS LAB

Course Title:	AC Motors Lab	Course Code	EE-508
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
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

CO1	Identify the parts of A.C motor starters
CO2	Draw and interpret the performance characteristics of three phase AC Motors by Conducting load test.
CO3	Draw and interpret the performance characteristics of single phase AC Motors by Conducting load test.
CO4	Identify and rectify faults in AC motors

Suggested Learning Outcomes

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

C01 - 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.

C02 - Draw and interpret the performance characteristics of 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 Conduct load test on synchronous motor and draw V and inverted V curves

C03 - Draw and interpret the performance characteristics of single phase AC Motors by Conducting load test.

- 3.1. Perform load test on single phase split phase induction motor.
- 3.2. Perform load test on single phase universal motor

C04 - 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.

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	2	3	1,2,5,6,7
CO2	3	-	2	1	2	2	2	1,3,4,6,7
CO3	2	3	3	2	2	2	3	2,3,4,5,6,7
CO4	3	2	2	1	2	2	1	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-508

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.

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: 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. Conduct brake test on 3-phase squirrel cage induction motor.
2. Conduct brake test on 3-phase slip ring induction motor
3. Conduct load test on Synchronous motor and draw V and inverted V curves.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-508

Course Name: AC Motors 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. 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. Identify the part of a given AC Motors.
7. Identify and rectify faults in AC Motors.
8. Identify the parts of a DOL starter, test its parts locate faults if any. Suggest remedies.
9. Identify the parts of a manual star-delta starter, test its parts and locate faults if any suggest remedies.
10. Identify the parts of automatic star-delta starter, test its parts and locate faults if any suggest remedies.
11. Identify the parts of autotransformer starters, test its parts locate faults if any. Suggest remedies.

EE-509-PROGRAMMABLE LOGIC CONTROLLERS AND MAT LAB

Course Title:	Programmable logic Controllers and MAT LAB	Course Code	EE-509
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	15:0:30	Credits	1.25
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Digital Electronics and C language commands.

Course Outcomes

CO1	Perform Logical Operations on the PLC.
CO2	Develop the ladder logic program for timer & counter functions, download it to the PLC and run the program
CO3	Execute the ladder programs for PLC based model applications
CO4	Develop and Execute Mathematical expressions and draw Sinusoidal wave in MATLAB environment

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to
C01 – Perform Logical Operations on the 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
- 1.7 Develop a ladder logic program for AND,OR and NOT gates, download the program and run it
- 1.8 Develop a ladder logic program for NAND,NOR, EX-OR and EX-NOR gates PLC, download the program and run it

C02 - Develop the ladder logic program for timer & counter functions, download it to the PLC and run the program

- 2.1 Execute the ladder logic program for T-ON(ON-Delay Timer)
- 2.2 Execute the ladder logic program for T-OFF(OFF-Delay Timer)
- 2.3 Execute the ladder logic program for RTON(Retentive on)
- 2.4 Execute the ladder logic program for CTU(count-Up counter)
- 2.5 Execute the ladder logic program for CTD(count-down Counter)

C03 - Execute the ladder programs for PLC based model applications

- 3.1 Execute the ladder logic program for stair case lighting
- 3.2 Execute the ladder logic program for DOL starter
- 3.3 Execute the ladder logic program for star delta starter

C04 - Practice with MATLAB Environment

- 4.1 To acquaint with MATLAB windows: Command window, Editor Window, Figure window, Command history window, Current directory window, Workspace window
- 4.2 Execute a Program to perform below Arithmetic Operators on real numbers
 - a) Addition b) Subtraction c) Multiplication d) Division
- 4.3 Develop and execute a Program to Implement below Conditional Statements
 - a) if-end b) if-else-end c) if-else if-else if-else-end
- 4.4 Develop and execute a Program to Implement below loop control statements
 - for loop b) while loop
- 4.5 Develop and execute a program to compute roots of a quadratic equation $ax^2+bx+c=0$ Given a, b and c.
- 4.6 Develop and Execute a MAT LAB Program to access elements of Array
- 4.7 Develop and Execute MAT LAB a program to add two Arrays
- 4.8 Plot a sine wave with title and labels

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	1	1,2,5,6,7
CO2	3	-	2	3	2	2	1	1,3,4,6,7
CO3	-	1	3	2	2	2	1	2,3,4,5,6,7
CO4	-	3	3	3	2	2	1	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-509

Duration: 1 Hour

Course Name: Programmable Logic Controllers and MATLAB

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-509

Duration: 1 Hour

Course Name: Programmable Logic Controllers and MATLAB

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-509

Duration: 2 Hour

Course Name: Programmable Logic Controllers and MATAB

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

EE-510- PROJECT WORK

Course Title:	Project Work	Course Code	EE-510
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	0:0:45	Credits	1.25
Methodology	Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

SCHEME OF INSTRUCTIONS AND EXAMINATION

Scheme of Instruction and Examination					
S. No	Subject	Duration	Items	Max Marks	Remarks
1	PROJECT WORK	6 Months	CIE		
			Mid sem-I Abstract submission	20	
			Mid sem-II Prototype project, content development, literature survey and submission of Draft copy	20	
			Internal Evaluation Final Report Internal viva and seminar	20	
			SEE		
			External exam Seminar	20	
			Viva Voice	20	
			Total :		

The Project work shall carry 100 marks and pass marks are 50% a candidate failing to secure the minimum marks should repeat the Project work.

The project selected should be useful to the society.

C24_ 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 Semester	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	0:0:0	Credits	20
Methodology	Training	Total Duration	6 months
CIE	900 Marks	SEE	100 Marks

This course requires the skills of handling electrical tools, accessories and performing wiring connections

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:

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:

1. The student should submit a report describing the profile of the company, Nature of the job assigned to him /her and other details in a standard format duly attested and approved by the head of the industry after two weeks and before Four weeks from the date of joining through e mail. Hard copy of the report may be submitted in person or by post.
2. A candidate shall be assessed twice in the spell of industrial training i.e. at the end of third month and finally before he/she completed the industrial training

3. The assessment shall be carried out by a committee comprising of a representative of the Industry where the candidate is undergoing training and a faculty member from the respective program from the Polytechnic.

For Institution level evaluation of industrial training, a committee consisting following faculty members (1) Head of Dept. concerned.(2) Faculty member who assessed the student in the industry (3) any other staff member of departmentconcerned may be formed.

Institution Level Evaluation Scheme			
Sl No	Criteria	Marks	Time
1	1 st Report Submission	50	within 4 Weeks
2	Seminar-I	50	9th to 10 th week
3	2 nd Report Submission	50	Within 12 weeks
4	Log book	100	--
5	Seminar-II	50	Before Viva-Voce
	Institute Evaluation Total	300	
Semester End Examination			
1	Viva-Voce	50	After 15 weeks
2	Demonstration of skills	50	
	Total	100	

Note: For obtaining Provisional certificate the student has to submit training completion certificate from the industry after six months of training.

Assessment parameters and Blue Print of Marks for Industry Evaluation

Sl No	Learning Parameter	Marks
1	Attendance and punctuality	40
2	Familiarity of tools and material	60
3	Engineering skills	100
4	Application of knowledge & Problem solving skills	100
5	Comprehension and observation	20
6	Professionalism/Professional ethics	40
7	Safety and environmental consciousness	20
8	Communication skills	40
9	Supervisory skills	100
10	General conduct during the period	80
Total marks for Industry Evaluation		600
Institute Evaluation		300
Semester End Examination/Viva-Voce		100
TOTAL		1000

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 ,variousComponents/ 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 andshutting 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