C24_CURRICULUM

DIPLOMA IN
MECHANICAL ENGINEERING

OFFEREDBY

STATE BOARD OF
TECHNICAL EDUCATION & TRAINING,
TELANGANA: HYDERABAD

I SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Credits	Examination Scheme						
			Instructionperiods 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	HU-101	Basic English	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	SC-102	Basic Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	
3	SC-103	Basic Physics	4	1	0	75	2.5	20	20	20	40	14	100	
4	SC-104	General Engineering Chemistry	4	1	0	75	2.5	20	20	20	40	14	100	
5	ME-105	Workshop Technology	4	1	0	75	2.5	20	20	20	40	14	100	
6	ME-106	Engineering Mechanics	4	1	0	75	2.5	20	20	20	40	14	100	
7	ME-107	Engineering Drawing-I	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	ME-108	Workshop Practice	1	0	2	45	1.25	20	20	20	40	20	100	
9	SC-109	Basic Science Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	CS-110	Computer Fundamentals Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

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			7, 8	10 (b)	14 (b)	
					12 (a)	16 (a)	
					12 (b)	16 (b)	
Total Questions		8			8	8	

Legend:

Remembering: **One mark**
Understanding: **Three marks**
Application: **Five marks**

Suggested Student Activities:

- Practice conversation / dialogue / speech and answer the questions.
- 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 starts _____(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 <u>generous</u> 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 and3A - 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) = 90^0 and (A + B + C) = 180^0 -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.($90^0 \pm \Theta$), ($180^0 \pm \Theta$),($270^0 \pm \Theta$), ($360^0 \pm \Theta$) 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±B), Cos (A±B), Tan (A±B) And Cot (A±B)).

3.10 Derive the identities i.e., sin (A+B). sin (A – B) = $\sin^2 A - \sin^2 B$, etc.,).

3.11 Calculate the values of $\text{Sin}15^0$, $\text{Cos}15^0$,$\text{Tan}\ 15^0$,$\text{Sin}75^0$, $\text{Cos}75^0$, $\text{Tan}75^0$ 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) = $90^0$and (A + B + C) = 180^0.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 02 × 05 = 10

2. Each question carries **FIVE** marks

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 $\frac{\cos 19° - \sin 19°}{\cos 19° + \sin 19°} = \tan 26^0$.

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 $\cos A + \cos(120° + A) + \cos(120° - A) = 0$.

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 $\cos 10° \cos 30° \cos 50° \cos 70° = \frac{3}{16}$.

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 $\cos(-510°)$.
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 $\cos(\cos^{-1}(30°))$.
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 $b = \sqrt{2}, c = \sqrt{3}, B = 45°$.

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 $a = 2, A = 30°$ and $C = 60°$.

PART C

Instructions: 1. Answer All questions $04 \times 05 = 20$

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 $\cos^{-1}\frac{x}{a} + \cos^{-1}\frac{y}{b} = \theta$, t hen 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, 1^{st} law of thermodynamics-explanation-list of applications, first law of thermodynamics to isothermal and adiabatic processes, 2^{nd} 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 ($\hat{\imath}, \hat{\jmath}, \hat{k}$) 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 ($W = \vec{F}.\vec{S}$) and power ($P = \vec{F}.\vec{v}$) 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 ($\vec{\tau} = \vec{r} X \vec{F}$) 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 =- μg and F = μR

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 $T = \frac{hrdg}{2\,Co\,s\theta}$)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) 11(a) 11(b)	13(b) 15(a) 15(b)	
6	VI			7,8	10(b) 12(a) 12(b)	14(b) 16(a) 16(b)	
Total Questions		8			8	8	

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

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 60^0 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 103Basic 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. 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 30^0 to the Earth's surface. Find maximum height reached by the ball. (Take g = 10 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.

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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 30^0C is 200 cc. What is the volume of the gas if temperature of the gas is raised to 100^0C 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 an 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): H_2, O_2, N_2
1.13 Explain the covalent bond formation in hetero atomic molecules(polar molecules): HF and H_2O
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 boron Trifluoride and Hydronium ion
1.17 Define metallic bond and explain with free electron theory/ electron sea model
1.18Define 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
1.20Find 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
4.7Define 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-GENERALENGINEERINGCHEMISTRY

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 n 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 $K_2Cr_2O_7$

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 0.53grams of Na_2CO_3.

BOARD DIPLOMA EXAMINATIONS (C24)

FIRST SEMESTER EXAMINATION
MIDSEM -II
SC-104-GENERALENGINEERINGCHEMISTRY

Time: 1Hour **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 sand 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-GENERALENGINEERINGCHEMISTRY

Time:2Hours **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 predictits 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. $Ca(HCO_3)_2$ =32.4 mg ii. $Mg(HCO_3)_2$=29.2mg iii.$CaSO_4$ =13.6mg iv.$MgCl_2$ =19 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 for1 hour.

ME-105 - WORKSHOP TECHNOLOGY

Course title:	Workshop Technology	Course code:	ME-105
Semester:	I	Course group:	Core
Teaching scheme in periods:	4:1:0	Credits:	2.5
Methodology:	Lecture+ Tutorial	Total Contact periods:	75
CE:	60 Marks	SEE:	40 Marks

Prerequisites

Enthusiasm to learn the course and requires the basic knowledge of Applied Science and Mathematics at Secondary school level.

CORSE OUTCOMES

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

COURSE OUTCOMES	
CO1	Identify the hand tools used in carpentry, fitting, sheet metal and forging works and know the purpose.
CO2	Acquaint with various operations of carpentry, fitting, sheet metal and forging operations.
CO3	Gain knowledge of measuring and checking tools used in fitting.
CO4	Attain the knowledge of mechanical working of metals and differentiate Hot working and cold working processes.
CO5	Acquaint with foundry tools, patterns and moulding sands
CO6	Explain various casting methods

BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Periods	Questions to beset for SEE				
			R			U	A
1	Carpentry and Forging tools	12	Q4	Q1		Q9(a)	Q13(a)
2	Fitting and Sheet metal tools	13					
3	Measuring and Checking Tools used in Fitting	12		Q2		Q10(a)	Q14(a)
4	Mechanical Working Of Metals	13					
5	Foundry	13		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Casting Methods	12			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	08			08	08

CO-PO Matrix:

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

COURSECONTENT

UNIT–I **CARPENTRY AND FORGINGTOOLS** **PERIODS:12**

Carpentry Tools:

Marking & Measuring Tools - Scales, Rules, Straight Edge, Try Square, Marking gauge, Mortise gauge, Cutting gauge; Striking Tools - Hammers - Claw hammer and Mallet.
Cutting Tools - Saws - Ripsaw, Cross cut saw (Hand saw), Tenon saw. Chisels - Firmer chisel, Beveled edge firmer chisel, Parting chisel, Mortise chisel, Inside and Outside gauges. Metal jack plane(only).

Forging Tools: Anvil, Swage block, Hand hammers - types; Sledge hammer - specifications and uses. Tongs – types and uses, Chisels - hot & cold chisels - uses. Swages - types, Fullers, Flatters, Set hammer, Punch and Drift - uses. Advantages and disadvantages of forging- forging operations

UNIT–II FITTING AND SHEET METAL TOOLS PERIODS:13

Fitting Tools:

Holding Devices:

Vices- Bench vice, Leg-vice, Hand vice, Pin vice, Tool makers vice, Pipe vice.

Cutting tools: Hand hacksaws, Files-Chisels-Scrapers-Drill Bits-Reamers-Taps & Dies – specifications and uses.

Marking Tools: Surface plate, V-block, Angle plate, Try square, Scriber, Punch, Prick punch, Centre punch, Number punch, and Letter punch.

Sheet Metal Tools:

Cutting and Striking Tools –Snips, Straight snip, Bent or curved snip, Double shears, Bench Shear, Riveting hammer, Setting hammer, Raising hammer, Mallet.
Stakes- Double seaming stake, Break horn stake, Bevel edged square stake, Funnel Stack, Half moon stack, Hatches stake, Needle stake, Blow Horn stake, Hollow mandrel stake.
Hems: Single hem, double hem, wired edge hem, Seam and types of seams.

UNIT –III CHECKING AND MEASURING INSTRUMENTS USED IN FITTING PERIODS:12

Checking instruments: Calipers: Outside &Inside calipers, Hermaphrodite (odd leg) caliper with firm joint, Spring calipers, Transfer caliper, Dividers - vernier calipers, vernier height gauge, vernier depth gauge, micrometer**.**

Measuring instruments: Combination set, bevel protractor, universal bevel protractor, sine bar, scribing block, universal scribing block, engineer's parallels, slip gauges, feeler gauge, plug gauge, ring gauge, taper gauge, snap gauges, thread gauges, screw pitch gauge, wire gauge, plate gauge, radius and fillet gauges, template gauge, telescopic gauge, - outside & inside, depth micrometer, screw thread micrometer.

UNIT IV MECHANICAL WORKING OF METALS PERIODS: 13

Introduction: Hot working and cold working,

Hot Working Processes: Rolling - types of rolling, two high mill, three high mills, four high mills, piercing or seamless tubing, reeling, drawing or cupping, spinning, Extrusion - direct or forward extrusion, indirect or backward extrusion, tube extrusion, Impact extrusion. Effects of hot working of metals, advantages & limitations of hot working of metals.

Cold Working Processes: Rolling, drawing- wiredrawing, tube drawing, Stretch forming, Cold extrusion, **Squeezing Operations**-Cold Heading, Cold reeling, Cold swaging, Stamping, Cold hobbing, Shot peening, Thread rolling, **Shearing Operations**- Blanking, Piercing, Notching, **Bending**-Roll bending, Angle bending, Cold spinning, Effects of cold working of metals, advantages & limitations of cold working.

UNIT V FOUNDRY PERIODS: 13

Introduction to foundry

Foundry Equipment: Hand moulding tools: shovel ,riddle, rammers, trowels, slick, lifter, strike off bar, sprue pin, bellow, swab, gate cutter, mallet, vent rod, draw spike, rapping plate or lifting plate, pouring weight, gagger, clamps, spirit level, moulding boxes and types of moulding Boxes.

Pattern – Making: Materials for pattern such as wood, cast iron, aluminium, brass, plastics, their uses and relative advantages, Sequence in pattern making, pattern allowances, classification of patterns such as solid (one piece), two piece and three pieces, split patterns, gate patterns, shell patterns, etc.

Types of MouldingSand : Green sand, dry sand, loam sand, facing sand, backing sand, parting sand, core sand, system sand, binders and sand additives.

Sand Properties: Properties of moulding sand - porosity, flow ability, collapsibility, adhesiveness, cohesiveness and refractoriness.

UNIT VI CASTINNG METHODS PERIODS: 13

Advantages and limitations of casting over other manufacturing processes.

Moldings: Moulding Procedure, Moulding Processes, Green sand, Dry sand moulding, Skin dry sand moulding, Loam moulding, Cement bonded moulding, Shell moulding, Ceramic moulding, Moulding a split pattern, Moulding with three parts flask.- elements of gating system – gates –runner -riser

Cores: Definition of core, Need of cores

Special casting methods: Die casting- hot chamber and cold Chamber die casting, Vacuum die casting, permanent mould (Gravity die) casting, centrifugal casting, CO_2 process, Investment casting.- casting defects causes and remedies

SUGGESTED LEARNING OUTCOMES:

Up on completion of the course the students shall be able to;

CO1: Identify the hand tools used in carpentry, fitting, sheet metal and forging works and know the purpose.

1.1. List various marking tools used in carpentry and find the purpose of each
1.2. List various measuring tools used in carpentry and find the purpose of each
1.3. Able to use of measuring tools in carpentry
1.4. State various cutting tools use in carpentry.
1.5. Explain the construction of Rip saw and illustrate tpi, saw setting
1.6. Explain the construction of Cross cut saw.
1.7. Explain the construction of Mortise chisel and firmer chisel and find the purpose of each.
1.8. Outline the usage of inside and outside gouges
1.9. Describe the construction and working of metal jack Plane.
1.10. Illustrate advantages and disadvantages of forging
1.11. Explain forgebility
1.12. List forging metals
1.13. Mention the forging temperatures of different metals
1.14. Describe black smith forge
1.15. State the purpose of tong
1.16. identify different types of tongs
1.17. List and explain forging operations
1.18. Describe construction and usage of anvil
1.19. Illustrate the various parts of anvil and identify the purpose of each
1.20. Classify and choose various hammers of forging and their specifications
1.21. Explain the purpose and usage of swage block, fullers, flatters and set hammers, chisels, and swages with simple sketches
1.22. Explain about, punches and drift

CO2: Acquaint with various operations of carpentry, fitting, sheet metal and forging operations.

2.1. Demonstrate the need of work holding deices
2.2. List various work holding devices used in fitting and outline its purpose
2.3. Illustrate construction and working of Bench vice.
2.4. What is an hack saw
2.5. Describe the construction of Hacksaw and show the parts
2.6. What is the need of a file
2.7. Explain types of files and its usage
2.8. Describe the construction of a standard file
2.9. List various chisels and know the purpose of each
2.10. List various scrapers and know the purpose.
2.11. What is a drill
2.12. Differentiate drills, reamers, taps and dies and their purposes
2.13. List various marking tools in fitting and know their purposes.
2.14. List various tools used in sheet metal work and know the purpose
2.15. Explain construction and working of cutting tools snips, shears used in sheet metal
2.16. Explain about various stakes used in sheet metal
2.17. What is the need of a sheet metal joint
2.18. List various sheet metal joints and their uses
2.19. How a sheet metal joint is made leak proof

CO3: Gain knowledge of measuring and checking tools used in fitting.

3.1. Explore the use of calipers and list various calipers
3.2. Explore the use of divider
3.3. Illustrate about slip gauges
3.4. Describe bevel protractor and universal bevel protractor
3.5. Explain combination set and sine bar
3.6. Differentiate simple scribing block and universal scribing block
3.7. Identify engineer's parallels
3.8. Classify various gauges and their uses
3.9. Able to operate various Vernier calipers
3.10. Able to operate various Micrometers
3.11. Describe the use of combination set
3.12. Describe the use of bevel protractor
3.13. Explore the use of universal bevel protractor
3.14. Describe the use of the following sine bar
3.15. Explore the use of scribing block
3.16. Describe the construction and use of universal scribing block
3.17. Able to use the engineer's parallels, slip gauges and feeler gauge
3.18. Explore the use of plug gauge, ring gauge, taper gauge and snap gauges
3.19. Explore the use of thread gauges and screw pitch gauge
3.20. Explore the use of wire gauge
3.21. Explore the use of plate gauge
3.22. Explore the use of radius and fillet gauges
3.23. Able to use template gauge
3.24. Able to use telescopic gauge
3.25. Explore the use of outside& inside, micrometer, depth micrometer and screw thread micrometer

CO4: Attain the knowledge of mechanical working of metals and differentiate Hot working and cold working processes.

4.1 Introduce various manufacturing methods
4.2 Illustrate the need and relevance of metal forming
4.3 Outline the advantages and disadvantages of metal forming
4.4 Define and explain Hot working process
4.5 Define and explain Cold working process
4.6 Differentiate hot working and cold working
4.7 Illustrate the rolling process and its need
4.8 Describe types of rolling
4.9 Explain how tubes are made by rolling and its advantages
4.10 Introduce extrusion and explain direct and indirect extrusion
4.11 Differentiate Piercing, reeling, drawing or cupping, spinning operations
4.12 Demonstrate direct extrusion, indirect extrusion, tube extrusion, impact extrusion
4.13 Explain Effect of hot working of metals, advantages and limitations of hot working.
4.14 List cold working processes
4.15 Explain about cold rolling; drawing–wire drawing, tube drawing, stretch forming
4.16 Describe cold extrusion ;squeezing operations-cold heading, cold reeling, cold swaging, stamping, cold hobbing, Shot peening, thread rolling
4.17 Explainshearingoperations-blanking,piercing,notching;bendingoperations- roll forming, angle bending and cold spinning
4.18 Write advantages and limitations of cold working processes

CO5: Acquaint with foundry tools, patterns and moulding sands.

5.1 Explain the importance of foundry
5.2 Being able to identify, select, and use the tools needed for mould preparation
5.3 List foundry tools and their purposes
5.4 Differentiate peen and butt rammer
5.5 Describe usage of foundry tools used in mould preparation
5.6 Define a pattern
5.7 Explain pattern making procedure
5.8 Describe pattern materials, their advantages and disadvantages
5.9 Explain types of patterns
5.10 Illustrate about pattern allowance need and types.
5.11 Compare solid, split and three peace pattern
5.12 Describe various moulding sand and its constituents
5.13 Define a binder and show its purpose
5.14 List and Explain desirable properties of a moulding sand

CO6: Explain various casting methods

6.1 Define a mould
6.2 List various moulds and explain their advantages and disadvantages
6.3 Introduce elements of gating system
6.4 Explain the purpose and construction of Gate, Runner and riser.
6.5 Define Core and need of cores
6.6 Explain preparation of mould
6.7 Explain moulding process with split pattern
6.8 Illustrate Green sand moulding, dry sand moulding and skin dry sand moulding
6.9 Differentiate loam moulding, cement bonded moulding, shell moulding, Ceramic moulding
6.10 What is a casting
6.11 Introduce Die casting system
6.12 Compare sand casting and die casting
6.13 Differentiate Die casting methods
6.14 Explain and differentiate hot chamber and cold chamber casting
6.15 Describe vaccum die casting
6.16 Explain centrifugal casting
6.17 Able to apply CO_2 Casting process and investing casting process
6.18 List various casting defects
6.19 Identify causes and remedies of casting defects

REFERENCE BOOKS

1. Production Technology by Jain &Gupta(KhannaPubliahers)
2. Elementary Workshop Technology(Vol.I& II)byHazra Chowdary
3. Manufacturing Technology(Vol.I)byP N Rao (McGrawHill)
4. Workshop Technology(Vol.I& II) by Raghuvamshi
5. Production Technology by P.C.Sharma

Suggested E-Learning references

1. http://www.asme.org
2. www.ocw.mit.edu/courses/mechanical-engineering
3. www.nptel.ac.in

SEMESTER END EXAMINATION (SEE) BLUEPRINT PATTERN

<table>
<tr><td rowspan="2">S No</td><td rowspan="2">Unit No.</td><td colspan="4">Questions to beset for SEE</td></tr>
<tr><td colspan="3">R</td><td>U</td><td>A</td></tr>
<tr><td>1</td><td>I</td><td rowspan="6">4</td><td colspan="2" rowspan="2">1</td><td rowspan="2">9(a)</td><td rowspan="2">13(a)</td></tr>
<tr><td>2</td><td>II</td></tr>
<tr><td>3</td><td>III</td><td colspan="2" rowspan="2">2</td><td rowspan="2">10(a)</td><td rowspan="2">14(a)</td></tr>
<tr><td>4</td><td>IV</td></tr>
<tr><td>5</td><td>V</td><td rowspan="2">3</td><td>5, 6</td><td>9(b)
11(a)
11(b)</td><td>13(b)
15(a)
15(b)</td></tr>
<tr><td>6</td><td>VI</td><td>7,8</td><td>10(b)
12(a)
12(b)</td><td>14(b)
16(a)
16(b)</td></tr>
<tr><td colspan="2">Total Questions</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

ME-105

BOARD DIPLOMA EXAMINATION,(C-24)
DME- I SEMESTER- EXAMINATION
MID SEM-I
WORKSHOP TECHNOLOGY

Time: 1Hour Total Marks:20

PART-A

04X01=04

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

1. State the use of try square
2. Define forging.
3. List any two vices used in fitting.
4. Why stakes are used in sheet metal work?

PART-B

02X03=06

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

5. (a)Write about Tenon Saw with a neat sketch?
(or)
6. (b)Differentiate hot chisel and cold chisel

6.(a)Draw a neat sketch of twist drill and label the parts
(or)
6.(b)Differentiate single hem and double hem.

PART-C

Instructions : 1. Answer any **TWO** questions. 02X05=10
2. Each question carries FIVE marks.

7.(a)List various chisels used in carpentry and explain firmer chisel with neat sketch (or)
7. (b)Draw a neat sketch of anvil and explain.

8.(a)Explain tapping process in fitting(or)
8. (b)List various stakes used in sheet metal, and explain about any one stake.

ME-105

BOARDDIPLOMAEXAMINATION, (C-24)
MID SEM-II
DME – II SEMESTER- EXAMINATION
WORKSHOP TECHNOLOGY

*Time:*1Hour TotalMarks:20

PART-A

04X01=04

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

1. What is the least count of vernier caliper?
2. Why gauges are used?
3. What is rolling?
4. Define hot working?

PART-B

02X03=06

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

5. (a)Draw a neat sketch of vernier depth gauge and lable the parts(or)
5. (b)Explain working of a sine bar

6. (a)Explain reeling operation with a neat sketch.
(or)
6.(b) Explain piercing operation with a neat sketch.

PART-C

10

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

7.(a)Draw and explain measuring dimensions with a vernier caliper.
(or)
7.(b)Draw and explain measuring dimensions with a universal bevel protractor.

8.(a)Explain hot extrusion with a neat sketch.
(or)
8. (b)How wire drawing is done in cold working?

ME-105

BOARDDIPLOMAEXAMINATION,(C-24)
MODEL PAPER-2024
DME-SEMESTER END EXAMINATION
WORKSHOP TECHNOLOGY

Time: 2Hours TotalMarks:40

PART-A

08X01=08

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

1. Name any two forging tools.
2. Define hot working.
3. List any two pattern materials
4. Define ‘drilling’.
5. Write any two allowances in foundry.
6. Why additives are used in moulding sand?
7. Define ‘moulding’.
8. Why cores are used in casting?

PART-B

04X03=12

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

9. (a)Draw a neat sketch of a file and label the parts.
(or)
9.(b)Explain shrinkage allowance

10.(a)Explain four high rolling with a near sketch
(or)
10.(b)Explain advantages and disadvantages of casting

11.(a)List and explain various materials used for pattern making.
(or)
11.(b) Explain any three properties of moulding sand.

12.(a)Explain procedure for preparing a mould.
(or)
12.(b) What are the advantages of dry sand moulding?

PART- C

Instructions : 1.Answer any **FOUR** questions.
2.Each question carries **FIVE** marks.
4X5=20

13.(a)Explain various thread cutting taps with sketches
(or)
13.(b) Explain pattern making procedure in foundry.

14.(a)Explain outside micrometer with a neat sketch
(or)
14.(b) Write about split pattern moulding procedure.

15.(a)What are the various moulding sands? Explain.
(or)
15.(b) Explain any five foundry tools with neat sketches.

16.(a)Explain hot chamber die casting with a neat sketch
(or)

16.(b) What is investing casting? Explain with neat sketch.

ME-106 - ENGINEERING MECHANICS

Course Title	Engineering Mechanics	Course Code	ME-106
SEMESTER	I	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:

This course requires the basic knowledge of High School Science and Mathematics

COURSE OUTCOMES:

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

CO1	Understand the concept of forces, analyse the force systems and find out the resultant of the force systems
CO2	Apply knowledge of friction and force resolution to solve related numerical problems.
CO3	Locate the centre of gravity of various sections and calculate the Moment of Inertia of standards sections.
CO4	Apply the various principles like, Work-Energy principle and Impulse – Momentum principle to solve the kinetic problems of particles
CO5	Compute velocity ratio, mechanical advantage and efficiency of simple machines.
CO6	Illustrate working principles and functioning of simple mechanisms

BLUE PRINT OF MARKS FOR SEMESTER END EXAM (SEE)

<table>
<tr><th colspan="2" rowspan="2">Units</th><th rowspan="2">No of periods</th><th colspan="4">Questions to be set for SEE</th><th rowspan="2">Remarks</th></tr>
<tr><th colspan="2">R</th><th>U</th><th>A</th></tr>
<tr><td rowspan="2">Part-A</td><td>1. Statics</td><td>13</td><td rowspan="6">Q4</td><td colspan="2">Q1</td><td>Q9(a)</td><td>Q13(a)</td><td></td></tr>
<tr><td>2. Friction</td><td>12</td><td></td></tr>
<tr><td rowspan="2">Part-B</td><td>3. Geometric Properties of Sections</td><td>12</td><td colspan="2">Q2</td><td>Q10(a)</td><td>Q14(a)</td><td></td></tr>
<tr><td>4. Dynamics</td><td>13</td><td></td></tr>
<tr><td rowspan="2">Part-C</td><td>5.SimpleMachines</td><td>13</td><td rowspan="2">Q3</td><td>Q5
Q6</td><td>Q9(b)
Q11(a)
Q11(b)</td><td>Q13(b)
Q15(a)
Q15(b)</td><td></td></tr>
<tr><td>6. Basic Link Mechanisms</td><td>12</td><td>Q7
Q8</td><td>Q10(b)
Q12(a)
Q12(b)</td><td>Q14(b)
Q16(a)
Q16(b)</td><td></td></tr>
<tr><td colspan="2">TOTAL</td><td>75</td><td colspan="3">08</td><td>08</td><td>08</td><td></td></tr>
</table>

COURSE CONTENT

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1. **Statics**

   Importance of engineering mechanics in engineering - Definition of force and its specifications-System of forces - Composition and Resolution of force - Equilibrium and Equilibrant, resultant -Statement of parallelogram law of forces, triangle law of forces, polygon law of forces and Lams' theorem- Numerical problems related tocon current coplanar forces. Moment of force and moment of a couple - Condition for equilibrium of a rigid body subjected to number of coplanar forces (problems omitted)-Varignon's Principle.

2. **Friction**

   Definition of static friction, dynamic friction - laws of solid and dynamic friction - angle of friction and angle of repose- Resolution of forces consideringfrictionwhenabodymovesonhorizontalplaneandinclinedplanewhenForceapplied (a) parallel to the plane(b) Parallel to the base (c) Inclined to the plane- Numerical examples on the above cases

3. **Geometric Properties of Sections:**

   Definition of Centre of Gravity, Centroid; Locating centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle); Centroid of composite figures composed of not more than three geometrical figures; Centre of Gravity of simple solids (Cube, Cuboid, cone, cylinder, sphere, hemisphere); Centre of Gravity of composite sections (T-Section, L-Section, I-Section Channel-Sections).

   Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, Parallel and Perpendicular axes theorems (without derivations): M.I. of rectangle, square, circle, semi-circle, quarter circle and triangle section (without derivations); M.I. of symmetrical I-section, Channel section and T-section about centroidal axes.

4. **Dynamics:**

   Definition of Kinematics and Kinetics - Classification of motion - Definition of displacement, velocity and acceleration – Equations of motion - Newton's Laws of motion (without derivation) - Solving the problems related to the rectilinear motion of a particle - Law of conservation of energy - Law of conservation of momentum - Work-Energy principle - Impulse–momentum equation- Solving the problems using the above principles - Definition of centripetal and centrifugal force and differences between them- Numerical problems.

5. **Simple Machines:**

   Definition of simple machine, and uses of simple machine, levers and inclined plane - Fundamental terms like mechanical advantage, velocity ratio and efficiency - Expressions (without derivation) for VR in case of three systems of pulleys, Weston Differential pulley block, Worm and Worm wheel, Rack and pinion, Winch crabs, & Screw jack -Numerical problems- Conditions for reversibility and self locking - Law of Simple Machine - Effort lost in friction, Load Equivalent of Friction Maximum Mechanical Advantage and Maximum Efficiency.

6. **Basic Link Mechanisms:**
   Define the terms kinematic link, kinematic pair, Kinematic Chain, Mechanism, Machine, Structure and inversion - classification of kinematic pairs on different criteria – nature of contact, relative motion and type of closure Inversions-Types of Kinematic Chains-Four Bar Chain- Beam Engine-Coupling Rod of Locomotive-Single Slider Crank Chain- Pendulum Pump-Crank and Slotted Lever Quick Return Motion Mechanism-Double Slider Crank Chain-Elliptical trammel-Scotch yoke mechanism-Oldham's coupling

REFERENCE BOOKS:

1. Singer.,Engineering Mechanics,B.S.Publications, New Delhi.
2. Kumar,K.L., Engineering Mechanics , TMH,New Delhi.
3. Timoshenko and Young, Engineering Mechanics ,TMH,New Delhi.
4. Bhavikatti,S.S.,MechanicsofSolids, New Age InternationalPublishers.
5. Rattan.S.S., TheoryofMachines, TMH,New Delhi.

ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/112103108
2. https://www.slideshare.net/
3. https://en.wikibooks.org/wiki/Engineering_Mechanics
4. http://ndl.ethernet.edu.et/bitstream/
5. https://archive.nptel.ac.in/courses/112/106/112106286/

SUGGESTED STUDENT ACTIVITIES:

1. Record various forces applied by human beings in their daily activities.
2. Identify the applications where parallelogram law of forces, Lami's theorem etc. are used and prepare a report.
3. Use toy blocks or building bricks to create inclined planes and test how different materials slide down them, discussing the role of friction in motion.
4. Create simple crank-and-slider mechanisms using cardboard and observe how they convert rotary motion into linear motion.
5. Cut out shapes from cardboard or paper and balance them on a pencil or pen to locate their Centroids, discussing the concept of balance points.
6. Compare the ease of spinning objects of different shapes and sizes (e.g., a coin, a ring, a disk) on a tabletop and discuss how their moments of inertia differ.

SUGGESTED LEARNING OUTCOMES

Upon completion of the course the student shall be able to

CO1: Understand the concept of forces, analyse the force systems and find out the resultant of the force systems

1.1. Explain the meaning of mechanics in engineering.
1.2. State the importance of mechanics in engineering.
1.3. Define the force, its units and types
1.4. Explain various types of force systems
1.5. Resolve a force into horizontal and vertical components
1.6. Describe the concept of resultant
1.7. State parallelogram law and do related numerical problems
1.8. State triangle law and polygon law
1.9 Explain the concept of free body diagram.
1.10. State Lami's theorem and do related numerical problems
1.11. Describe the concept of equilibrium of forces, equilibrant and conditions for it.
1.12. Explain Various Force systems with neat sketches
1.13. Solve numerical problems on finding out the resultant of a simple coplanar, concurrent force system.
1.14. Explain moment of force and couple.
1.15.State Varignon's theorem.

CO2: Apply knowledge of friction and force resolution to solve related numerical problems.

2.1. Explain the concept of friction
2.2. State the laws of friction
2.3. Differentiate between static friction and dynamic friction
2.4. Define i) Normal Reaction ii)Co-efficient of friction
2.5. Define i) angle of friction ii)angle of repose
2.6. Interpret the significance of the angle of friction and the angle of repose in various situations.
2.7. Identify them a chine members in which friction is desirable.
2.8. Resolve the forces acting on bodies moving on horizontal plane.
2.9. Solve the related numerical problems
2.10. Identify factors influencing frictional forces and equilibrium on inclined planes
2.11. Resolve the forces acting on bodies moving upon an inclined plane. Force Applied (a)parallel to the plane (b)Parallel to the base (c)Inclined to the plane.
2.12. Resolve the forces acting on bodies moving down on an inclined plane. Force applied (a)Parallel to the plane(b)Parallel to the base (c)Inclined to the plane
2.13. Solve the related numerical problems of the above cases.

CO3: Locate the centre of gravity of various sections and calculate the Moment of Inertia of standards sections.

3.1. Define Centre of gravity and Centroid
3.2. Identify the relationship between Centroid and Centre of Gravity.
3.3. Locate Centroid of geometrical plane figures such as square, rectangle, triangle, circle, semi-circle, quarter circle
3.4. Locate Centroid of simple composite figures
3.5. Find out the Centre of Gravity of simple solids such as cube, cuboid, cone, cylinder, sphere, hemisphere
3.6. Find out the Centre of Gravity of simple composite sectionsT-Section, L-Section,I-Section, and Channel sections.
3.7. Define Moment of Inertia (M.I.) of plane lamina
3.8. Define the term polar moment of inertia.
3.9. Describe the concept of Radius of gyration
3.10. State and understand Parallel and Perpendicular axes theorems (without derivations)
3.11. State the necessity of finding Moment of Inertia for various engineering applications.
3.12. Find out M.I. of laminas such as rectangle, square, circle, semi-circle, quarter circle and triangle section
3.13. Find out M.I. of symmetrical I-section, Channel section and T-section about Centroidal axes

CO4: Apply the various principles like, Work-Energy principle and Impulse –Momentum principle to solve the kinetic problems of particles

4.1. Define the terms Kinematics and Kinetics.
4.2. Classify the motion types.
4.3. Define the terms displacement, velocity and acceleration and write equations of motion.
4.4. State the Newton's Laws of motion
4.5. Solve the problems related to the rectilinear motion of a particle
4.6. Explain the rotary motion of particle
4.7. Define the law of conservation of energy
4.8. Explain the Work-Energy principle
4.9. Define the law of conservation of momentum
4.10. Explain the Impulse–momentum equation
4.11.Solve the problems using the above principles.
4.12.Define centripetal force and centrifugal force.
4.13.Differentiate centripetal force from centrifugal force.
4.14.Solve the problems using the above principles.

CO5: Compute velocity ratio, mechanical advantage and efficiency of simple machines.

5.1.Define the important terms of simple machines a) Machine, b) Mechanical c) Advantage, c) Velocity Ratio, d) Efficiency
5.2. Define the terms with respect to simple machines a) Ideal Machine b) Ideal Effort c) Ideal Load d) Reversibility of a machine
5.3. Differentiate between Practical Machine and an Ideal Machine
5.4. Illustrate the use of three classes of simple lever.
5.5. Explain how an inclined plane act as a simple machine to reduce the effort in Lifting loads.

5.6. Explain the working of i) Wheel & axle ii) Weston Differential pulley block iii) Pulleys iv) Worm & Worm wheel v) Winch crabs vi) Screw jack vi) Rack & pinion

5.7.Find out velocity ratio for i) Wheel &axle ii) Weston Differential pulley block iii) Pulleys iv) Worm & Worm wheel v) Winch crabs vi) Screw jack vi) Rack & pinion

5.8. Calculate the efficiency of a given machine.

5.9. Explain the law of machine.

5.10. State the conditions for self-locking .

5.11. State the conditions for reversibility.

5.12.Calculate effort lost in friction and load equivalent of friction.

5.13.Evaluate the conditions for i) maximum mechanical advantage iii) maximum efficiency of a machine.

CO6: Illustrate working principles and functioning of simple mechanisms

6.1.Define the terms i) kinematic link ii)kinematic pair iii)Kinematic chain iv) Mechanism v) Machine vi) Structure

6.2.Write the classification of kinematic Links of a Mechanism.

6.3. Differentiate between a Machine and a Mechanism.

6.4. Differentiate between Structure and Machine.

6.5.Write the classification of kinematic pairs on different criteria.

6.6. Identify examples of different classifications of kinematic pairs.

6.7. Define inversion in the context of mechanisms.

6.8. List out different inversions of the quadric cycle mechanism.

6.9.Explain with legible sketches the inversions of quadric cycle chain.

6.10. List out different inversions of the Slider Crank chain

6.11. Explain with legible sketches the inversions of Slider Crank chain.

6.12.List out different inversions of the Double Slider Crank chain.

6.13. Explain with legible sketches the inversions of Double Slider Crank chain.

COURSE OUTCOMES		CL	Linked POs	Teaching Periods
CO1	Understand the concept of forces, analyse the force systems and find out the resultant of the force systems	R, U, A	1, 2, 3, 7	13
CO2	Apply knowledge of friction and force resolution to solve related numerical problems.	R, U, A	1, 2, 3, 7	12
CO3	Locate the centre of gravity of various sections and calculate the Moment of Inertia of standards sections.	R,U, A	1, 2, 3	12
CO4	Apply the various principles like, Work-Energy principle and Impulse –Momentum principle to solve the kinetic problems of particles	R,U, A	1, 2, 3, 7	13
CO5	Compute velocity ratio, Mechanical Advantage and efficiency of simple machines.	R,U, A	1, 2, 3,5,7	13
CO6	Illustrate working principles and functioning of simple mechanisms	R, U, A	1, 2, 3, 5,7	12
			Total Periods	**75**

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

CO-PO ATTAINMENT MATRIX

COURSE OUTCOMES	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
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	3				1
CO2	3	2	3				1
CO3	3	2	3				
CO4	3	3	3				1
CO5	3	2	3		2		1
CO6	3	2	3		2		1

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Lowly Addressed**.**

MID SEM - I
MODEL PAPER
Engineering Mechanics (ME-106)

Time: 1 Hours **Max. Marks:** 20

PART-A 4 X 1 = 4

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

1. State triangle law of forces.
2. What is meant by resolution of a force?
3. State laws of dynamic friction.
4. Define Angle of Repose.

PART-B 2 X 3 = 6

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

5. (a) Explain the conditions of equilibrium of a coplanar system of forces.

OR

5. (b) Two forces of 50 N and 25 N act at a point. The angle between the lines of action of two forces is 60^0. Determine the magnitude and direction of the resultant.

6. (a).A block of mass 5 kg is placed on a horizontal surface with a coefficient of friction of 0.3. A force of 18 N is applied horizontally to the block. Calculate the frictional force acting on the block and determine if the block will move.

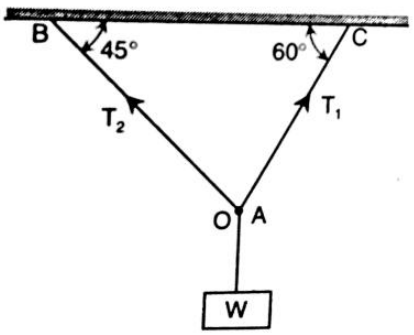
OR

6. (b) A box weighing 100 N is placed on an inclined plane with an angle of 30 degrees. If the coefficient of static friction between the box and the plane is 0.4, determine whether the box will start sliding down the plane.

PART-C 2 X 5 = 10

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

7. (a) A weight of 5kN is supported by two strings as shown in figure given below. Determine the tensions in the string.



OR

7. (b) i) State parallelogram law of forces and write the expression for magnitude and direction of resultant force. (3M)
ii) State Varignon's Principle. (2M)

8. (a) A body resting on a rough horizontal plane required a pull of 18 N inclined at 30^o to the plane just to move it. It was found that a push of 22 N inclined 30^o to the plane just moved the body. Determine the weight of the body and coefficient of friction.

OR

8. (b) A body of weight 1200 N is to be pulled up an inclined plane of angle 25°. The coefficient of friction between body and plane is 0•3. Draw the diagrams and find the effort required (a) when it is parallel to the plane and (b) when it is parallel to the base.

MID SEM - II
MODEL PAPER
Engineering Mechanics (ME-106)

Time: 1 Hours **Max. Marks:** 20

PART-A 4 X 1 = 4

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

1. Define the term centroid.
2. Write the moment of inertia about their centroidal axes for a quadrant if its radius is R.
3. Define(a) centripetal force(b)centrifugal force.
4. State work- energy principle.

PART-B 2 X 3 = 6

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

5. (a) State parallel axis theorem. Write its equation.

OR

5. (b) A right angle triangle of base 30 mm and height 50 mm is placed in such a way that its base is parallel to horizontal. Find the moment of inertia about (a) horizontal centroidal axis (b) base.
6. (a) A 1Kg ball is thrown vertically upwards with an initial velocity of 10 m/s. Calculate the maximum height reached by the ball..

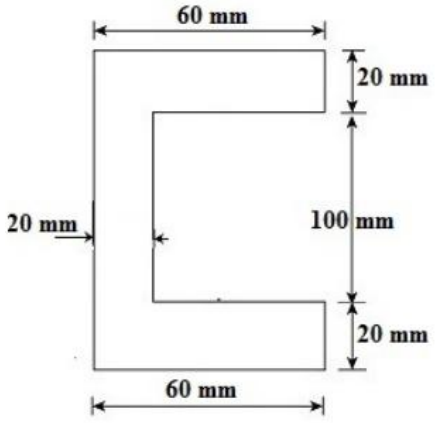
OR

6. (b) State and explain the principle of conservation of momentum..

PART-C 2 X 5 = 10

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

7. (a) Find the moment of inertia about centroidal X – X axis for the C-section given in the following figure.



OR

7. (b) Two rectangles of dimension 100 mm X 10 mm form a L section. Find its centroid

8. (a)A stone is projected upwards with a velocity of 110 m/s. With what initial velocity should a second stone be projected upwards 2 seconds later so that it may overtake the first stone at its maximum height?.

OR

8. (b) Find the height of tower from the top of which an object falls freely and during the last seconds of its motion, the object travels a distanceequalto2/3 rd of the height of the tower. Take g=9.8m/s^2.

BOARD DIPLOMA EXAMINATION, (C-24)
SEE-MODEL PAPER
DME– I SEMESTER EXAMINATION
Engineering Mechanics (ME-106)

Time: 2 Hours **Max. Marks:** 40

PART-A 8 X 1 = 8

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

1. State Lami's theorem.
2. State Perpendicular axis theorem.
3. Define Mechanical Advantage.
4. What is a couple?.
5. Define (a) ideal effort and (b) ideal load.
6. Define Velocity Ratio.
7. List out any three names of inversions of four bar chain
8. Define (a) link and (b) kinematic pair.

PART-B 4 X 3 = 12

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

9. (a) Two forces of magnitude 30N and 40N each act on a body. The angle between the forces is $20^{0.}$ Find the magnitude and direction of the resultant.

OR

9. (b)The velocity ratio of a simple machine is 10. The effort applied is 150 N. Determine the load lifted, if 20% of the effort is lost in friction.
10. (a) Two rectangles of dimension 100mmX10mm form a T section. Find its centroid.

OR

10. (b) Write any three differences between machine and mechanism.
11. (a) What is self-locking? Mention the condition for self-locking.

OR

11. (b)Write the law of the machine with effort versus load diagram.
12. (a) Define (a) lower pair, and (b) higher pair and give at least two examples of each.

OR

12. (b)) Differentiate between structure and machine.

PART-C 4 X 5 = 20

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

13. (a) A body of weight 200 N is held vertically by means of two strings which make 30^0 and 60^0 with horizontal. Find tension in strings.

OR

13. (b) The larger and smaller diameters of differential axle are 80 mm and 70 mm respectively. The effort is applied to the wheel at the end of the lever 120 mm long. What is the velocity ratio? Find also the efficiency and frictional effort lost, when the load lifted is 8000 N and the effort applied is 320 N.

14. (a)) A bullet of mass 0•1 kg is fired into a target with a velocity of 350 m/s. The mass of the target is 10 kg and it is free to move. Find the loss of kinetic energy.

OR

14. (b) Explain Whitworth Quick Return Motion Mechanism with a neat sketch.

15. (a) In a differential wheel and axle, the difference between axle diameters is 50 mm and the diameter of the effort wheel is 750 mm. If a load of 2500 N is lifted by an effort of 175 N and a load of 3250 N is lifted by an effort of 210 N, determine : (a) law of the machine, (b) load lifted by an effort of 225 N, (c) mechanical advantage, (d) velocity ratio and(e) efficiency.

OR

15. (b) In a simple machine, whose velocity ratio is 30, a load of 2400 N is lifted by an effort of 150 N and a load of 3000 N is lifted by an effort of 180 N. Find the law of machine and calculate the load that could be lifted by a force of 200 N.

16. (a)Illustrate the working of the crank and slotted lever mechanism with a neat diagram.

OR

16. (b) Explain the slider crank mechanism with a neat line diagram.

ME-107-ENGINEERING DRAWING - I

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]Note: Question Paper consists PART– A and PART-B
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 –Shaped escription 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, leaderline, 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 tone 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.
1. 4 Select the correct instruments and draw lines of different orientation.
1.5 Select the correct instruments and draw small and large Circles.
1.6 Select the correct instruments for measuring distances on the drawing.
1.7 Use correct grade of pencil for different types of lines, thickness and given function.
1.8 Select and use appropriate scales for a given application.
1.9 Identify different drawing sheet sizes as per I.S. and Standard Lay-outs.
1.10 Prepare Title block as per B.I.S. Specifications.

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

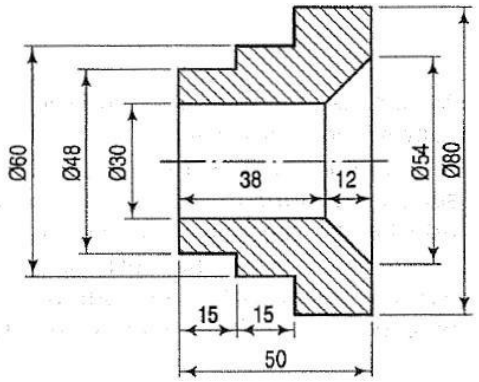
Time:1Hour] **[TotalMarks:20**

PART-A 04x02=08

Instructions : 1.Answer**ALL** questions.
2. 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.

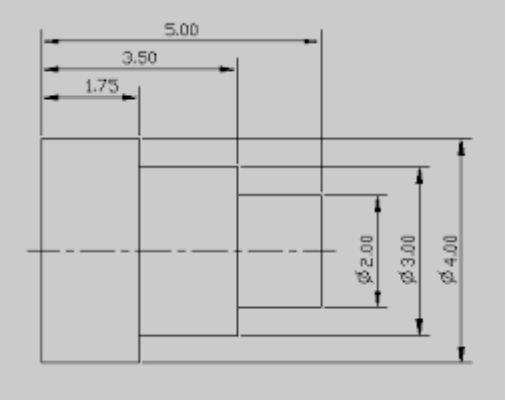


3. To divide a straight line of70 mm into 6 equal parts.
4. Bisect a given line AB of length 75 mm.

PART-B 02x06=12

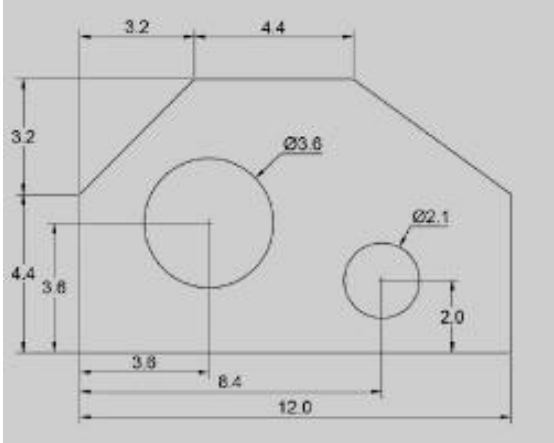
Instructions : 1.Answer ALL questions.
2. Each question carries **SIX** marks.

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 baseside30mmin 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.

ME-107

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 length70mm 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 direct rix 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.

ME-107

MODEL PAPER SEE

BOARD DIPLOMA EXAMINATION, (C–24)

DME– I SEMESTEREND EXAMINATION

ENGINEERING DRAWING - I

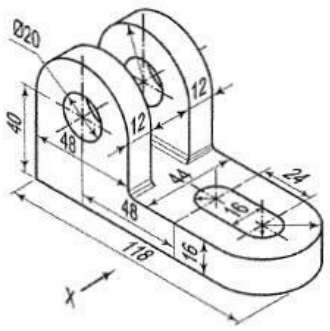
Time:2hours] **[TotalMarks:40**

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.

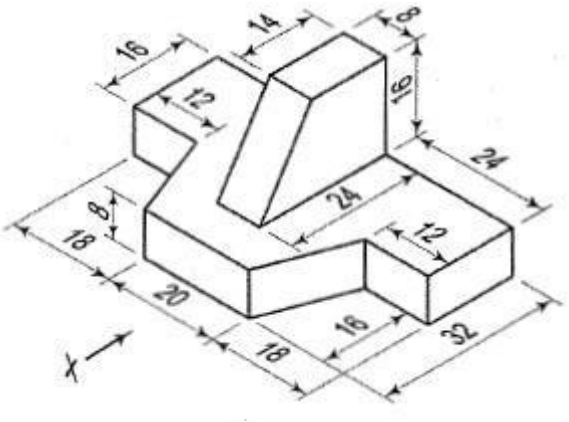
PART-A 08x02=16

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 angleof55^0.
3. Inscribe a pentagon in a given circle of radius35mm.
4. Draw the projections of a point 'P' lyingonHPand30mmbehind VP.
5. Drawthetopviewofacircularplaneofdiameter50mmwhenitsplaneisperpendiculartoHP.
6. Draw the projections of a cube of base side 30mm 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

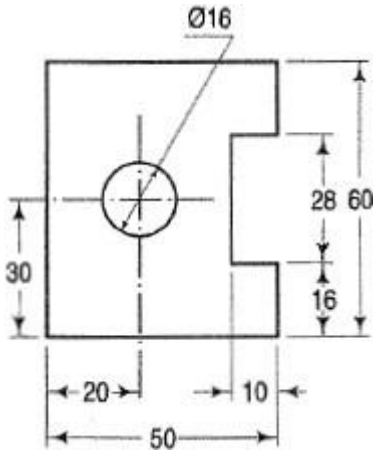


PART-B

04x06=24

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

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



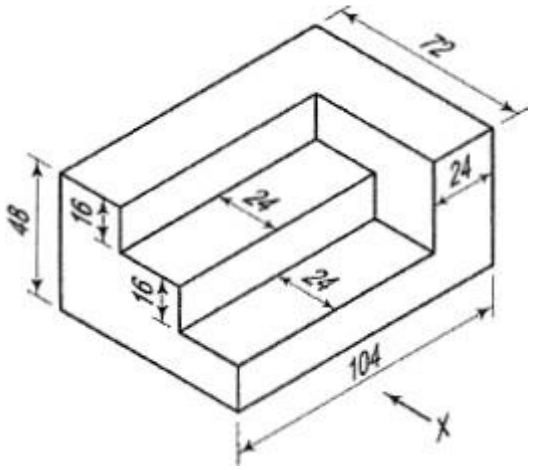
(Or)

9. (b) Inscribe a hexagon in a given circle of radius 30mmbykeepingoneofitsside 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)

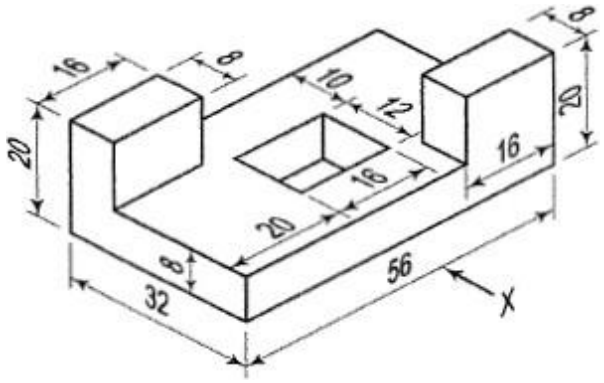
10. (b) A line AB 75 mm long is parallel to H.P. and inclined at 30^0 to V.P. The end A is 25mmaboveH.Pand 30 mm in front of V.P. Draw its projections.

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

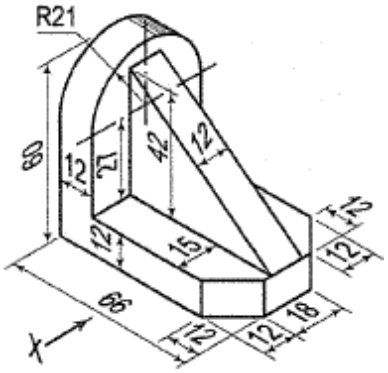


(Or)

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

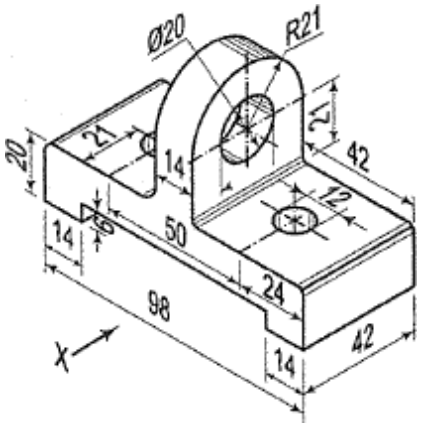


12. (a)Draw the front view of component shown in figure



(Or)

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



ME-108 - WORKSHOP PRACTICE

Course Title	Workshop Practice	Course Code	ME-108
Semester	I	Course Group	Practical
Teaching Scheme in Periods (L: T: P)	15:00:30	Credits	1.25
Methodology	Lecture + Theory + Practice	Total Contact Periods :	45 Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic skills of handling workshop tools, this course also requires the basic knowledge of applied science and mathematics at secondary school level.

BLUEPRINT FOR MARKS IN SEE

Unit No	Unit name	Periods	Questions for SEE			Marks Weightage	% Weightage
			Handling	Manipulation	Precision		
1	Fitting shop	12	10	15	15	40	100
2	Forging shop	11	10	15	15	40	100
3	Carpentry shop	11	10	15	15	40	100
4	Sheet metal shop	11	10	15	15	40	100
	Total	**45**					

Note:

1. Student can answer any one question out of 4 questions.
2. To pass in practical Exam student should acquire 50% marks in both CIE and SEE separately and CIE & SEE put together.
3. If the students acquire less than 50% in CIE, accordingly the students have to acquire more than 50% in SEE to get overall 50 % to pass

Course Outcomes

On completion of course the student should be able to;

CO1	Identify and use the tools and equipment in fitting Shop
CO2	Acquire skill in basic fitting operations
CO3	Identify and use the tools to perform forging operations
CO4	Identify and use the tools to perform carpentry operations
CO5	Identify and use the tools to perform operations in sheet metal shop

COURSE CONTENTS:

FITTING SHOP

1. Marking and chipping on Mild – steel flat 12 mm thick.
2. Cutting with hack saw, M.S. Flats of 6 mm thick.
3. Marking, cutting, drilling, Chamfering and tapping on a M.S. Flat 12 mm thick.
4. Assembling of two pieces, Matching by filing (L/V Shape)

FORGING SHOP

5. Conversion of round to square.
6. Conversion of round to Hexagon.
7. Preparation of chisel from round rod.
8. Preparation of ring and hook from M.S. round.
9. Preparation of a hexagonal Head using upsetting operation.

CARPENTRY SHOP

1. Cutting of wood with hand saw.
2. Planning of wood.
3. Chiselling of wood.
4. Lap joint
5. T- Joint
6. Preparation of Dovetail joint.

SHEET METAL SHOP

1. Practice on cutting of sheet
2. Formation of joints like grooved joints, locked groove joint
3. Preparation of a rectangular open type tray
4. Preparation of hollow cylinder
5. Preparation of mug.
6. Preparation of funnel

REFERENCE BOOKS:

1.Manufacturing Technology (VolI) by P N Rao (McGraw Hill)
2.Mechanical Workshop & Laboratory Manual By K. C. John

Competencies and Key competencies to be achieved by the student.

Title of the Job	Competencies	Key Competencies
Fitting shop		
Marking and Chipping on Mild steel flat of 12 mm thick	Identify appropriate measuring tool Handle appropriate marking tool Handle appropriate chipping tool Mark the dimensions Remove the material by chipping from MS flats	Mark the dimensions Remove the material by chipping from MS flats
Cutting with hack saw of MS flats of 6mm thick	Check the raw material for size Fix the work piece in vice Mark the work as per given dimensions Perform dot punching Load and unload hack saw blade from its frame Use the hack saw to perform cutting operation	Load and unload hack saw blade from its frame cut the work as per marked dimensions using Hack saw
Drilling, chamfering and on a MS flat of 2 mm thick	Check the raw material for size Apply the chalk on the surface and on all sides of the flat Layout the dimensions and mark the lines using dot punch Chamfer the edges through filing Locate the hole centres using odd leg callipers and centre punching Identify appropriate drill bit Load and unload drill bit from the machine	Load and unload drill bit from the machine Identify appropriate taps Tap the hole

Title of the Job	Competencies	Key Competencies
Forging shop		
1. Conversion of Round to Square	● Identify the holding and striking tools ● Heat the specimen to the appropriate temperature ● Remove the specimen and hold it on the anvil ● Hammer the specimen to the	● Heat the specimen to the appropriate temperature ● Hammer the specimen to the required shape

Title of the Job	Competencies	Key Competencies
Forging shop		
	required shape	
2. Conversion of Round to Hexagon	● Identify the holding and striking tools ● Heat the specimen to the appropriate temperature ● Remove the specimen and hold it on the anvil ● Hammer the specimen to the required shape	● Heat the specimen to the appropriate temperature ● Hammer the specimen to the required shape

Title of the Job	Competencies	Key Competencies
Carpentry Shop		
1. Cutting of wood with hand saw	● Identify the orientation of grains ● Select appropriate saw for cutting in each of the directions viz. across and along the grains ● Select appropriate work holding device ● Handle appropriate measuring and marking tools(Steel rule, Try square, Marking gauge) ● Mark dimensions on work using Marking gauge ● Fix the work in the vice ● Perform cutting along the grains using Rip saw ● Change the position of work in the vice ● Perform cutting perpendicular the grains using cross cut saw	● Identify the orientation of grains ● Mark dimensions on work using marking gauge ● Perform cutting along and perpendicular the grains using appropriate saw
2. Planning of wood	● Identify the direction for planning wood stock ● Select appropriate jack plane ● Prepare the jack plane for planning ● Load and unload the blade of a jack plane ● Select appropriate work holding	● Identify the direction for planning wood stock ● Prepare the jack plane for planning ● Plane the surfaces on all four sides using jack plane

Title of the Job	Competencies	Key Competencies
Carpentry Shop		
	device ● Perform marking on work using appropriate tool ● Fix the work in the vice ● Plane the surfaces on all four sides using jack plane	
3. Chiselling of wood	● Select appropriate chisels and saw ● Select appropriate work holding device ● Select appropriate measuring and marking tools ● Fix the work in the vice ● Mark the position of grooves on work using marking gauge ● Cut sides of grooves by hand saw ● Chip the material using firmer chisel by applying pressure with mallet ● Finish the grooves with rasp file	● Select appropriate chisels and saw ● Mark the position of grooves on work using marking gauge ● Cut sides of grooves by hand saw ● Chip the material using firmer chisel by applying pressure with mallet
4. Preparation of T-Joint, Lap joint and Dove tail joint	● Select the appropriate cutting tools and work holding devices ● Plane the wooden pieces on all sides ● Mark at an angle of 750 with bevel square ● Trim the dovetail by chisel to exact size ● Cut the dovetail groove on second piece ● Finish the groove ● Assemble the two pieces to prepare dovetail halving joint by using mallet	● Trim the dovetail by chisel to exact size ● Mark at an angle of 75^0 with bevel square ● Cut the dovetail groove on second piece ● Assemble the two pieces to prepare dovetail halving joint by using mallet

Title of the Job	Competencies	Key Competency
Sheet metal Work		
1. Practice on cutting of sheet	● Cut the required sheet from the stock using snip ● Mark the dimensions on the sheet using scriber & steel rule ● Draw the circular shapes using divider	● Identify the marking and cutting tools ● Cut the sheet of different shapes using appropriate tools

	• Perform rough cutting of the curved shapes using chisel and finish cutting using snips • Cut the straight edges using straight snips	
2. Formation of joints like grooved joint, locked groove joint	• Cut the sheet in to two halves • Form the flange on the sheet by folding the sheet along scribed lines using mallet & stakes • Perform bending edges of sheets applying moderate pressure using mallet • Inter lock the bent edges and apply pressure with mallet to make required joint	• Identify the marking and cutting tools • Cut the sheet • Perform bending along the marked lines.
3. Preparation of a rectangular open type tray	• Draw the development of the object to be made • Place the pattern on the sheet • Mark the dimensions using scriber • Shear the required piece from the stock using straight snips • Mark the lines on the sheet to form bends • Strengthen the sides of sheet by singe hem using hatchet stake • Form the sheet in to desired shape using stakes • Seam the corners by inserting laps of the adjacent sides with single hem	• Drawing development of objects • Cut the sheet • Seam the corners by inserting laps of the adjacent sides with single hem
4. Preparation of hollow cylinder	• Draw the development of the object to be made • Place the pattern on the sheet • Mark the dimensions using scriber • Shear the required piece from the stock using straight snips • Mark the lines on the sheet to form bends • Strengthen the sides of sheet by singe hem on top & bottom side using hatchet stake • Form the flat sheet into cylindrical shape by cylindrical	• Identify the marking and cutting tools • Drawing development of objects • Cut the sheet • Inter lock the sides and apply pressure using mallet to make a strong joint

	stake and apply pressure using mallet ● Prepare single hem on to longitudinal sides in opposite directions ● Inter lock the sides and apply pressure to make a strong joint	

Course Outcome (CO)		Cognizant Level	Linked Program Outcomes (PO)	Teaching periods
CO1	Identify and use the tools and equipment in fitting Shop	R/U/A	1,2,3,4,7	6
CO2	Acquire skill in basic fitting operations	R/U/A	1,2,3,4,7	6
CO3	Identify and use the tools to perform forging operations	R/U/A	1,2,3,4,7	11
CO4	Identify and use the tools to perform carpentry operations	R/U/A	1,2,3,4,7	11
CO5	Identify and use the tools to perform operations in sheet metal shop	R/U/A	1,2,3,4,7	11
R: Remembering, U: Understanding, A: Applying				

CO-PO MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
CO1	3	2	2	3	-	-	1	1, 2,3,4,7
CO2	3	2	3	3	-	-	1	1, 2,3,4,7
CO3	3	2	3	3	-	-	1	1, 2,3,4,7
CO4	3	2	3	3	-	-	1	1,2,3,4,7
CO5	3	2	3	3	-	-	1	1,2,3,4,7

ME-108

BOARD DIPLOMA EXAMINATIONS(C-24)
Model Paper
Mid Sem-I
Workshop Practice

Time: 1 Hour **Total Marks: 20 MARKS**

Note: Answer any one question.

1. Plain the given wood piece and cut as per the given fig
2. Prepare a lap joint.
3. Prepare the groove joint
4. Prepare a locked groove joint
5. File the given MS plate and cut as per the drawing
6. Convert the round bar into square shape

ME-108

BOARD DIPLOMA EXAMINATIONS (C-24)
Model Paper
Mid Sem-II
Workshop Practice

Time : 1 Hour **Total Marks : 20 MARKS**

Note: Answer any one question.

1. Prepare a T joint.
2. Prepare a open tray
3. Prepare a hallow cylinder
4. File the given MS plate and drill a 6mm hole as per the drawing
5. Convert the round bar into hexagon shape

ME-108

BOARD DIPLOMA EXAMINATIONS (C-24)

Model Paper

Semester End Examination

Workshop Practice

Time : 2 Hours **Total Marks : 40 MARKS**

Note: Answer any one question.

1. Plain the given wood piece and cut as per the given fig
2. Prepare a lap joint.
3. Prepare a dovetail joint
4. Prepare the groove joint
5. Prepare a locked groove joint
6. File the given MS plate and cut as per the drawing
7. Convert the round bar into square shape
8. Prepare a T joint.
9. Prepare a open tray
10. Prepare a hallow cylinder
11. File the given MS plate and drill a 6mm hole as per the drawing
12. Convert the round bar into hexagon shape.

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 in500 ml solutionusing0.02MHCl 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 $MgSO_4$ 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 in500ml of the given solution using 0.02M sodium carbonate solution.
3. FindtheMolarityandestimatetheamountofNaOHpresentin100mlofthegivensolution using0.01M 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**