C21_ Curriculum

DIPLOMA IN MECHANICAL ENGINEERING

OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

III SEMESTER

	Course Code	Course Name	Teaching Scheme					Examination Scheme						
			Instruction periods per week			Total Periods per semester	Credits	Continuous internal Evaluation(CIE)			Semester end examination (SEE)			
			L	T	P			Mid Sem1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including CIE
1	SC-301	Applied Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35
2	ME-302	Solid Mechanics	4	1	0	75	3	20	20	20	40	14	100	35
3	ME-303	Thermodynamics	4	1	0	75	3	20	20	20	40	14	100	35
4	ME-304	Engineering Materials	4	1	0	75	3	20	20	20	40	14	100	35
5	ME-305	Fluid Mechanics and Hydraulic Machinery	4	1	0	75	3	20	20	20	40	14	100	35
6	ME-306	Machine Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50
7	ME-307	Basic Manufacturing & Fabrication Engineering Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	ME-308	Fuels Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	ME-379 / ME-389	Material Testing Lab / Fluid Mechanics & Hydraulic Machines Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	HU-310	Communication and Life Skills Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
11	ME-311	Skill Upgradation	0	0	8	120	2.5	0	0	**Rubrics**			--	-
	Activities: student performance is to be assessed through Rubrics													

SC-301 - APPLIED ENGINEERING MATHEMATICS

Course Title	Applied Engineering Mathematics	Course Code	SC-301
SEMESTER	III	Course Group	Foundation
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of Basic Engineering Mathematics and Engineering Mathematics at Diploma 1st and 2nd Semester level.

Course Outcomes: COs

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

CO 1	Integrate different kinds of continuous functions
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Find the values of definite integrals using fundamental theorem of integral calculus.
CO 4	Apply definite integrals to determine Areas, Volumes of irregular shapes.
CO 5	Find the Mean and RMS values of various functions and Approximate values of Definite integrals using Trapezoidal and Simpson's 1/3rd rule
CO 6	Find order and degree of a Differential equation, form the Differential Equation from given primitive by eliminating the arbitrary constants and Solve Simple DEs of 1st order and 1st degree.

Course Content:

Unit-I

Duration: 14 Periods (L: 11 – T:3)

Indefinite Integration-I

Integration regarded as anti-derivative – Indefinite integral of standard functions. Properties of indefinite integral. Integration by substitution or change of variable. Integrals of the form $\sin^m \theta . \cos^n \theta$. Where m and n are positive integers. Integrals of tan x, cot x, sec x, cosec x and powers of tan x, sec x by substitution. Evaluation of integrals which are reducible to the following forms: (Nine standard integrals)

$$i)\ \frac{1}{a^2+x^2}, \frac{1}{a^2-x^2}, \frac{1}{x^2-a^2}$$

$$ii)\ \frac{1}{\sqrt{a^2+x^2}}, \frac{1}{\sqrt{a^2-x^2}}, \frac{1}{\sqrt{x^2-a^2}}$$

$$iii)\ \sqrt{x^2+a^2}, \sqrt{a^2-x^2}, \sqrt{x^2-a^2}$$

Unit – II

Duration: 10 Periods (L: 8 – T:2)

Indefinite Integration-II

Integration by decomposition of the integrand into simple rational algebraic functions. Integration by parts - Bernoulli's rule.

Unit-III

Duration: 10 Periods (L: 8 – T: 2)

Definite Integral and its Properties:

Definite integral fundamental theorem of integral calculus properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum.

Unit – IV

Duration: 12 Periods (L: 10 – T: 2)

Applications of Definite Integrals:

Areas under plane curves – Sign of the Area – Area enclosed between two curves. Solid of revolution – Volumes of solids of revolution.

Unit – V

Duration: 10 Periods (L: 8 – T: 2)

Mean , RMS values and Numerical Integration:

Mean values and Root Mean Square values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

Unit – VI

Duration: 19 Periods (L: 15 – T: 4)

Differential Equations of First Order:

Definition of a differential equation – order and degree of a differential equation – formation of differential equations – solution of differential equation of first order, first degree : Variables -separable, Homogeneous, Exact, Linear differential equation, Bernoulli's equation.

Reference Books:

1. Integral Calculus Vol. I, by M. Pillai and Shanti Narayan
2. Thomas' Calculus, Pearson Addison –Wesley Publishers
3. Higher Engineering. Mathematics, by B.S. Grewal— Khanna publishers—New Delhi

Suggested E-Learning references

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

Suggested Learning Outcomes

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

Unit-I

1.0 Use Indefinite Integration to solve engineering problems

1.1 Use the concept of Indefinite integral as an anti-derivative.

1.2 Use the indefinite integrals of standard functions and properties of Integrals $\int (u + v)\, dx$ And $\int k\, u\, dx$ where k is constant and u, v are functions of x in solving simple problems.

1.3 Solve integration problems involving standard functions using the above rules.

1.4 Evaluate integrals involving simple functions of the following type by the method of Substitution.

(i) $\int f(ax + b)\, dx$ *where* $f(x)\, dx$ is in standard form.

(ii) $\int [f(x)]^n f'(x)\, dx$

(iii) $\int f'(x)/[f(x)]\, dx$

(iv) $\int f\{g(x)\} g'(x)\, dx$

1.5 Find the Integrals of *tan x, cot x, sec x* and *cosec x using* the above.

1.6 Evaluate the integrals of the form $\int Sin^m \theta\, Cos^n \theta.\, d\theta$ where m and n are positive integers.

1.7 Evaluate integrals of powers of *tan x* and *sec x.*

1.8 Evaluate the Standard Integrals of the functions of the type : (Nine standard integrals)

$$i)\ \frac{1}{a^2+x^2}, \frac{1}{a^2-x^2}, \frac{1}{x^2-a^2}$$

$$ii)\ \frac{1}{\sqrt{a^2+x^2}}, \frac{1}{\sqrt{a^2-x^2}}, \frac{1}{\sqrt{x^2-a^2}}$$

$$iii)\ \sqrt{x^2+a^2}, \sqrt{a^2-x^2}, \sqrt{x^2-a^2}$$

1.9 Evaluate the integrals of the type :

$$\int \frac{1}{a \pm bSin\theta} d\theta, \int \frac{1}{a \pm b\cos\theta} d\theta \text{ and } \int \frac{1}{a\cos\theta \pm b\sin\theta \pm c} d\theta$$.

Unit-II

2.0 Use Indefinite Integration to solve engineering problems

2.1 Evaluate integrals using decomposition method.

2.2 Evaluate integrals using integration by parts with examples.

2.3 Apply the Bernoulli's rule for evaluating the integrals of the form $\int u.v\,dx$.

2.4 Evaluate the integrals of the form $\int e^x [f(x) + f'(x)]\,dx$.

Unit-III

3.0 Understand definite integral and use it in engineering applications

3.1 Use the fundamental theorem of integral calculus in solving problems

3.2 Calculate the definite integral over an interval.

3.3 Apply various properties of definite integrals in engineering problems.

3.4 Evaluate simple problems on definite integrals using the above properties.

3.5 Find definite integral as a limit of sum by considering an area.

Unit –IV

4.0 Understand definite integral and use it in Engineering applications

4.1 Find the Areas under plane curves and area enclosed between two curves using Integration.

4.2 Obtain the Volumes of solids of revolution and solve problems.

Unit –V

5.0 Understand Mean, RMS values and Numerical Methods

5.1 Obtain the Mean value and Root Mean Square (RMS) value of the functions in any given Interval.

5.2 Apply the Trapezoidal rule, Simpson's 1/3 rules for approximation of definite integrals and solve some problems.

Unit –VI

6.0 Solve Differential Equations in engineering problems.

6.1 Identify a Differential equation and find its order and degree

6.2 Form a differential equation by eliminating arbitrary constants.

6.3 Solve the first order first degree differential equations by the following methods:

(i) Variables Separable.

(ii) Homogeneous Equations.

(iii) Exact Differential Equations

(iv) Linear Differential equation of the form $\frac{dy}{dx}$+ Py = Q,
Where P and Q are functions of x or constants.

(v) Bernoulli's Equation (Reducible to linear form.)

6.4 Solve simple problems leading to engineering applications by using above methods.

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material
2. Quiz
3. Group discussion

4. Surprise tests
5. Seminars
6. Home Assignments
7. Mathematics for preparing competitive exams and solving old question papers on arithmetical ability.

CO / PO - MAPPING

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

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

Semester End Examination

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

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

BOARD DIPLOMA EXAMINATIONS (C21)

MID SEM –I, III SEMESTER

SC-301- APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

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

2 Each question carries **ONE** mark

1. Integrate (e^x – Sin x + x^4) with respect to x
2. Find $\int \frac{dx}{5x+7}$ dx
3. Write Bernoulli's rule of integration
4. Find $\int$ x logx dx

PART-B

Instructions: 1. Answer **ALL** questions 02 X 03 = 06

2. Each question carries **THREE** marks

5 a) Evaluate $\int \frac{x^5}{1+x^{12}} dx$.

OR

5 b) Evaluate $\int \frac{dx}{(x^{2+}16)}$

6 a) Evaluate $\int x\, sinxdx$

OR

6 b) Evaluate $\int \frac{3x+2}{(x-1)(2x+3)} dx$.

PART- C

Instructions: 1. Answer **ALL** questions 02 X 05 = 10

2. Each question carries **FIVE** marks

7 a) Evaluate $\int \sqrt{x^2 + 2x + 5}$ dx

OR

7 b) Evaluate: $\int cosx\, cos2xdx$.

8 a) Find $\int xtan^{-1}xdx$.

OR

8 b) Find $\int x^4 Cos2xdx$.

BOARD DIPLOMA EXAMINATIONS (C21)
MID SEM –II, III SEMESTER
SC-301-APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

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

1. Find $\int_0^1 (x^4 + 1)\, dx$
2. Evaluate : $\int_0^{\pi} Sin3x dx$
3. Evaluate : $\int_0^1 \frac{1}{1+x^2} dx$
4. Write the formula to find area bounded by the curve y= f(x) , x-axis, between the limits x=a and x =b

PART-B

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

5 a) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{1 - Sin2x} dx$

OR

5 b) Evaluate: $\int_0^{\frac{\pi}{2}} sin^2 x dx$

6 a) Find the area bounded by the line 2x + y =8, x-axis and the lines x = 2 and x = 4.

OR

6 b) Find the Volume of the Solid generated by revolving the part of the Circle $x^2 + y^2 = 36$ From x = 0 to x = 4 about x – axis.

PART C

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

7 a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{Sinx}}{\sqrt{Sinx}+\sqrt{Cosx}} dx$

Or

7 b) Evaluate: $\int_0^{\frac{\pi}{2}} \log cos\, x dx$

8 a) Find the area enclosed between the Parabolas $y = 3x - x^2$ *and* $y = x^2 - x$.

Or

8 b) Find the Volume of the Solid generated by the revolution of the area bounded by the Ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, about x- axis.

BOARD DIPLOMA EXAMINATION (C-21)
III SEMESTER END EXAMINATION
SC-301-APPLIED ENGINEERING MATHEMATICS

Time: 2 hours **[Total Marks: 40]**

PART-A

Instructions: 1. Answer **ALL** questions 08 X 01 = 08
2 Each question carries **ONE** mark

1. Find $\int(x^8 - \frac{5}{x})\,dx$
2. Evaluate $\int_0^1 (x^2+1)\,dx$
3. Write the formula to find mean value of y = f(x), in the interval (a, b)
4. Find the Order and Degree of the Differential Equation $x\frac{dy}{dx} = \sqrt{1+\left(\frac{dy}{dx}\right)^2}$.
5. Write Trapezoidal Rule to find the approximate value of $\int_a^b f(x)dx$.
6. Write the formula to find RMS value of y = f(x) over the range x=a and x = b.
7. Solve $\frac{dy}{dx} = e^{4x+y}$
8. Write the condition for exactness of the differential equation M(x, y)dx + N(x,y)dy =0

PART-B

Instructions: 1. Answer **ALL** questions 04 X 03 = 12
2. Each question carries **THREE** marks

9.

a) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{1-Sin2x}dx$

OR

b) Find the approximate value of $\int_0^6 \frac{dx}{1+x}$ by taking n = 6 using Trapezoidal rule.

10.

a) Find the area bounded by the Parabola $y = x^2 - 2x + 1$ and x-axis.

OR

b) Form the Differential Equation from $y = Ae^x + Be^{3x}$ where A, B are arbitrary constants

11.

a) Find the RMS value of $\sqrt{\log x}$ over the range x= 1 and x= e

OR

b) Calculate approximate value of $\int_0^4 \frac{dx}{1+x}$ by taking n = 4 using Simpson's 1/3 rule

12.

a) Solve: $x\frac{dy}{dx} + 2y = logx$.

OR

b) Solve: $x(1-y^2)dx + y(1-x^2)dy = 0$

PART C

Instructions: 1. Answer **ALL** questions 04 X 05 = 20

2. Each question carries **FIVE** marks

13.

a) Evaluate: $\int \frac{1}{x^2 + 8x + 25}\, dx$

OR

b) Find the RMS value of y = $\sqrt{8 - 4x^2}$ between x = 0 and x = 2

14.

a) Find the volume of solid generated by revolving the Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about Major axis

OR

b) Solve: $\frac{dy}{dx} = Sin(x + y)$

15.

a) A curve is drawn to passing through the points given by the following table:

x	1	1.5	2	2.5	3	3.5	4
y	3	3.4	3.7	3.8	2.7	2.6	2.1

Calculate the approximate area bounded by the curve, x-axis and the lines x= 1 and x= 4 using Simpson's 1/3 rule

OR

b) Evaluate: $\int_0^1 \sqrt{(1 - x^2)}dx$ approximately by taking n = 4 using Simpson's 1/3 rd Rule.

16.

a) Solve: $(y^2 - xy)dx = x^2 dy$.

OR

b) Solve: $\frac{dy}{dx} + yCosx = y^3$Sin2x.

ME-302 SOLID MECHANICS

Course Title	Solid Mechanics	Course Code	ME-302
SEMESTER	III	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre-Requisites:

Basic knowledge of properties of materials and types of loads.

COURSE OUTCOMES:

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

CO1	Understand the concept of forces, analyze the force systems and find out the resultant of the force systems
CO2	Compute stress and strain values and find the changes in axial, lateral and volumetric dimensions of bodies of uniform section and of composite section under the influence of normal forces.
CO3	Locate the centre of gravity of various sections and calculate the Moment of Inertia of standards sections.
CO4	Compute shear force and bending moment at any section of beam and draw the S.F. & B.M diagrams for point loads and UDL.
CO5	Calculate bending stresses, safe load, safe span, dimensions of cross section and deflections of the given beam
CO6	Estimation of shear stress and angle of deflection when a shaft is subjected to torsion and compares the strength of solid and hollow shafts.

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="3">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. Force Systems</td><td>12</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td><td></td></tr>
<tr><td>2. Simple Stresses & Strains</td><td>13</td><td></td></tr>
<tr><td rowspan="2">Part-B</td><td>3. Geometric Properties of Sections</td><td>12</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td><td></td></tr>
<tr><td>4. Shear Force & Bending Moment</td><td>13</td><td></td></tr>
<tr><td rowspan="2">Part-C</td><td>5. Theory of Simple Bending & Deflection of Beams</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. Torsion in Shafts</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="2">08</td><td>08</td><td>08</td><td></td></tr>
</table>

COURSE CONTENT

1. **Force Systems:**
   Force – definition, types; Force system and its classification; Resolution of a force; Resultant of a coplanar force system - Parallelogram law, Triangle law, Polygon law; Equilibrium of forces, Equilibrant and conditions for equilibrium; Free body diagram; Lami's theorem; Related simple numerical problems on the above topics.

2. **Simple Stresses and Strains:**
   Stress, Strain and their nature; Mechanical properties of common engineering materials; Stress – Strain diagram for M.S. and C.I. specimens and Significance of various points on it; Significance of factor of safety; Hooke's Law, Relation between elastic constants (without derivations); Longitudinal and lateral strain, Poisson's ratio; Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces; Related numerical problems on the above topics.
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 solids composed of not more than two simple solids.

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. **Shear Force and Bending Moment:**
   Types of beams and loads; Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases:
   a) Cantilever with point loads,
   b) Cantilever with uniformly distributed load,
   c) Simply supported beam with point loads,
   d) Simply supported beam with UDL,
   e) Over hanging beam with point loads, at the centre and at free ends,
   f) Over hanging beam with UDL throughout,
   g) Combination of point and UDL for the above (not more than two loads);
   Related simple numerical problems; Point of contraflexure.

5. **Theory of Simple Bending & Deflection of Beams:**
   Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature; Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/y = E/R$ (without derivation); Problems involving calculations of bending stress, modulus of section and moment of resistance; Calculation of safe loads and safe span and dimensions of cross- section;
   Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only); Related numerical problems.

6. **Torsion in Shafts:**
   Definition and function of shaft; Define the terms polar moment of inertia, torsional rigidity and torsional stiffness; Calculation of polar M.I. for solid and hollow shafts; Assumptions in simple torsion; Torsion Equation $T/J = \tau/r = G\theta/L$ (without derivation); Problems on design of shaft based on strength and rigidity; Numerical problems related to comparison of strength and weight of solid and hollow shafts.

REFERENCE BOOKS:

1. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
2. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
3. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
4. Punmia B C, Strength of Materials, Laxmi Publications (P) Ltd. New Delhi.
5. Bansal R K, Strength of Materials, Laxmi Publications.

ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/
2. https://www.slideshare.net/
3. https://en.wikipedia.org/wiki/Strength_of_materials
4. http://ndl.ethernet.edu.et/bitstream/
5. http://www.engineersedge.com/mechanics_material_menu.shtml/

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. Using internet record various properties of commonly used materials and compare their strengths.
4. How a corrugated roof sheet differs from plain roof sheet? Demonstrate with models.
5. List out the applications of shafts in our daily activity as well as in industries.
6. Collect the pictures of various types of beams which practically exist.

SUGGESTED LEARNING OUTCOMES:

Upon completion of the course the student shall be able to

1. Force Systems:

1.1. Define the force, its units and types
1.2. Understand various types of force systems
1.3. Resolve a force into horizontal and vertical components
1.4. Understand the concept of resultant
1.5. State parallelogram law and do related numerical problems
1.6. State triangle law and polygon law
1.7. Know about free body diagrams
1.8. State Lami's theorem and do related numerical problems
1.9. Understand the concept of equilibrium of forces, equilibrant and conditions for it.
1.10. Solve numerical problems on finding out the resultant of a simple coplanar, concurrent force system.

2. Simple Stresses and Strains:

2.1. Define the mechanical properties of commonly used engineering materials
2.2. Define the term stress, strain and understand various types of stresses and strains
2.3. State Hooke's law and define various elastic constants
2.4. Draw Stress – Strain diagram for M.S and C.I. specimens and identify salient points on it
2.5. State the significance of factor of safety
2.6. Define the terms longitudinal & lateral strains and Poisson's ratio
2.7. Write down the relation between elastic constants E, N, K, & 1/m
2.8. Compute stress and strain values in bodies of uniform sections
2.9. Compute stress and strain values in bodies of composite sections

2.10. Compute changes in axial, lateral and volumetric dimensions of bodies of uniform sections under the action of normal forces

3. Geometric Properties of Sections:

3.1. Define centre of gravity and centroid

3.2. Locate centroid of geometrical plane figures such as square, rectangle, triangle, circle, semi-circle, quarter circle

3.3. Locate centroid of simple composite figures

3.4. Find out the Centre of Gravity of simple solids such as cube, cuboid, cone, cylinder, sphere, hemisphere

3.5. Find out the Centre of Gravity of simple composite solids

3.6. Define Moment of Inertia (M.I.) of plane lamina

3.7. Understand the concept of Radius of gyration

3.8. State and understand Parallel and Perpendicular axes theorems (without derivations)

3.9. Find out M.I. of laminas such as rectangle, square, circle, semi-circle, quarter circle and triangle section

3.10. Find out M.I. of symmetrical I-section, Channel section and T-section about centroidal axes

4. Shear Force and Bending Moment:

4.1. List the types of beams and loads

4.2. Define and explain the terms shear force, bending moment and point of contraflexure

4.3. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for cantilever with point loads

4.4. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for cantilever with UDL

4.5. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for cantilever with point loads & UDL

4.6. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for simply supported beam with point loads

4.7. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for simply supported beam with UDL

4.8. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for simply supported beam with point loads & UDL

4.9. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for overhanging beam with point loads

4.10. Calculate the S.F. and B.M. and drawing the S.F and B.M. diagrams by the analytical method for overhanging beam with UDL

5. Theory of Simple Bending & Deflection of Beams:

5.1. Define the terms Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress and Radius of curvature

5.2. Find out section modulus for various sections such as plain & hollow rectangular, square and circular sections,

5.3. List out the assumptions made in theory of simple bending

5.4. Write the Bending Equation $M/I = \sigma/y = E/R$ (without derivation) and understand the terms involved in it and their units

5.5. Solve the numerical problems involving calculations of bending stress, modulus of section and moment of resistance using bending equation
5.6. Solve the numerical problems involving calculations of safe loads and safe span and dimensions of cross- section using bending equation
5.7. Define and understand the concept of deflection of beams
5.8. Write the deflection formulae without proof for cantilever beam with point load and UDL(Standard cases only) and solve related numerical problems
5.9. Write the deflection formulae without proof for simply supported beam with point load and UDL (Standard cases only) and solve related numerical problems
5.10. Solve numerical problems on deflection of cantilever or simply supported beams subjected to a combination of point load and UDL (Standard cases only)

6. Torsion in Shafts:

6.1. Define and state the functions of a shaft
6.2. Define the terms polar moment of inertia, torsional rigidity and torsional stiffness
6.3. Calculate of polar M.I. for solid and hollow shafts
6.4. List out the assumptions made in theory of simple torsion
6.5. Write the Torsion Equation $T/J = \tau/r = G\theta/L$ (without derivation) and understand the terms involved in it and their units
6.6. Solve numerical problems related to Torsion Equation
6.7. Design of solid and hollow shafts based on strength and solve related numerical problems
6.8. Design of solid and hollow shafts based on rigidity and solve related numerical problems
6.9. Design of solid and hollow shafts based on both strength & rigidity and solve related numerical problems
6.10. Solve numerical problems related to comparison of strength and weight of solid and hollow shafts

COURSE OUTCOMES		CL	Linked POs	Teaching Periods
CO1	Understand the concept of forces, analyze the force systems and find out the resultant of the force systems	R, U, A	1, 2, 3, 7	12
CO2	Compute stress and strain values and find the changes in axial, lateral and volumetric dimensions of bodies of uniform section and of composite section under the influence of normal forces.	R, U, A	1, 2, 3, 7	13
CO3	Locate the centre of gravity of various sections and calculate the Moment of Inertia of standards sections.	U, A	1, 2, 3,	12
CO4	Compute shear force and bending moment at any section of beam and draw the S.F. & B.M diagrams for point loads and UDL.	U, A	1, 2, 3, 7	13
CO5	Calculate bending stresses, safe load, safe span, dimensions of cross section and deflections of the given beam	U, A	1, 2, 3	13
CO6	Estimation of shear stress and angle of deflection when a shaft is subjected to torsion and compares the strength of solid and hollow shafts.	R, U, A	1, 2, 3, 7	12
			Total Periods	**75**

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

CO-PO ATTAINMENT MATRIX:

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

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

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	**1. Force Systems**	1, 2	5(a) 5(b)	7(a) 7(b)	
2	**2. Simple Stresses & Strains**	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit Name	R	U	A	Remarks
1	**3. Geometric Properties of Sections**	1, 2	5(a) 5(b)	7(a) 7(b)	
2	**4. Shear Force & Bending Moment**	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

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

MID SEM - I
MODEL PAPER
Solid Mechanics (ME-302)

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. Define lateral strain.
4. List out any two types of stresses.

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 100 N and 60 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) List out the three elastic constants and write down the relation between them.

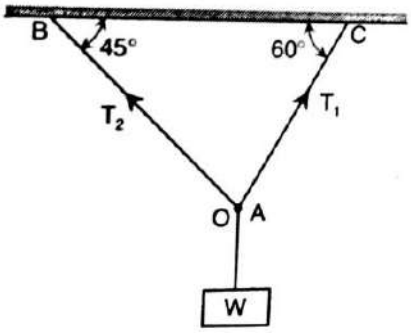
OR

6. (b) Find the diameter of a M.S. rod, carrying a load of 560 kN. If the maximum tensile strength of the rod is 30 N/mm^2.

PART-C 2 X 5 = 10

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

7. (a) A weight of 2 kN 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) Write about the free body diagram. (2M)
8. (a) Draw stress-strain diagram for mild steel, show the salient points on it.

OR

8. (b) A tensile load of 15 kN is applied longitudinally on a mild steel bar having a diameter of 10 mm and 350 mm length. Calculate the extension in the bar, the change in diameter and change in volume. Take E = 2 X 10^5 N/mm^2 and the Poisson's ratio as 0.25.

MID SEM - II
MODEL PAPER
Solid Mechanics (ME-302)

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 cetroidal axes for a quadrant if its radius is R.
3. Name any two types of loads experienced by a beam for the calculation of shear force and bending moment.
4. What is a point of contraflexure?

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) Draw SF and BM diagrams for simply supported beam of length 'L' with a point load 'W' at centre.

OR

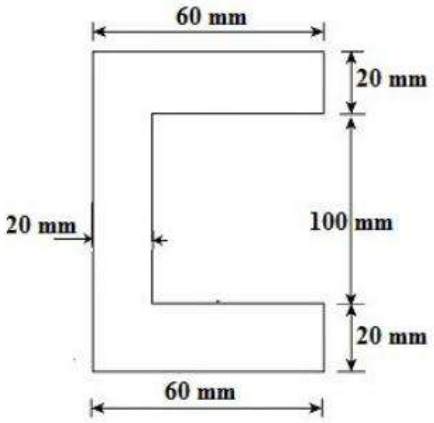
6. (b) Describe any three types of beams with the help of outline sketch.

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.



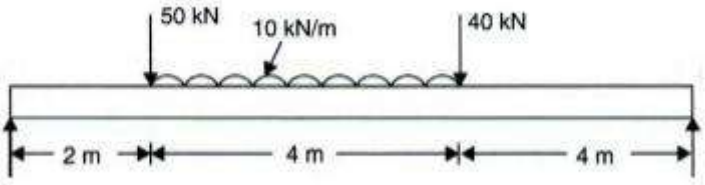
OR

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

8. (a) A cantilever beam of length 2 m carries a uniformly distributed load of 2 kN/m length over the entire span and a point load of 3 kN at the free end. Draw S.F. and B.M. diagrams for the beam.

OR

8. (b) Draw the SF diagram for a simply supported beam of length 10 m carrying a uniformly distributed load and two point loads as shown in the following figure.



BOARD DIPLOMA EXAMINATION, (C-21)
SEE-MODEL PAPER
DME– III SEMESTER EXAMINATION
Solid Mechanics (ME-302)

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 Hooke's law
3. Write significance of finding centroid of a body.
4. Name any two types of loads experienced by a beam for the calculation of shear force and bending moment.
5. Define flexural rigidity.
6. Define neutral axis.
7. Write the expression for polar moment of inertia of a solid shaft having a diameter 'D'.
8. Write the equation for the torque to be transmitted by a hollow shaft in terms of its diameters.

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)Write any three assumptions made in the theory of simple bending.
10. (a) Two rectangles of dimension 100mmX10mm form a T section. Find its its centroid.

OR

10. (b) A solid shaft of 150 mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft, if the maximum shear stress induced in the shaft is $45N/mm^2$.
11. (a) A steel plate of width 100 mm and 30 mm depth. Find the Moment of Inertia about centroidal axes

OR

11. (b)Write the deflection formulae for cantilever with point load at free end and UDL for entire span.
12. (a) A solid circular shaft transmits 1.5 kN-m torque at 1440 rpm. Find the power transmitted by the shaft.

OR

12. (b) The shear stress of the solid shaft is not to exceed to $40N/mm^2$ when the torque transmitted is 20 kN-m. Determine the minimum diameter of the shaft.

PART-C 4 X 5 = 20

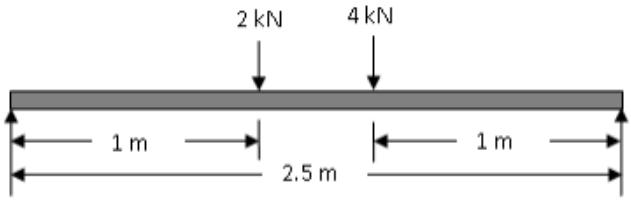
Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks.

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) A wooden beam of rectangular section is subjected to a bending moment of 5 kN-m. If the depth of the section is to be twice the breadth and stress in the wood is not to exceed 60 N/mm^2 , find the dimensions of the cross-section of the beam

14. (a) A simply supported beam of span 2.5 m is carrying two point loads as shown in Fig. given below. Draw the shear force and bending moment diagrams for the beam.



OR

14. (b) A hollow shaft is to transmit 300 kW at 900 rpm. If the shear stress is not exceed 50 N/mm^2 , find the external and internal diameter of the shaft. The internal diameter is 0.6 times the external diameter.

15. (a) A cantilever 3 m long and of rectangular section carries a UDL of 20 kN/m over its entire length. If the maximum stress induced is not to exceed 125 N/mm^2 , find the dimensions of the beam. Take depth of section is twice the width.

OR

15. (b) A simply supported beam of span 3 m is carrying a uniformly distributed total load of 6000 N. The beam has a rectangular section 150 mm wide and 300 mm deep. Calculate the maximum deflection. Take E = 0.1 x 10^5 N/mm^2

16. (a) Find the power transmitted by a circular shaft of 50 mm diameter at 120 rpm, if the maximum shear stress in the shaft is not to exceed 60 N/mm^2.

OR

16. (b) A steel wire of 5 mm diameter is bent into a circular shape of 5 m radius. Determine the maximum stress induced in the wire. Take E = 2 X 10^5 N/mm^2

ME-303 THERMODYNAMICS

Course Title	Thermodynamics	Course Code	ME-303
SEMESTER	III	Course Group	Core
Teaching Scheme in periods (L : T : P)	4:1:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

PREREQUISITES: Basic knowledge of Physics

COURSE OUTCOMES: At the end of the course the students will have the ability to

CO1	Explain Laws of thermodynamics and interpret the gas laws.
CO2	Assess various thermodynamic processes and estimate different thermo dynamic properties.
CO3	Classify fuels and describe experimental procedure to determine their Calorific value
CO4	Analyse different air standard cycles and compare them.
CO5	Illustrate working principles of IC Engines.
CO6	Explain different systems used in IC Engines and evaluate the performance of IC Engines.

BLUE PRINT OF MARKS FOR SEE:

Unit No	Unit Name	Periods	Questions to be set for SEE					Remarks
			R			U	A	
1	Fundamentals of Thermodynamics and perfect gas laws	13	4	1		9(a)	9(b)	
2	Thermodynamic Processes	12						
3	Fuels and Combustion	12		2		10(a)	14(a)	
4	Air Standard Cycles	13						
5	IC Engines – Working Principles	13		3	5 , 6	9(b), 11(a), 11(b)	13(b), 15(a), 15(b)	
6	IC Engines – Systems used and Performance of IC engines	12			7 , 8	10(b), 12(a), 12(b)	14(b), 16(a), 16(b)	

Legend: R-Remembering, U-Understanding, A-Applying

COURSE CONTENT

Unit-1

Duration: 13 Periods (L:10-T:3)

Fundamentals of Thermodynamics and perfect gas laws

Introduction- Thermodynamic systems - properties – Zeroth law , First law, First law applied to closed system (NFEE) and Second Law of Thermodynamics-Perfect gas – Boyle's Law, Charles's law, Avogadro's law, Regnault's law, Joule's law - Ideals Gas equation - Relation between specific heats.

Unit-2

Duration: 12 Periods (L:10-T:2)

Thermodynamic processes

Expression for work done and heat supplied (without derivation) for Isochoric, Isobaric, Isothermal, Isentropic, Polytropic processes – Free expansion and Throttling process – Entropy – Expression for entropy (without derivation) for the above thermodynamic processes.

Unit-3

Duration: 12 Periods (L:10-T:2)

Fuels and Combustion

Fuel – Types – Calorific values (Heating value) of fuels – Dulong's formula for calorific value – Bomb calorimeter – Junker's Gas calorimeter – Definition of combustion of fuel – Calculation of minimum air required (on Mass basis) for the complete combustion of fuel having a given composition – products of combustion – Orsat Apparatus for flue gas analysis.

Unit-4

Duration: 13 Periods (L:10-T:3)

Air Standard Cycles

Air standard cycle – Reversible and irreversible process – Explanation and analysis of Carnot cycle, Otto cycle, Diesel cycle – Expression for efficiency of these cycles (without derivation) – Comparison of performance of Otto cycle and Diesel cycle.

Unit-5

Duration: 13 Periods (L:10-T:3)

IC Engines – Working principles

Heat engines – Internal combustion engines and external combustion engines – classification of IC engines – Components of IC engines – Functions of each part and materials used – Principle of working of four stroke petrol engine and four stroke diesel engine – Principle of

working of two stroke petrol engine – Value timing diagram of four stroke petrol engine and four stroke Diesel engine.

Unit-6

Duration: 12 Periods (L:10-T:2)

IC Engines – Systems used and performance of IC engines

Fuel systems – Ignition systems - Cooling systems – Lubrication systems – Evaluation of performance of parameters.

REFERENCE BOOKS

1. Engineering Thermodynamics by P.K. Nag TMH Publishers
2. Thermal Engineering by R.K Rajput
3. Thermodynamics and Heat Engines Vol 1 and Vol 2 by R Yadav
4. IC Engines by Gill and Smith

SUGGESTED LEARNING OUTCOMES:

1.0 Fundamentals of Thermodynamics and perfect gas laws

1.1 Define the various terms associated with the thermodynamic system. Explain with examples Open system, closed system and isolated system.

1.2 Define the various thermodynamic properties, state, Path, process, Cycle, Temperature, Heat and Work and know sign convention of heat and work.

1.3 Define the Specific heats, Internal Energy, Enthalpy, Flow work – Solve problems on properties of thermodynamic systems.

1.4 Define Thermal equilibrium – Know the Zeroth law of thermodynamics, First law of Thermodynamics, First law applied to closed system and Second law of Thermodynamics.

1.5 Solve problems on First law applied to closed system (Non Flow Energy Equation-NFEE).

1.6 Define perfect gas – Know Boyle's law, Charles's law and Characteristic gas equation (without derivation), Universal gas constant**.**

1.7 Solve problems on above gas laws.

1.8 Define the relation between specific heats (without derivation) – solve problems

1.9 State Avogadro's law, Renault's law and Joule's law.

2.0 Thermodynamic processes

2.1 Know expression for work done and heat supplied (without derivation) for Isochoric process.

2.2 Know expression for work done and Heat supplied for Isobaric process

2.3 Know expression for work done and heat supplied for Isothermal process.

2.4 Solve problems on the above processes.

2.5 Know expression for work done and heat supplied (without derivation) for Isentropic, process.

2.6 Know work done and heat supplied (without derivation)for Polytropic process.

2.7 Know the relation between pressure, volume and temperature in Adiabatic (isentropic) process.
2.8 Sketch all the above processes during expansion and compression on P-V diagram.
2.9 Solve problems on above processes.
2.10 Know throttling process and Free expansion process.
2.11 Define Entropy and know expression for change in entropy for various thermodynamic processes (without derivation).
2.12 Solve problem on change in entropy.

3.0 Fuels and Combustion

3.1 Define the term fuel- Classification of fuels –Different solid fuels, stages of formation of coal, advantages and disadvantages of solid fuels.
3.2 Different Liquid fuels gaseous fuels- Their advantages and disadvantages.
3.3 Define higher calorific value (heating value) and Lower calorific value- Know Calorific value of fuels by using Dulong's formula.
3.4 Explain with line diagram the components of Bomb calorimeter narrate the sequence of determination of calorific value and write final formula to find calorific value (problems omitted).
3.5 Explain the working principle of Junker's gas calorimeter narrate the sequence of determination of calorific value and write final formula to find calorific value (problems omitted).
3.6 Define Combustion of fuel, know the expression for minimum air required (on Mass) for complete combustion of fuel and solve problems.
3.7 Know the products of combustion (problem omitted).
3.8 Explain with line diagram the working of Orsat's apparatus and narrate the sequential procedure in conducting flue gas analysis by using Orsat's apparatus.

4.0 Air Standard Cycles

4.1 Define the term air standard cycle. Know assumptions for air standard cycle.
4.2 State the assumptions made in Carnot cycle and study its working with line diagram.
4.3 Write the formula for the air standard efficiency of a Carnot cycle (without derivation) and solve simple problems.
4.4 State the assumptions made in Otto cycle and study its working with a line diagram.
4.5 Write the formula for the air standard efficiency of a Otto cycle (without derivation) and solve simple problems.
4.6 State the assumptions made in Diesel cycle and study its working with line diagram.
4.7 Write the formula for the air standard efficiency of a Diesel cycle (without derivation) and solve simple problems.
4.8 Compare the differences between Otto cycle and Diesel cycle.

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5.0 IC Engines – Working principles

5.1 Define Heat engine- comparisons of Internal Combustion Engines and External Combustion Engines- classify Internal Combustion Engines.

5.2 Explain with line diagram of an IC Engine , name the various parts and briefly explain their functions. Know the various terms associated with IC Engine

5.3 Explain the working of four stroke petrol engine (SI) with line diagram.

5.4 Explain theoretical indicator diagram, valve timing diagram of four stroke petrol (SI) engine.

5.5 Explain the working of four stroke Diesel engine (CI) with line diagram.

5.6 Explain theoretical indicator diagram, valve timing diagram of four stroke Diesel (CI) engine.

5.7 Explain the working of two stroke petrol engine (SI) with line diagram. Draw the Indicator diagram.

5.8 Compare the differences between two stroke engine and four stroke engine

5.9 Compare the differences between petrol engine and Diesel engine.

6.0 IC Engines- Systems used and performance analysis of IC engines

6.1 Know the functions of the elements of the fuel system in a petrol engine (Fuel tank, Fuel pump, Fuel filter, Air cleaner and carburettor).

6.2 Know the functions of various elements of the fuel systems of Diesel engine (Fuel Feed pump, Filter, Fuel Injection pump and Fuel injector).

6.3 Explain with line diagram the working of Battery Ignition system.

6.4 Explain with line diagram the working of Magneto Ignition system- compare Battery ignition system with Magneto ignition system.

6.5 Know the necessity of cooling of IC engine. Study with legible sketch Air cooling system, forced circulation water cooling system and forced circulation liquid coolant system and compare them.

6.6 Know the necessity of Lubrication of IC engine and know the parts to be lubricated.

6.7 Understand the lubrication system with a line diagram and know the components of lubricating system (Oil pump, Oil strainer pressure relief valve, oil gallery pressure gauge etc).

6.8 Define the performance analysis of IC engines like Indicated power, Brake power, Indicated mean effective pressure ,brake mean effective pressure, Friction power, Specific fuel consumption, Mechanical efficiency, Thermal efficiency and know their formulae.

6.9 Solve simple problems involving above parameters.

SUGGESTED STUDENT ACTIVITIES:

1. Make a list of different bikes available in market and know their capacities.
2. Make list of different cars available in market and know their capacities.
3. Visit to automobile workshops /service centers and see how an IC engine works

4. Make a note on the solid, liquid fuels available in market and know their calorific values.
5. Collect the data of pressure required in tyres of a two wheeler and four wheeler
6. Collect data of different engine oils used in automobiles.
7. Collect information of different liquid coolants used in automobiles.
8. Study of cutout models of IC engines.
9. Working of bomb calorimeter
   https://www.youtube.com/watch?v=nJOH29SGcCk
10. Visit to automobile workshop.
11. Working of IC Engine
    https://www.youtube.com/watch?v=O9tfIfwlmz8
12. Know fuel system
    https://www.youtube.com/watch?v=DCfyUm3I4oI
13. *Know battery ignition system*
    https://www.youtube.com/watch?v=OMLSNwQiiKg
14. *Know cooling system in automobile*
    https://www.youtube.com/watch?v=V7inC4lOpGs
15. *Know lubrication system*
    https://www.youtube.com/watch?v=mmmcj53TNic

CO-PO MATRIX:

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

QUESTION PAPER BLUE PRINT FOR CIE (MID SEM I)

Unit No	Unit Name	Questions to be set for CIE			Remarks
		R	U	A	
1	Fundamentals of Thermodynamics and perfect gas laws	Q No 1 Q No 2	Q No 5(a) Q No 5(b)	Q No 7(a) Q No 7(b)	
2	Thermodynamic processes	Q No 3 Q No 4	Q No 6(a) Q No 6(b)	Q No 8 (a) Q No 8(b)	

QUESTION PAPER BLUE PRINT FOR CIE (MID SEM II)

Unit No	Unit Name	Questions to be set for CIE			Remarks
		R	**U**	**A**	
3	Fuels and Combustion	Q No 1 Q No 2	Q No 5(a) Q No 5(b)	Q No 7(a) Q No 7(b)	
4	Air Standard Cycles	Q No 3 Q No 4	Q No 6(a) Q No 6(b)	Q No 8 (a) Q No 8(b)	

BOARD DIPLOMA EXAMINATION
SEMESTER END EXAM MODEL PAPER
THERMODYNAMICS (ME-303)

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

PART – A

8 X1 = 8

NOTE: 1)Answer **all** questions and each question carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceeding **three** simple sentences

1. Define heat.
2. Define calorific value of solid fuel.
3. State any two functions of lubricants.
4. Define TDC
5. Define clearance volume.
6. State the two functions of connecting rod.
7. State two functions of cooling systems in IC engine
8. State the function of fuel injection.

PART – B

NOTE: *Answer **all** questions . Each question carries **three** marks*

4X3 =12

9(a) Define specific heat ? List two specific heats for gases.

OR

9(b) Draw ideal indicator diagram for 4-stroke petrol engine.

10(a) A sample of coal has the mass analysis as C= 60 % , H_2 =15 %, O_2=15%, N_2 =5 %, S= 3% remaining ash. Calculate the minimum air required for complete combustion of 1 kg of coal.

OR

10(b) Why ignition is required in S.I engine.

11(a) State any three differences between S.I engine and C.I engine.

OR

11(b) State any three advantages of IC engine over EC engine.

12(a) Draw the line diagram of petrol engine fuel system .

OR

12(b) During a trial of 4 stroke diesel engine the following observations were recorded.

Area of indicator diagram = 475 mm^2 , Length of indicator diagram = 62 mm

Spring number = 1.1 bar/mm

Determine indicated mean effective pressure.

PART – C

NOTE: Answer **all** questions . Each question carries **five** marks 4X5 = 20

13 (a) A quantity of gas has an initial pressure , volume and temperature of 150 kN/m^2 , 0.14 m^3 and 25^o C respectively. It is compressed to a pressure of 1.5 MN/m^2 according to the law $PV^{1.25}$= constant. Determine (a) Work transfer to the gas (b) heat transfer from the gas and (c) The change of entropy. Take C_p = 1.041 kJ/kg K , C_V = 0.743 kJ/kg K.

OR

13 (b) Explain working of four stroke petrol engine with a neat sketch.

14 (a) Explain the working of Junkers gas calorimeter with a neat sketch.

OR

14 (b) Explain the differences between coil ignition and magneto ignition system.

15 (a) Explain valve timing diagram for 4 stroke C.I engine.

OR

15 (b) Explain construction features of IC engine with line diagram.

16 (a) Explain working of simple carburetor with neat sketch..

.

OR

16 (b) The following results were obtained from a test on a petrol engine.

Indicated power = 30.3 kW , Brake power = 26.05 kW

Brake specific fuel consumption = 0.315 kg/kW.h , calorific value of fuel = 44100 kJ/ kg

Calculate (i) Indicated thermal efficiency

(ii) Brake thermal efficiency

(iii) Mechanical efficiency.

***

BOARD DIPLOMA EXAMINATION

MID SEM-I MODEL PAPER

THERMODYNAMICS (ME-303)

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

PART – A 8 X1 = 8

NOTE: 1)Answer **all** questions and each question carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceeding **three** simple sentences

1. Define state.
2. Define perfect gas.
3. Draw P-V diagram of Isothermal process.
4. Define entropy.

PART – B

NOTE: *Answer **all** questions . Each question carries **three** marks*

4X3 =12

5. (a) State First law of thermodynamics.

OR

5. (b) State Boyel's law.
6. (a) Represent Adiabatic and Isobaric process on P-V and T-S diagram.

OR

6 (b) Write an expression change of entropy for Isochoric process.

PART – C

NOTE: Answer **all** questions . Each question carries **five** marks 4X5 = 20

7 (a) Write Second law of thermodynamics (both Kelvin planck and clausius statements) OR

7 (b) 3 kg of an ideal gas is connected in a rigid cylinder 25 kJ of heat is added to the gas, which has an initial temperature of 30^{o} C. Determine (a) Final temperature and (b) change in entropy Assume R = 0.317 kJ/kg K and adiabatic index = 1.26

8 (a) A thermodynamic system undergoes a cycle composed of a series of three processes for which Q_1 = + 10 kJ , Q_2 = + 30 kJ , Q_3 = - 5kJ. For the first process delta E= +20 kJ and for the third process delta E = - 20 kJ. What is the work in the second process and network output of cycle.

OR

8 (b) Explain Isothermal and polytropic processes. Write an expression for change of entropy for above processes.

DME III SEMESTER
MID SEM II EXAMINATION
THERMODYNAMICS (ME-303)
MODEL PAPER

Time : 1 hr **Total Marks : 20**

PART – A

8 X1 = 8

NOTE: 1)Answer **all** questions and each question carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceeding **three** simple sentences

1. Define fuel.
2. Define air standard efficiency.
3. What is combustion
4. State any two assumptions made in analysis of air standard cycle.

PART – B

NOTE: *Answer **all** questions . Each question carries **three** marks*

4X3 =12

5 (a) Define HVC and LCV.

OR

5 (b) A sample of coal has the following mass analysis C= 60 % , H_2 = 15 % , O_2 =15 % , N_2 = 5 % , S = 3% remaining ash. Calculate the minimum air required for complete combustion of 1 kg of coal.

6. (a) State any three differences between Otto cycle and Diesel cycle.

OR

6 (b) Draw P-V and T-S diagram for Diesel cycle.

PART – C

NOTE: Answer **all** questions . Each question carries **five** marks 4X5 = 20

7. (a) Explain construction and working of Bomb calorimeter.

OR

7 (b) A sample of coal has the following composition by mass carbon 75%, hydrogen 6%, oxygen 8%, nitrogen 2%, sulphur 1.5% and ash 7%. Calculate its higher and lower calorific values per kg of coal.

8 (a) Describe the processes involved in a carnot cycle and draw P-V diagram.

OR

(b) A diesel engine has a compression ratio 14 to 1 , and the heat supply is cut-off at 0.06 stroke. Find the air standard efficiency of the cycle. Assume adiabatic ratio as 1.4

ME-304 ENGINEERING MATERIALS

Course Title	Engineering Materials	Course Code	ME-304
Semester	III	Course Group	Core
Teaching Scheme in Periods (L: T: P)	4:1:0	Credits	3
Methodology	Lectures + Tutorials	Total contact periods	75
CIE	60 marks	SEE	40 marks

PREREQUISITES: Basic knowledge of Physics and Chemistry

COURSE OUTCOMES:

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

CO1	Understand the properties of engineering materials and know the testing methods to analyse the mechanical properties
CO2	Acquire knowledge on structure of materials.
CO3	Understand the process of producing Iron and steel by various processes.
CO4	Study Iron-Carbon equilibrium diagram and interpret all the microstructures of iron and steel and eutectic, eutectoid and peritectic reactions. Involved
CO5	Describe the various heat treatment processes of steel and their importance.
CO6	Explain composition, application of important Ferrous and Nonferrous metals, their alloys and describe various methods used in powder metallurgy.

BLUE PRINT OF MARKS FOR SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">No of Periods</th><th colspan="3">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>1</td><td>Mechanical properties and Testing of engineering materials</td><td>12</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</td><td>Structure of materials</td><td>13</td></tr>
<tr><td>3</td><td>Production of Iron and Steel</td><td>12</td><td colspan="2">Q 2</td><td>Q10(a)</td><td>Q14 (a)</td><td></td></tr>
<tr><td>4</td><td>Iron -Carbon Equilibrium Diagram</td><td>13</td></tr>
<tr><td>5</td><td>Heat treatment of Steel</td><td>13</td><td rowspan="2">Q 3</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</td><td>Ferrous, Non Ferrous Metals - their alloys and Powder Metallurgy</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>

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

COURSE CONTENT

Unit – 1

Duration:12 Periods (L: 10 – T:2)

Mechanical properties and testing of engineering materials

Engineering Materials –Importance and applications of engineering materials, mechanical properties: strength (Tensile strength, Compressive strength and shear strength), stiffness elasticity, plasticity, Ductility, Malleability, Hardness, Toughness, Brittleness, Impact strength, Fatigue, Creep.

Testing of Engineering materials: **Destructive tests**– Tensile and Compressive test ,shear test, stress- strain curve for different materials – Brinell, Rockwell and Vickers's hardness test –Izod & Charpy impact test. Non-destructive testing: purpose – Different methods (without explanation)

Unit – 2

Duration:13 Periods (L: 10 – T:3)

Structure of materials

Space lattices, Unit cells – BCC, FCC, HCP structures. Crystallization of metal: dendrite growth, grain boundary, grain size and its effect on properties–factors affecting grain size - Recrystallisation

Unit – 3

Duration: 12 Periods (L:10 – T:2)

Production of Iron and Steel

Raw materials used in production of Iron and steel – Production of**:** Pig Iron by Blast Furnace, Wrought Iron by Puddling furnace, Cast Iron from Cupola, Steel by Bessemer Process, L.D. Process, Open Hearth Process, Electric Arc process and Electrical Induction process.

Unit – 4

Duration: 13 Periods (L: 10 – T:3)

Iron-Carbon Equilibrium Diagram

Phase, equilibrium, Gibb's phase rule, alloy, solid solution: Interstitial, substitutional, chemical compound, mechanical mixture – Cooling curves of pure metals – Allotropic forms of pure iron and critical points – Micro constituents of Iron & Carbon alloy – Iron Carbon equilibrium diagram.

Unit – 5

Duration: 13 Periods (L: 10 – T:3)

Heat Treatment of Steel.

Stages in heat treatment – critical rate of cooling – martensite, bainite, sorbite and troostite- Isothermal transformation (TTT curves) - Austenite decomposition on continuous cooling transformation (CCT) diagram

Heat treatment processes: Annealing – Full Annealing, Sub critical annealing, spheroidise annealing and isothermal annealing. Normalising, Hardening, Tempering – Austempering and Martempering, Surface hardening and Case hardening (only definition).

Unit – 6

Duration: 12 Periods (L: 10 – T:2)

Ferrous, Non-Ferrous metals - their alloys & Powder metallurgy

Ferrous Metals and alloys–cast iron and types – effect of carbon on properties of cast iron-composition, properties and applications of white cast iron, gray cast iron, nodular iron and malleable Iron – Plain carbon steels – effect of carbon on properties. classification of plain carbon steels – Alloy steels: Effect of adding alloying elements chromium, cobalt, manganese, molybdenum, nickel, tungsten, vanadium – composition, properties and application of chromium steel, nickel steel, manganese steel, stainless steel and HSS steel.

Non-Ferrous metals and alloys - composition, properties and application of duralumin, dow metal, Brass: cartridge brass, admiralty brass, muntz metal, and naval brass. Bronze**:** gun and bell metal Nickel: constantan, Monel, nichrome and invar. Babbit

Powder metallurgy: Definition and applications – Manufacturing process in powder metallurgy, methods to produce metal powders – methods to compact powders (without explanation) – Pre sintering and sintering (definition) – Advantages, limitations of powder metallurgy.

Note: At the end of every unit Tutorial classes should be held to interact with the students by various methods (slip test, seminar, quiz, virtual labs etc.) to enhance the skill and to create student centric learning.

REFERENCEBOOKS:

1. Introduction to Physical metallurgy by Avner
2. Physical metallurgy by V. Raghavan
3. Material science and engineering by V. Raghavan
4. Material science and metallurgy by Dr. O.P. KHANNA
5. Powder Metallurgy by TTTI, ECH

SUGGESTED LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1. **Mechanical properties and testing of engineering materials.**
   - 1.1 Know the importance of materials in industry.
   - 1.2 Applications of engineering materials.
   - 1.3 Classification of engineering materials.
   - 1.4 Identify the various factors for selection of engineering materials
   - 1.5 Know different mechanical properties like strength (tensile, compressive and shear strengths) stiffness, elasticity, plasticity, ductility, malleability, hardness, toughness, brittleness, impact strength, fatigue, creep.
   - 1.6 Draw stress-strain curves for different materials.
   - 1.7 Know the various Destructive tests and Non -destructive tests.
   - 1.8 Describe tensile test and compression test on mild steel using universal testing machine(UTM)
   - 1.9 Describe shear test
   - 1.10 Describe Brinell hardness test.
   - 1.11 Describe Rockwell hardness test
   - 1.12 Describe Vickers hardness test.
   - 1.13 Conduct Izod and Charpy impact tests.
   - 1.14 State the purpose of different Non -destructive tests used in industry

2. **Structure of materials**
   - 2.1 Understand the terms Space lattices, Unit cells
   - 2.2 Draw the structure, calculate effective number of atoms of BCC structure and mention some materials which have the BCC structure
   - 2.3 Draw the structure, calculate effective number of atoms of FCC structure mention some materials which have the FCC structure.
   - 2.4 Draw the structure, calculate effective number of atoms of HCP structure mention some materials which have the HCP structure.
   - 2.5 Explain the process of crystallisation of metals and discuss the process of grain formation, dendritic growth and grain boundaries
   - 2.6 Explain factors effecting grain size.
   - 2.7 Explain the process of recrystallisation

3. **Production of iron and steel**
   - 3.1 Name the raw materials used in production of Iron and steel
   - 3.2 Describe the production of Pig Iron by Blast Furnace.
   - 3.3 Describe the production of Wrought Iron by puddling furnace.
   - 3.4 Understand the production of Cast Iron from Cupola furnace.
   - 3.5 Illustrate the production of steel by Bessemer process.
   - 3.6 Describe the production of steel by L.D. Process.
   - 3.7 Know the production of steel by Open Hearth process.
   - 3.8 Understand the production of steel by Electric Arc process.
   - 3.9 Describe the production of steel by Electrical Induction process.

4. Iron -carbon equilibrium diagram.

4.1 State Gibbs phase rule and define the terms involved.
4.2 Know the importance of alloy and its advantages
4.3 Understand solid solution
4.4 Discus Interstitial and substitutional solid solutions
4.5 Describe chemical compound, and mechanical mixture.
4.6 Sketch Cooling curves of pure metals
4.7 Discuss allotropic forms of pure iron and identify the critical points
4.8 Explain the following micro constituents of Iron & Carbon alloy: ferrite, austenite, cementite, ledeburite, pearlite, steel, eutectoid steel, hypo eutectoid steel and hyper eutectoid steel.
4.9 Sketch Iron- Carbon equilibrium diagram and understand salient points on it.
4.10 Describe peritectic, eutectic, eutectoid reactions.

5. Heat treatment of steel.

5.1 Importance of heat treatment.
5.2 know the stages in heat treatment
5.3 Define critical rate of cooling, martensite, bainite, sorbite and troosite
5.4 Draw TTT curves (isothermal transformations) and interpret it.
5.5 Sketch austenite decomposition on continuous cooling transformation (CCT) diagram.
5.6 Explain Annealing heat treatment process
5.7 Compare full Annealing, Sub critical annealing, spheroidise annealing and isothermal annealing
5.8 Describe Normalising process and its importance
5.9 Describe hardening process and its importance
5.10 Describe Tempering process and its importance.
5.11 Explain the processes Austempering and Martempering
5.12 Define Surface hardening and Case hardening.

6. Ferrous metals and alloys &Non ferrous metals and alloys & powder metallurgy.

6.1 Discuss the effect of carbon on properties of cast iron
6.2 List different types of cast irons
6.3 Compare the composition and applications of white cast iron, Gray cast iron, nodular iron and malleable Iron
6.4 Classify the plain carbon steels
6.5 Discus the effect of carbon on properties of steel
6.6 Describe the effect of adding alloying elements chromium, cobalt, manganese, molybdenum, nickel, tungsten, vanadium to steel
6.7 Define ternary, quaternary and complex alloy steel
6.8 Explain the composition, properties and application of chromium steel, HSS steel, nickel steel, manganese steel and stainless steel.
6.9 List composition, properties and application of duralumin, dow metal
6.10 Give composition, properties and application of brass, cartridge brass, admiralty

brass, muntz metal, and naval brass.

6.11 Explain the importance of Bronze, gun metal and bell metal

6.12 Discuss the composition and application of Nickel alloys: constantan, Monel, Nichrome and invar.

6.13 Write composition and application of Babbit metal

6.14 Define Powder metallurgy

6.15 Describe the manufacturing process in powder metallurgy.

6.16 Write the processes to produce metal powders.

6.17 List the methods to compact powders

6.18 Define Pre sintering and sintering.

6.19 Write advantages and limitations of powder metallurgy.

6.20 Applications of powder metallurgy.

SUGGESTED STUDENT ACTIVITIES:

1. Make a list of commonly used materials in daily life like blade, knife, scissors etc and write the material used.
2. Study microstructure of given specimen.
3. Study micro structure of given specimen after it is welded and notice the difference.
4. Visit to a steel plant
5. Compare hardness of commonly available materials and interpret.
6. Make a list of major parts of a two wheeler and know the material used.
7. Visit a heat treatment plant.

SUGGESTED E-RESOURCES:

1. Crystal lattice and unit cell
   https://www.youtube.com/watch?v=BjVTdZ_htu8
2. BCC, FCC and HCP crystal structure
   https://www.youtube.com/watch?v=tq7botEnakA
3. Production of pig iron by blast furnace
   https://www.youtube.com/watch?v=D3ejDgChEhw
4. Production of Wrought Iron by Puddling furnace
   https://www.youtube.com/watch?v=XJ0GyofGchI
5. Production ofCast Iron from Cupola
   https://www.youtube.com/watch?v=Cgbpbw5GRK4
6. Production ofSteel by Bessemer Process
   https://www.youtube.com/watch?v=uh_RAMqRgrk
7. Production ofSteel by Open Hearth Process
   https://www.youtube.com/watch?v=LxH-B1efDnI
8. Production ofSteel by electric arc furnace
   https://www.youtube.com/watch?v=7oSbZgjXlFo
9. Production ofSteel by electrical induction process
   https://www.youtube.com/watch?v=5TLBdBXzMsg

COURSE OUT COMES		CL	LINKED PO'S	TEACHING PERIODS
CO1	Understand the properties of engineering materials and know the testing methods to analyse the mechanical properties	R, U, A	1,2,3.4	12
CO2	Acquire knowledge on structure of materials.	R, U, A	1,3,4,7	13
CO3	Understand the process of producing Iron and steel by various processes.	R, U, A	1,2,4,5	12
CO4	Study Iron-Carbon equilibrium diagram and interpret all the microstructures of iron and steel and reactions involved.	R, U, A	1,2,4,7	13
CO5	Describe the various heat treatment processes of steel and their importance.	R, U, A	1,2,4,7	13
CO6	Explain composition, application of important Ferrous and Non-ferrous metals, their alloys and describe various methods used in powder metallurgy.	R, U, A	1,2,3,5	12
			TOTAL PERIODS	**75**

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

CO-PO ATTAINMENT MATRIX

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

Level-3-highly addressed, Level-2-moderately addressed, Level-1-Lowely addressed

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	**Mechanical properties and Testing of engineering materials**	1, 2	5(a) 5(b)	7(a) 7(b)	
2	**Structure of materials**	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		**4**	**4**	**4**	

MID SEM-II EXAM

S.No	Unit Name	R	U	A	Remarks
3	Production of Iron and Steel	1, 2	5(a) 5(b)	7(a) 7(b)	
4	Iron -Carbon Equilibrium Diagram	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		**4**	**4**	**4**	

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

MODEL PAPER

MID SEM I EXAMINATION

DME III SEMESTER

ENGINEERING MATERIALS

Time: 1 hr **Total Marks: 20**

PART – A Marks: 4 X 1 M = 4 M

*NOTE: 1) Answer **all** questions and each question carries **one** marks.*

*2) Answers should be brief and straight to the point and shall not exceed **three** simple sentences*

1. Define the term strength
2. Define the term creep
3. What is meant by unit cell?
4. Draw the shape of dendrite.

PART – B Marks : 2 X 3 M= 6 M

NOTE: 1) Answer **all** questions and each question carries **three** marks

2) The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

5 (a) Write the importance of engineering materials in industry.

OR

5 (b) Write any three differences between Izod and Charpy impact test .

6 (a) Describe factors affecting the grain size.

OR

6 (b) Calculate effective numbers of atoms in FCC structure.

PART – C

Marks: 2 X 05 M= 10 M

NOTE: 1)Answer **all** questions and each question carries **five** marks

2)The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

7 (a) Explain the procedure to conduct the tensile test on mild steel by UTM

OR

7(b) Explain about Vickers hardness test

8 (a) Explain BCC structure with the help of sketch.

OR

8 (b) Explain the process of recrystallisation.

ME-304

MODEL PAPER

MID SEM II EXAMINATION

DME III SEMESTER

ENGINEERING MATERIALS

Time: 1 hr **Total Marks: 20**

PART – A Marks: 4 X 1 M = 4 M

*NOTE: 1) Answer **all** questions and each question carries **one** marks.*

*2) Answers should be brief and straight to the point and shall not exceed **three** simple sentences*

1. What are the different raw materials for production of iron?
2. Name the type of iron produced by puddling furnace.
3. Define alloy.
4. What is a solid solution?

PART – B Marks: 2 X 3 M= 6 M

NOTE: 1) Answer **all** questions and each question carries **three** marks

2) The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

5 (a) List two types of electric furnaces.

OR

5 (b) Write the principle of steel making.

6 (a) Define interstitial solid solution and substitutional solid solution.

OR

6 (b) Write short note on eutectoid steel.

PART – C

Marks: 2 X 05 M= 10 M

NOTE: 1)Answer **all** questions and each question carries **five** marks

2)The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

7(a) Explain about steel production by L-D Process.

OR

7(b) Explain production of wrought iron by puddling furnace.

8 (a) Discuss allotropic forms of pure iron and identify the critical points.

OR

8(b) Explain peritectic, eutectic, and eutectoid reactions in iron carbon equilibrium.

ME-304

SEE- MODEL PAPER
BOARD DIPLOMA EXAMINATION
DME III SEMESTER
ENGINEERING MATERIALS

TIME: 2 Hours Max. Marks: 40

PART – A Marks: 8 X 1 M = 8M

NOTE:1) Answer **all questions** and each question carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceeding **three** simple sentences

1. Define the term malleability.
2. What are the by-products of blast furnace?
3. What is meant by non-ferrous metal?
4. Define shear strength.
5. Define the term heat treatment.
6. Name any two annealing processes.
7. What is steel?
8. What is meant by sintering?

PART – B

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

4 x 3 M = 12M

9 (a) Write short notes on a) creep b) fatigue.

OR

9 (b) What are the three stages of heat treatment of steel?

10 (a) Write the function of coke and lime stone in production of iron.

OR

10 (b) Write the composition of High speed steel. And its applications.

11(a) Write about tempering process and its importance.

OR

11 (b) Explain sub critical annealing.

12 (a) Classify plain carbon steels.

OR

12 (b) what are the advantages of powder metallurgy?

PART – C

Answer **all** questions . Each question carries **five** marks **4 x 5 M = 20 M**

13 (a) Explain BCC structure with sketch and name the materials which have the BCC structure.

OR

13 (b) Explain normalising process.

14 (a) Explain production of cast iron by cupola furnace.

OR

14 (b) Write short notes on below two methods of manufacture of metal powders

i) Mechanical pulverisation ii) atomisation

15 (a) Explain continuous cooling transformation (CCT) curves.

OR

15 (b) Explain hardening processes.

16 (a) Write composition, properties and application of Babbitt metal.

OR

16 (b) Explain briefly the sequence of operation in producing a part by powder metallurgy.

ME-305 FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Title	Fluid Mechanics and Hydraulic Machinery	Course Code	ME-305
Semester	III	Course Group	Core
Teaching Scheme in Periods (L: T: P)	4:1:0	Credits	3
Methodology	Lectures + Tutorials	Total contact periods	75
CIE	60 marks	SEE	40 marks

PREREQUISITES: Basic knowledge of physics.

COURSE OUTCOMES: At the end of the course the students will be able to

CO1	Selection of suitable fluid for various applications based on fluid properties.
CO2	Applying concept of Bernoulli's equation for flow of liquids
CO3	Estimate frictional losses and design the pipe for flow of liquids through pipes.
CO4	Analyze forces on plates or vanes due to impact of jets
CO5	Describe the working of water turbines and estimate the power developed by turbines
CO6	Describe a hydraulic pump and estimate the power required to operate hydraulic pumps.

BLUE PRINT OF MARKS FOR SEE

Unit No	**Unit Name**	**No of Periods**	**Questions to be set for SEE**				**Remarks**
			R		**U**	**A**	
1	Properties of Fluids	12	Q4	Q1	Q9(a)	Q13(a)	
2	Flow of Liquids	12					
3	Flow through pipes	12		Q 2	Q10(a)	Q14 (a)	
4	Impact of jets	13					
5	Water Turbines	13		Q 3 Q5 Q6	Q9(b) Q11(a) Q11(b)	Q13(b) Q15(a) Q15(b)	
6	Pumps	13		Q 3 Q7 Q8	Q10(b) Q12(a) Q12(b)	Q14(b) Q16(a) Q16(b)	
TOTAL		**75**	**08**		**08**	**08**	

Legends: R; Remembering, U: Understanding & A: Applying

COURSE CONTENT

UNIT-1

Duration: Periods 12 (L: 09 – T: 03)

Properties of fluids

Definition of fluid, ideal and real fluids, compressible and incompressible fluids -Units used in fluid mechanics. Density, specific weight, specific gravity, viscosity and surface tension, compressibility and capillarity. Intensity of pressure, gauge and absolute pressures. Measurement of pressures by piezometer, U-Tube – manometer – simple problems – Bourdon tube pressure gauge.

UNIT-2

Duration: Periods 12 (L: 10 – T: 02)

Flow of Liquids

Types of Fluid flow- Steady and Unsteady flow, Uniform and Non-Uniform Flow,1D,2D&3D Flow, Rotational and Irrotational flow, Laminar & Turbulent flow- Concept on Reynolds's Number, Discharge, Continuity equation for compressible and incompressible fluids- Simple problems on continuity equation- Pressure, potential and kinetic energy of liquids - Total energy, Bernoulli's equation (no derivation) – assumptions made, Simple problems on Bernoulli's equation, Working principle of Venturi meter, Simple Problems on Venturi meter, Pitot tube – principle –applications.

UNIT-3

Duration: Periods 12 (L: 09 – T: 03)

Flow through pipes

Concept of loss of head in pipes due to friction, Darcy's & Chezy's formula (without proof), Simple problems on Darcy's and Chezy's formulae, Hydraulic gradient line and Total energy line-illustration, Calculation of discharge, velocity, diameter of pipe etc., for pipes connecting two reservoirs (considering frictional losses only), Siphon – principle of working (Numerical problems omitted), Expression for power transmitted through pipes. Expression for transmission efficiency, condition for maximum efficiency (without proof.), Simple problems on power transmission

UNIT-4

Duration: Periods 13 (L: 10 – T: 03)

Impact of jets

Derivation of formulae for the force of jet on Stationary vertical flat plate, stationary inclined flat plate, Stationary curved plate and Simple problems on the above, Derivation of formulae for the force of jet on moving vertical flat plate. Derivation of formulae for the force of jet on series of moving plates fixed on the rim of a wheel, Simple problems on the above, Force of jet striking on a moving curved blade when jet strikes tangentially at one end of the tip - velocity triangles, Work done, power and efficiency in the above cases, Simple problems on the above.

UNIT-5

Duration: Periods 13 (L: 10 – T: 03)

Water turbines

Introduction to water turbines- Hydro-electric power stations line sketch showing layout of hydro-electric power plant with head race, dam, sluice gate, pen stock turbine, generator and tail race, Classification of turbines-impulse and reaction turbines, Brief sub-classification as axial, radial and tangential flow type, Working principle of Pelton wheel-velocity triangles, Simple problems, Working principle of Francis turbine - velocity triangles, Simple problems, Working principle of Kaplan turbine - velocity triangles, Simple, problems, Differences between Pelton wheel and Francis Turbines, Differences between Francis and Kaplan turbines, Governing of methods of Water turbines

UNIT-6

Duration: Periods 13 (L: 10 – T: 03)

Pumps

Pump-Function – Classification, Principle of operation of a reciprocating pump, Constructional details of single acting, double acting pumps. Expression for theoretical power required to drive the pump (without proof)-slip- Simple problems, working principle of centrifugal pump, Installation of centrifugal pump, Priming of centrifugal pump – necessity-Cavitation in centrifugal pump -, Simple problems on work, power and efficiency of Centrifugal pumps, Difference between Reciprocating pump and Centrifugal pump.

SUGGESTED STUDENT ACTIVITIES:

1. Visit nearby Hydroelectric power station and observe dam, penstock, turbines, generators etc.
2. Visit nearby pumping station and identify the pumps used.
3. Quiz
4. Group discussion
5. Surprise test
6. Seminars

SUGGESTED LEARNING OUTCOMES:

Upon the completion of the course the student should be able to

1. **Understand the various properties of fluids**
   - 1.1 Define fluids.
   - 1.2 Differentiate between ideal and real fluids
   - 1.3 Differentiate between compressible and incompressible fluids
   - 1.4 State the various units used in Hydraulics
   - 1.5 Define various properties of fluids and state their units
   - 1.6 Solve problems on properties of fluids
   - 1.7 Define intensity of pressure and their units, differentiate between gauge pressure and absolute pressure.
   - 1.8 Solve problems on pressure.
   - 1.9 Explain the working principle of manometer Solve simple problems on simple U–tube manometer.
   - 1.10 Borden tube pressure gauge

2. **Understand the behavior of liquids in motion**
   - 2.1 Distinguish types of fluid flows and concept on Reynolds's number.
   - 2.2 State the various type of energies and the total energy.
   - 2.3 Know about the Discharge and velocity of a flowing liquid
   - 2.4 Understand the equation of continuity and solve simple problems
   - 2.5 State Bernoulli's equation and its application in hydraulics
   - 2.6 Solve simple problems on Bernoulli's equation
   - 2.7 Explain the working principle Venturi meter and simple problems on Venturi meter.
   - 2.8 Explain the working principle pitot tube simple problems pitot tube.

3. **Evaluate frictional losses during flow of liquids through pipes**
   - 3.1 Mention the equation for loss of head due to friction in pipes
   - 3.2 State Darcy's and chezy's formulae and simple problems
   - 3.3 Explain the hydraulic gradient and total energy line
   - 3.4 Calculate the velocity of flow, discharge and diameter of pipes connecting two reservoirs
   - 3.5 Explain the function of siphon and give reason for limiting the height of the pipes

3.6 Explain how the power can be transmitted through pipes carrying liquid under pressure.
3.7 Express the condition for maximum H.P. through pipes
3.8 Solve simple problems on power transmission through pipes

4. Analyze forces during the impact of jets

4.1 Derive expression for force of jet on stationary or fixed vertical plate and problems.
4.2 Derive expression for force of jet on stationary or fixed inclined flat plate and problems
4.3 Derive expression for force of jet on stationary or fixed curved plate and problems
4.4 Derive expression for force of jet on moving flat plate and problems.
4.5 Derive expression for the force of jet on a series of plates fixed on the rim of a wheel and problems.
4.6 Derive expression for the force of jet of water on a moving curved vane when jet strikes tangentially at one end of the tip.
4.7 Find the expressions for work done, power and efficiency
4.8 Solve simple problems on moving curved vane when jet strikes tangentially at one end of the tip.

5. Understand the working of water Turbines

5.1 State the importance of water turbines
5.2 Draw the layout of a hydroelectric power station
5.3 Classify the water turbines based on the direction of flow of water & other criteria
5.4 Explain the working of Pelton wheel and simple problems.
5.5 Explain the working of Francis turbine and simple problems.
5.6 Explain the working of and Kaplan turbine and simple problems.
5.7 Difference between Pelton wheel and Francis Turbine
5.8 Difference between Francis and Kaplan turbines
5.9 Describe the governing of water turbines

6. Know the working of pumps

6.1 Explain the function of pump and Classify the pumps
6.2 Mention the constructional details of single acting pump and simple problems
6.3 Mention the constructional details of double acting pumps and simple problems
6.4 Expression for theoretical power required and slip and simple problems.
6.5 Explain the principle of operation of centrifugal pumps
6.6 Mention the constructional and installation of a centrifugal pump
6.7 Derive the expression for work done by the centrifugal pump.
6.8 Define the heads and efficiency of a centrifugal pump
6.9 Solve simple problems on centrifugal pumps
6.10 Appreciate the importance of priming and explain priming methods
6.11 Explain cavitation in centrifugal pump
6.12 Compare the centrifugal pump with a reciprocating pump

REFERENCE BOOKS:

1. Fluid Mechanics and Hydraulic Machines Dr.R.K.Bansal
2. Hydraulic Machines by S.AnanthaSwamy
3. Hydraulic Machines by R.C. Patel
4. Hydraulics ByMalhotra&Malhotra
5. Hydraulics & Hydraulic Machinery by Yeaple
6. Hydraulics and Pneumatics by Reya and Rao.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
CO1	3	1	1	-	1	-	-	1,2,3,5
CO2	3	2	2	-	-	-	-	1,2,3
CO3	3	3	3	-	-	-	-	1,2,3
CO4	3	3	1	-	-	-	-	1,2,3
CO5	3	3	3	-	2	1	-	1,2,3,5,6
CO6	3	3	2	-	-	1	-	1,2,3,6

QUESTION PAPER BLUE PRINT FOR CIE (MID-I)

Unit No	Unit Name	Questions to be set for CIE (Q No)			Remarks
		R	U	A	
1	Properties of Fluids	1 2	5(a) 5(b)	7(a) 7(b)	
2	Flow of Liquids	3 4	6(a) 6(b)	8(a) 8(b)	

QUESTION PAPER BLUE PRINT FOR CIE (MID-II)

Unit No	Unit Name	Questions to be set for CIE (Q No)			Remarks
		R	U	A	
3	Flow through pipes	1 2	5(a) 5(b)	7(a) 7(b)	
4	Impact of jets	3 4	6(a) 6(b)	8(a) 8(b)	

ME-305 FLUID MECHANICS AND HYDRAULIC MACHINERY

MODEL PAPER - MID -I (CIE)

Time: 1 Hour **Max. Marks: 20 M**

PART – A 4 X 1 = 4

NOTE: (i) Answer all questions and each question carries one mark.

(ii) Answers should be brief and straight to the point

1. Define ideal fluid.
2. Write the relation between specific weight and density.
3. What is a turbulent flow?
4. What is a pitot tube?

PART – B 2 X 3= 6

NOTE: (i) Answer all questions and each question carries three marks

(ii) The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

5. (a) Calculate the density and specific weight of 1 lt. of petrol with specific gravity 0.7?

OR

5. (b) Convert a vacuum of 90 mm of mercury into absolute pressure in meters of water?
6. (a) What is the difference between steady flow and unsteady flow?

OR

6. (b) Draw a neat sketch of a venturi meter and label its parts.

PART – C 2 X 5 = 10

NOTE: (i) Answer all questions and each question carries five marks

(ii) The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

7. (a) Explain the working of Bourdon tube pressure gauge with a neat sketch.

OR

7. (b) A flat plate of area 1.5 x 106 mm^2 is pulled with a speed of 0.4m/s relative to another plate located at a distance of 0.15mm from it. Find the force and power required to maintain this speed, if the fluid separating them is having viscosity as 1 poise.
8. (a) A pipe has a diameter 15cm at one end, 30cm at the other end. Water is flowing in this pipe with mean velocity of 20m/sec at first end. Find out A) Discharge of water through pipe, B) velocity at the other end

OR

8. (b) A pipe 300 m long has a slope of 1 in 100 and tapers from 1 m diameter at higher end to 0.5 m at the lower end. The quantity of water flowing is 900 lit/ sec. If the pressure at the higher end is 70 kPa, find the pressure at the lower end.

ME-305 FLUID MECHANICS AND HYDRAULIC MACHINERY

MODEL PAPER - MID -II (CIE)

Time: 1 Hour **Max. Marks: 20 M**

PART – A 4 X 1 = 4

NOTE: (i) Answer all questions and each question carries one mark.

(ii) Answers should be brief and straight to the point

5. Define Hydraulic mean depth.
6. Define Total energy line?
7. Write an expression for force exerted on flat moving plate.
8. State the condition for maximum efficiency for a series of moving blades struck by a jet of water

PART – B 2 X 3= 6

NOTE: (i) Answer all questions and each question carries three marks

(ii) The answers should be comprehensive and the criteria for valuation is the content

but not the length of the answer.

5. (a) Water flows through a pipe of 100mm diameter and 60m long with velocity of 2 m/sec. Find the head lost due to friction by using Darcy's formula, f = 0.005.

OR

5. (b) State the reason for limiting the height of the pipes for siphon system?

6. (a) A jet of diameter 40mm strikes horizontally on a plate held vertically. What force is required to hold plate for a flow of oil of specific gravity 0.8 with a velocity of 30m/s.

OR

6. (b) Draw the inlet and outlet velocity triangles for a moving curved vane, when a jet enters tangentially at one tip and leaving at the other tip.

PART – C 2 X 5 = 10

NOTE: (i) Answer all questions and each question carries five marks

(ii) The answers should be comprehensive and the criteria for valuation is the content

but not the length of the answer.

7. (a) Two reservoirs are connected by a pipeline consisting of two pipes, one of 15cm dia. and 10m length and the other of 22.5cm diameter and length 20m. If the

difference between water levels in the two reservoirs is 10m. Calculate the discharge, take f= 0.02, neglect minor losses.

OR

7. (b) Water is to be supplied from a reservoir to a turbine. The turbine is situated 150m below the reservoir level. The length of penstock is 1500m. Determine the smallest diameter of penstock to produce 500kW of power with a turbine of efficiency 95% take f= 0.02.

8. (a) A jet of 78.64cm² area, moving with a velocity of 12 m/sec impinges on a series of vanes moving with a velocity of 8 m/sec. Determine (i) Force on the plate(ii) Work done per sec,(iii) Efficiency.

OR

8. (b) A jet of water of diameter 15 cm, strikes a curved plate at it centre with a velocity of 25 m/sec. The curved plate is moving with a velocity of 11 m/sec in the direction of jet. The jet is deflected through an angle of 165°. Assuming the plate smooth, find (i) Force exerted on the plate in the direction of jet, (ii) Power of the jet, and (iii) Efficiency of the jet.

BOARD DIPLOMA EXAMINATIONS

SEMESTER END EXAMINATION (SEE)

MODEL PAPER- ME-305

FLUID MECHANICS AND HYDRAULIC MACHINERY

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

PART – A 8 X 1 = 8

NOTE : 1) Answer **all** questions and each question carries **one** mark.

2) Answers should be brief and straight to the point and shall not exceeding three simple sentences

9. Write the Continuity equation for Incompressible fluids.
10. Write the Darcy Weisbach formula.
11. State the pump use.
12. Define Surface tension?
13. What is the Cross-sectional area of bucket in Pelton wheel?
14. Define overall efficiency in hydraulic turbine.
15. Define negative slip for the reciprocating pump.
16. What is positive displacement pump?

PART – B 4X 3= 12

NOTE: (i) Answer **all** questions and each question carries **three** marks

(ii) The answers should be comprehensive and the criteria for valuation is the content

but not the length of the answer.

9 (a) State Bernoulli's equation and write any two assumptions made in Bernoulli's equation

OR

9 (b) Draw the layout of hydroelectric power plant and indicate the main parts.

10 (a) Write short notes on syphon system.

OR

10 (b) What are the functions of the casing of a centrifugal pump?

11(a) List any three features of Kaplan turbine.

OR

11 (b) State the need of governing in water turbines.

12 (a) What are the advantages of centrifugal pump over reciprocating pump?

OR

12 (b) Why can the suction height of a pump not exceed certain limit?

PART – C 4 X 5 = 20

NOTE: (i) Answer **all** questions and each question carries **five** marks

(ii) The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

13 (a) Explain the working of Simple U-tube manometer with a neat sketch.

OR

13 (b) Explain governing of the reaction turbines with line diagram.

14 (a) Water supplied from a reservoir through a 300mm diameter pipe 600m long to a turbine which is situated 108m below the free surface. Discharge through the pipe is 81 lit/sec. Find the head lost and the power transmitted by the pipe? Darcy's friction factor, f=0.01.

OR

14 (b) Explain the working of single acting reciprocating pump with a sketch.

15 (a) A Francis turbine working under a head of 130m runs at 400rpm. The diameter of the runner at inlet is 1.5m and the flow area is $0.5m^2$. The guide blade angle is 20^o and vane angle at inlet is 60^o. i) Determine power developed ii) Hydraulic efficiency. The velocity of whirl at outlet is zero.

OR

15 (b) A Kaplan turbine is required to develop 7000 KW under a head of 4m, speed ratio is 2, flow ratio is 0.7 and the ratio of boss diameter to runner diameter is 0.35. Find the speed of runner assuming 90% overall efficiency.

16 (a) A double acting reciprocating pump delivers oil of specific gravity 0.82 through a height of 8 m from the pump. The suction height is 5 m and the piston speed is 4 m/sec. The diameter of the cylinder is 10 cm. taking the efficiency of the pump as 60%, find the power of the machine driving the pump.

OR

16 (b) Explain the working principle of centrifugal pump with neat sketch?

ME-306 MACHINE DRAWING

Course title	Machine Drawing	Course Code	ME-306
Semester	III	Course group	Core
Teaching scheme in periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecturer + Practice	Total contact periods	45
CIE	60 Marks	SEE	40 Marks

PRE REQUISITES: This course requires the knowledge of Engineering Drawing

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

CO1	Understand the machine drawing.
CO2	Understand need and application of different types of fasteners and draw according to specifications, keys and cotter joints welded joints, piping layout and riveted joints as per IS standards.
CO3	Understanding and draw various Welding symbols
CO4	Understand various pipe fittings and layouts
CO5	Proficiency In reading and interpret various drawings of a component and understand the concepts of Assembly drawings

BLUE PRINT OF MARKS FOR SEMESTER END EXAM

Unit No.	Unit Name	Periods	Questions for SEE			Remarks
			R	U	A	
1	Introduction and fastening devices	8		Q.No.1,2		
2	Pipe Layouts and Welding symbols	7		Q.No.3,4		
3	ASSEMBLY-I Assembly drawings of cotter joint, Gib and Cotter joint, Knuckle Joint,Muff coupling, universal coupling, Flange couplings, Screw Jack, Stuffing Box	15			Q.No.5	
4	ASSEMBLY –II Assembly Drawings of Bearings (Foot step Bearing, Plummer block),cross Head, connecting rod, Eccentric, lathe tail stock	15			Q.No.6	
TOTAL		**45**		**4**	**2**	

COURSE CONTENT

1.0 Introduction

Importance of Machine Drawing - Brief revision of 1st and 3rd angle projections - Understand the concepts of Orthographic projections and Sectional views.

Fastening Devices

Temporary and Permanent fastenings and their areas of application-thread nomenclature, forms of screw thread profiles, metric, B.A., Acme, Knuckle, etc.

Bolts and Nuts: Specification of bolts and nuts, different types of bolted joints (through bolts, studs, screws etc.) in different applications. Purpose of lock nuts and theirtypes

Keys and cotters: Types of keys and cotters: Difference between key and cotter uses.

Rivets and Riveted joints: Types and proportions and specification of rivets: Different types of riveted joints: Lap, butt-single row, double row etc., chain and zigzag riveting – calculation of diameter of rivet: Pitch and arrangement of rivets in row – use – of standard proportions.

Welded joints and types. Pipe Joints

Exercises: 1

1. Thread Nomenclature and forms of screw thread profiles.
2. Exercises in drawing – bolted connections using standard proportions.
3. Drawing of various types of lock nuts & types of keys indicating their proportionate dimensions.
4. Exercise in drawing riveted joints using standard proportions: Single row, double row (chain and zigzag) in lap and butt joints (single & double strap).

2.0 Piping layouts

Classification of pipes and tubes- Components of pipes lay-out.-Screw fitting bend, elbow, tee, lateral Cross-nipple, reducing socket and plug - Unions: Screwed ground and flanged - Valves: Gate valve: angle valve, check valve - Various conventional symbol used for the above components.

Exercise: 2

1. Single line diagram of pipe layout one exercises.
2. Double line diagram of pipe layout one exercise.

Welded fabrication drawings

Different types of weld and their basic symbols including sectional representation as per table of I.S. standards, fillet, square butt, single V-Butt, double V-Butt, single bevel butt, double bevel butt, stud, bead (edge or seal) spot, seam. - Elements of welding symbol andtheir standard location the symbol as per IS standards reference code arrow head, weld symbol supplementary symbol dimensions of welds, method of welding process, special reference - Significance of arrow & position of arrow head significance of reference line as per I.S. standards with reference to fillet, V-Butt an stud welds.

Supplementary symbols and special instructions: surface of reference line; as per I.S. standards with reference to fillet, V-Butt an stud welds.- Dimensions of welds: length, location and spacing of welds as per I.S., B.I.S., standards with showing dimensions required on awelding - Need of special reference.

Exercise: 3

1. Drawing tables and figs. Referred in the contents above taking form I.S. standards.
2. Dimensioning a given welding drawings as per I.S., SP-46-1988.
3. Preparing working drawing of welding fabrication from given data.

3.0 Assembly Drawings-I

Need and functions of assembly and detailed drawings - Steps in preparing assembly drawings -. - Exercises in preparing assembly drawings of commonly available engineering components.

Exercise: 4

Draw the views / sectional views of

1. Cotter joint
2. Jib and cotter joint assembly
3. Knuckle joint assembly
4. Assembly of muffs coupling (solid & split) coupling, Flange couplings
5. Screw jack assembly
6. Stuffing box.

4.0 Assembly Drawings-II

With the knowledge gained by the above exercises the students shall be able to draw exercises onbearings,

1. Protective type flanged coupling
2. Piston of petrol engine
3. Cross head

4. Connecting rod
5. Eccentric
6. flexible coupling
7. Lathe tool post
8. Foot step bearing
9. Plummer block
10. Lathe tail stock

REFERENCE BOOKS:

1. T.S.M & S.S.M in respect of Technical Drawing by TTTI, Madras
2. Machine Drawing by A.C. Parkinson.
3. Machine Drawing by Jones & Jones.
4. Machine Drawing by N.D. Bhatt.

SUGGESTED LEARNING OUTCOMES:

On the completion of the course the student should be able to

1.0 Introduction & Fastening devices

1.1 Know and draw Conventional representation of materials and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
1.2 Know the standard specifications of Nuts & Bolts
1.3 Know the various temporary fastening devices
1.4 Know the various permanent fastening devices
1.5 Know difference between Temporary and permanent joints
1.6 Know the standard representation of Internal and external threads of Bolts & Nuts
1.7 Understand the Standard proportions of various threads like V, ACME, Square, Metric , Knuckle etc.,
1.8 Know the standard designation and purpose of Locknut, washer, set screws.
1.9 Know the Applications of Keys, riveted joints
1.10 Understand the Standard proportions of various keys and cotters
1.11 Know the difference between Key & Cotter
1.12 Know different types of riveted joints and draw according to standard specifications

2.0 Piping Layouts and Welded Joints

2.1 Know the conventional symbols of various welded joints
2.2 Know the conventional symbols of various pipe joints.
2.3 Draw the Single line diagram of pipe layout
2.4 Know and draw Double line diagram of pipe layout

3.0 Assembly drawings

3.1 Know the need of assembly drawing
3.2 Know the functions of assembly drawing like manufacturing and functional requirements
3.3 Know the various steps in making assembly drawing like
    - Geometrical mapping

- Dimensional mapping and
- Functional matching

3.4 Study functional requirements of each component and their inter relationship

3.5 Study carefully the views of each component in the detail drawing and decide the relative location of each part for the proper functioning of the machine.

3.6 Decide the mating dimensions between two components which are required to be assembled

3.7 Know the use of bill of material and its designation

Course Outcomes		CL	Linked PO	Teaching Periods
CO1	Understand the machine drawing.	U/A	1,4,7	3
CO2	Understand need and application of different types of fasteners and draw according to specifications, keys and cotter joints welded joints, piping layout and riveted joints as per IS standards.	U/A	1,2,3,4,5,7	6
CO3	Understanding and draw various Welding symbols	U/A	1,4,7	3
CO4	Understand various pipe fittings and layouts	A	1,3,4,5,7	3
CO5	Proficiency In reading and interpret various drawings of a component and understand the concepts of Assembly drawings	U/A	1,2,3,4,7	30

CO-PO MAPPING MATRIX

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

MID SEM-I EXAM

S.No.	Unit Name	R	U	A	Remarks
1	Unit-1		Q.No. 1,2,3		Answer any four questions
2	Unit-2		Q.No. 4,5,6		

MID SEM-II EXAM

S.No.	Unit Name	R	U	A	Remarks
1	Unit-3			Q.No. 1,2	Answer any one

BOARD DIPLOMA EXAMINATIONS, (C-21)

CIE- MID SEM-I MODEL PAPER

MID –I MODEL PAPER

ME-306 MACHINE DRAWING

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

Instructions: Answer any **four** questions. Each question carries five marks 4 x 5=20

1. Draw the square thread profiles with proportions.
2. Draw the views of a square headed bolt.
3. Draw a hexagonal headed bolt with nut of 25 mm diameter.
4. Draw a double riveted lap joint connecting two plates of 6mm Thick.
5. Draw the symbols of the following welded joints.
    a. Concave fillet weld
    b. Single v-butt weld
    c. Spot weld
    d. Seam weld
    e. Square butt weld
6. Draw the following piping joint symbols(single line)
    a. T
    b. Elbow
    c. Gate valve
    d. Lateral
    e. Union

BOARD DIPLOMA EXAMINATIONS, (C-21)

CIE- MID SEM-I MODEL PAPER

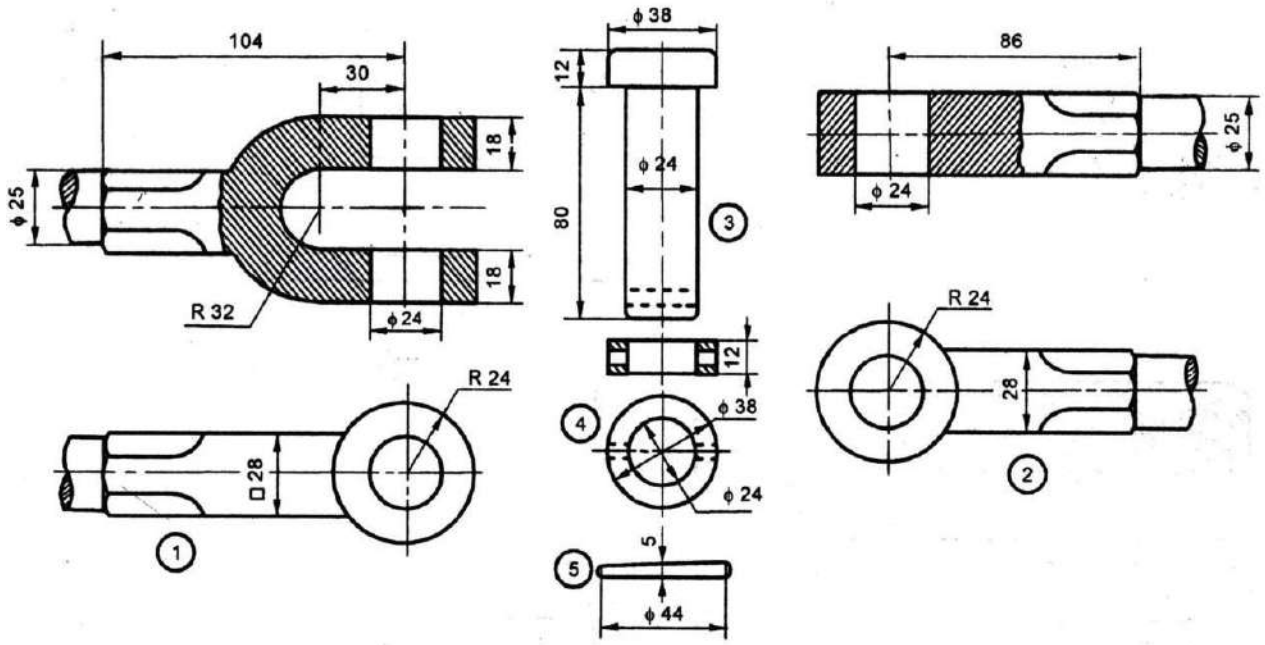
MID –II MODEL PAPER

ME-306 MACHINE DRAWING

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

Instructions: Answer any **one** question. Each question carries twenty marks 1 x 20=20

1. Assemble all the parts of the knuckle joint and draw the sectional front view.

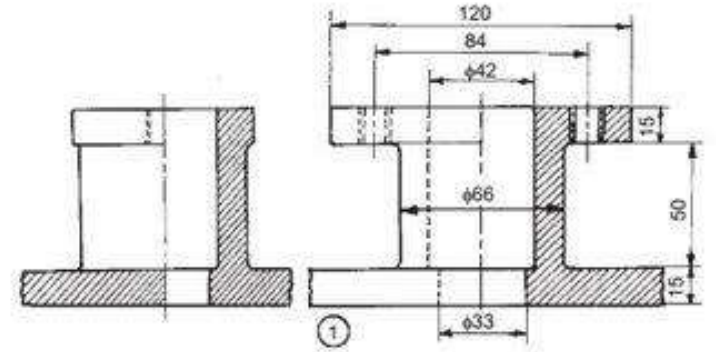


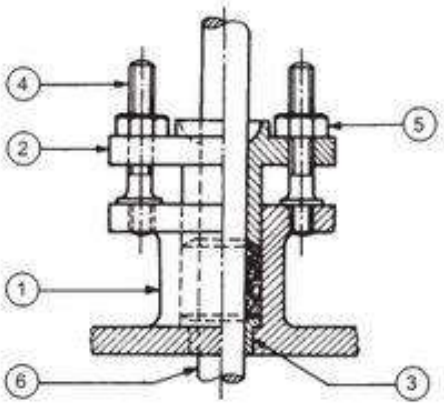
Parts list

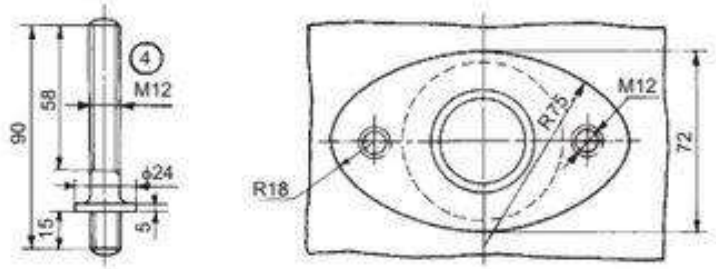
No.	Name	Matl	Qty
1	Fork end	F S	1
2	Eye end	F S	1
3	Pin	M S	1
4	Collar	M S	1
5	Taper pin	M S	1

KNUCKLE JOINT

2. Study given part drawing of stuffing box and draw half sectional front view .

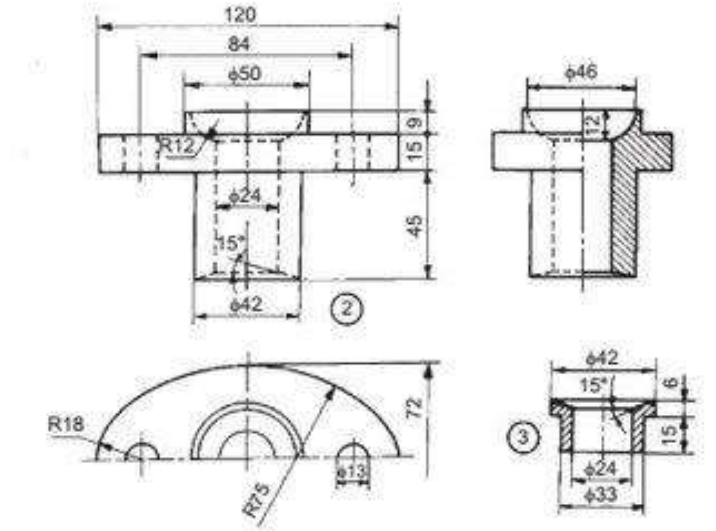






Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2



SEMESTER END EXAMINATION MODEL QUESTION PAPER

DME III ME-306 MACHINE DRAWING

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

PART-A 3 X 4 = 12

INSTRUCTIONS: (1) Answer **ALL** questions

(2) Each question carries three marks.
(3) Answer should be neat & clear with all the necessarydimensions.
(4) All dimensions are in 'mm'. Choose suitable scale

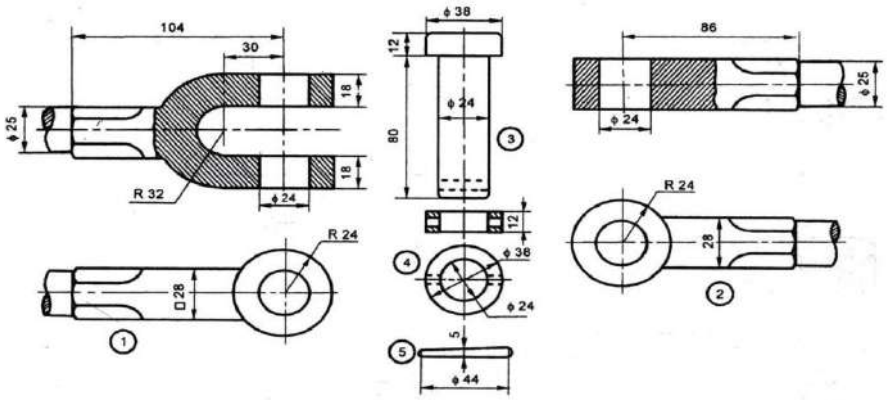
1. Draw the following thread profiles with proportions.
   (a) V threads (b) Square thread
2. Draw the views of a hexagonal headed bolt.
3. Draw a single riveted lap joint connecting two plates of 6mm Thick.
4. Draw the symbols of the following welded joints.
   (a) Concave fillet weld (b) Double v-butt weld (c) Spot weld
   (d) Seam Weld (e) Square Butt Weld

PART-B 1 X 28 = 28

INSTRUCTIONS: (1) Answer any **ONE** question

(2) Each question carries three marks.
(3) Answer should be neat & clear with all the necessarydimensions.
(4) All dimensions are in 'mm'. Choose suitable scale

5. Assemble all the parts of the **knuckle joint** and draw
   a. Sectional front view b. Top view

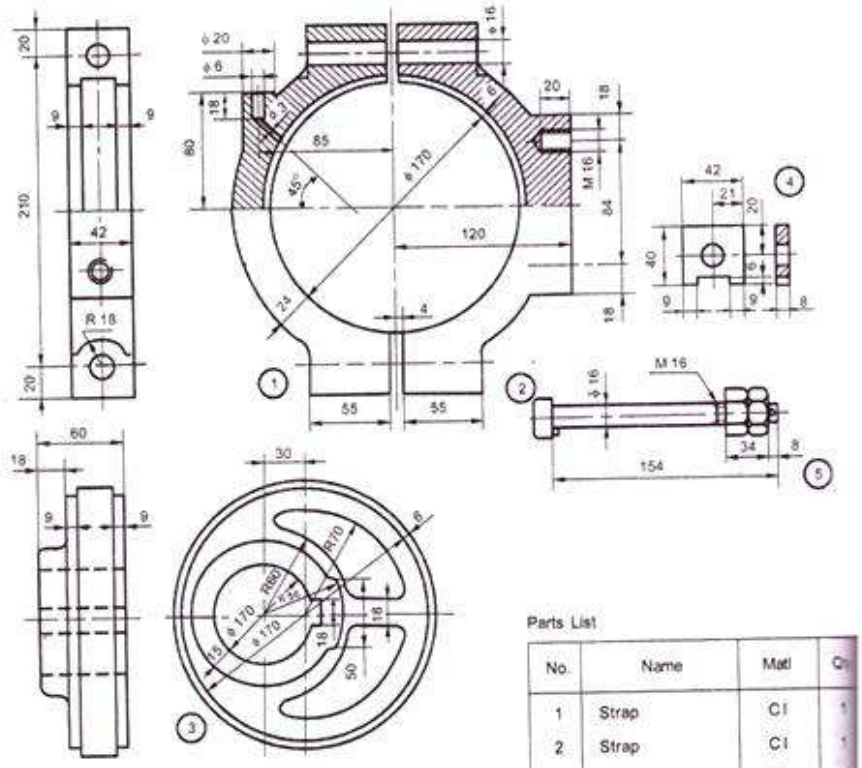


Parts list

No.	Name	Matl	Qty
1	Fork end	FS	1
2	Eye end	FS	1
3	Pin	MS	1
4	Collar	MS	1
5	Taper pin	MS	1

KNUCKLE JOINT

6. Assemble all the parts of the **eccentric** and draw the
   a. Half sectional front view (18 marks)
   b. Right side View (10 marks)



Parts List

No.	Name	Matl	Qty
1	Strap	CI	1
2	Strap	CI	1
3	Sheave	CI	1
4	Shim	BRASS	2
5	Bolts with nuts	MS	2

ME-307-BASIC MANUFACTURING & FABRICATION ENGINEERING LAB

Course Title	Basic Manufacturing & Fabrication Engineering Lab	Course Code	ME-307
Semester	III	Course Group	Core
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

PRE REQUISITES: This course requires the knowledge in basic manufacturing technology

COURSE CONTENT:

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

CO1	Understand integral parts of lathe and various accessories and attachments used.
CO2	Demonstrate machining skills with appropriate selection of tools and cutting parameters like cutting speed, feed and depth of cut for various machining operations on lathe.
CO3	Ability to perform certain lathe operations like Plain Turning, Step Turning, Taper Turning, Turning Collars, Knurling, Facing.
CO4	Understand different equipments, tools and accessories used in welding.
CO5	Basic knowledge in operating welding equipment and performing some welding operations.
CO6	Demonstrate the knowledge and necessary skills to perform sand preparation for moulds and making the moulds ready for casting operation.

BLUE PRINT OF MARKS FOR SEE

Unit No	Unit name	Periods	Marks for SEE			Total Marks	%Weightage
			Handling	Manipulation	Precision		
1.	Hands on practice on Lathe	15	10	15	15	40	100
2.	Hands on practice in welding	15	10	15	15	40	100
3.	Hands on practice in foundry processes	15	10	15	15	40	100
Total		**45**					

COURSE CONTENT

1 Foundry

Preparation of sand Mould

1.1 V – Pulley
1.2 Gear pulley
1.3 Preparation of Core

2 Machine Shop (Turning)

2.1 Facing, Plain Turning and knurling
2.2 Facing ,Step Turning and grooving
2.3 Facing, Taper Turning
2.4 Turning Collars

3. Welding

3.1 Layout of Beads
3.2 Butt joints.
3.3 Lap joints.

NOTE: In foundry section a minimum of one demonstration per batch is to be conducted for casting involving melting, pouring and fettling

Course Outcomes		**Linked POs**
CO1	Understand integral parts of lathe and various accessories and attachments used.	1,2,3
CO2	Demonstrate machining skills with appropriate selection of tools and cutting parameters like cutting speed, feed and depth of cut for various machining operations on lathe.	1,2,3,7
CO3	Able to perform certain lathe operations like Plain Turning, Step Turning, Taper Turning, Turning Collars, Knurling, Facing.	1,2,3,7
CO4	Understand different equipments, tools and accessories used in welding.	1,2,3,7
CO5	Basic knowledge in operating welding equipment and performing some welding operations.	1,2,3,7
CO6	Demonstrate the knowledge and necessary skills to perform sand preparation for moulds and making the moulds ready for casting operation.	1,2,3,7

CO-PO ATTAINMENT MATRIX

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

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

SUGGESTED LEARNING OUTCOMES:

Up on the completion of the course the student shall able to

1. Practice the casting principles and operations in foundry
2. Write the sand moulding procedures in foundry.
3. Prepare a mould sand mix.
4. Identify various tools used in foundry shop.
5. Prepare mould in two boxes, three boxes.
6. Prepare a mould ready for casting with provision for runners, risers and gates
7. Place the cope over the drag without any mismatch
8. Prepare the molten metal and calculate the amount of metal to be poured in the mould
9. Core making and uses
10. Practice the operation of Lathe
11. Perform a plain turning operation on a lathe machine.
12. Select proper tool to perform the job.
13. Centre the job by dial gauge
14. Select the suitable speed for different operations
15. Use various measuring instruments for taking dimensions.
16. Perform step turning operation on lathe.
17. Calculate the taper angle.
18. Practice different taper turning methods on lathe
19. Turn the required tapers by swivelling the compound rest.
20. Produce articles of industrial application such as ring gauges, plug gauges, handle.
21. Tapper turning – Hands on experience in swivelling the compound rest method
22. Practice the joining of metals in Arc Welding, Gas welding, brazing
23. Prepare the edges for welding
24. Select the suitable electrode, voltage and current
25. Handle the Electrode Holder for laying welding beads.
26. Operate the welding transformer and generator.
27. Perform various weld joint operations.

Key Competencies to be achieved by the Student

Title of the Experiment	Key Competency
Moulding and Casting of V – Pulley	- Select the suitable sand and mix it for the mould - Cut gates and runners - Pour sufficient quantity of molten metal
Moulding and Casting of Gear Pulley	- Prepare and place the core - Cut the gates and runners - Pour the sufficient quantity of molten metal
Preparation of core	- Prepare suitable core sand mix - Select wooden mould box - Pour the core sand into the mould box and proper ramming of the sand
Plain turning	- Check the centering of the work piece using dial gauge - Fix the cutting tool at proper inclination - Select the suitable speed, feed and depth of cut for rough and finishing operations - Check the dimensions
Step turning	- Check the centering of the work piece using dial gauge - Fix the cutting tool at proper inclination - Select the suitable speed, feed and depth of cut for rough and finishing operations - Check the dimensions
Taper turning	- Just an introduction of 4 methods. Student is expected to show how they work on machine. - Hands on exposure to swiveling compound rest method
Collar turning	- Check the centering of the work piece using dial gauge - Fix the cutting tool at proper inclination to turn the work piece - Select the suitable speed, feed and depth of cut for rough and finishing operations - Check the dimensions
Knurling	- Check the centering of the work piece using dial gauge - Fix the cutting tool at proper inclination to turn the work piece - Select the suitable speed, feed and depth of cut for rough and finishing operations - Check the dimensions - Fix the knurling tool and selecting the suitable speed and feed

Title of the Experiment	Key Competency
Welding Layout of beads	- Perform Edge preparation - Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc - Check the bead
Lap joint	- Perform Edge preparation - Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc - Check the bead
Butt joint	- Perform Edge preparation - Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc - Check the bead

State Board of Technical Education, Telangana State

Model Paper

ME-307-BASIC MANUFACTURING & FABRICATION ENGINEERING LAB

Mid Sem-I (CEE)

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

Note: Answer any one question.

1. Prepare the plain turning as per the given figure.
2. Prepare the step turning as per the given figure.
3. Prepare the taper turning as per the given figure.
4. Prepare Lap joint as per the given figure.
5. Prepare Butt joint as per the given figure.
6. Prepare mould for given pattern V-Pulley
7. Prepare mould for given pattern Gear Pulley
8. Prepare a core for making hallow section.

. **Note:** 1. For Mid sem15 marks are to be awarded for conduct of experiment, 3 marks for record and 2 marks for Viva voice

2. Exam should be conducted from the trade in which student undergone training only as classes are conducted on rotation basis.

State Board of Technical Education, Telangana State

Model Paper

ME-307-BASIC MANUFACTURING & FABRICATION ENGINEERING LAB

Mid Sem-II (CEE)

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

Note: Answer any one question.

1. Prepare the plain turning as per the given figure.
2. Prepare the step turning as per the given figure.
3. Prepare the taper turning as per the given figure.
4. Prepare Lap joint as per the given figure.
5. Prepare Butt joint as per the given figure.
6. Prepare mould for given pattern V-Pulley
7. Prepare mould for given pattern Gear Pulley
8. Prepare a core for making hallow section.

. **Note:** 1. For Mid sem15 marks are to be awarded for conduct of experiment, 3 marks for record and 2 marks for Viva voice

2. Exam should be conducted from the trade in which student undergone training only as classes are conducted on rotation basis.

State Board of Technical Education, Telangana State

Model Paper

ME-307-BASIC MANUFACTURING & FABRICATION ENGINEERING LAB

(SEE)

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

Note: Answer any one question.

1. Prepare the plain turning as per the given figure.
2. Prepare the step turning as per the given figure.
3. Prepare the taper turning as per the given figure.
4. Prepare Lap joint as per the given figure.
5. Prepare Butt joint as per the given figure.
6. Prepare mould for given pattern V-Pulley
7. Prepare mould for given pattern Gear Pulley
8. Prepare a core for making hallow section.

Note: 30 marks are to be awarded for the experiment and 10 marks for Viva voice

ME-308 FUELS LAB

Course Title	Fuels Lab	Course Code	ME-308
Semester	III	Course Group	Core
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

PREREQUISITES: Basic knowledge of Thermodynamics

COURSE OUTCOMES:

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

C01	Determine Flash and Fire point of given sample of fuels and Lubricants by using given Apparatus (Cleveland /Abel's/ Pensky Martens)
C02	Compute Viscosity of given fuel or Lubricating oil using given apparatus (Redwood/Saybolt viscometers)
C03	Measure Calorific value of Solid and liquid fuels by using Bomb calorimeter
C04	Measure Calorific value of gaseous fuels by using Junker's calorimeter
C05	Estimate percentage of carbon residue in given petroleum product
C06	Evaluate the need and importance of calibration of Pressure gauge

BLUE PRINT OF MARKS FOR SEE

S.N	Unit Name	Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1.	Flash and Fire point test using Cleveland Apparatus (open cup test)	3	10	10	20	40	100
2.	Flash and Fire point test using Pensky Martens Apparatus (closed cup test)	3	10	10	20	40	100
3.	Flash and Fire point test using Abels Apparatus (closed cup)	3	10	10	20	40	100
4	Viscosity measurement test	12	15	15	10	40	100
5	Calorific value test using Bomb calorimeter	6	15	15	10	40	100
6	Calorific value test using Junkers gas calorimeter	6	15	15	10	40	100
7	Carbon residue test	6	15	15	10	40	100
8	Valve Timing Diagram	6	10	10	20	40	100
TOTAL		**45**					

COURSE CONTENT

S.No	Fuels Lab	Number of Periods
1	Flash and Fire point test using Cleveland Apparatus (open cup test)	03
2	Flash and Fire point test using Pensky Martens Apparatus (closed cup test)	03
3	Flash and Fire point test using Abels Apparatus (closed cup test)	03
4	Viscosity measurement test using Redwood/ Saybolt viscometer	12
5	Calorific value test using Bomb calorimeter	06
6	Calorific value test using Junkers gas calorimeter	06
7	Carbon residue test using Conradson's apparatus	06
8	Draw valve timing diagram of 4-stroke engine	06
	Total	**45**

CO-PO ATTAINMENT MATRIX

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

Level 3- Highly addressed Level 2- Moderately addressed Level 1- Lowly addressed,

SUGGESTED LEARNING OUTCOMES

S.No	Exercise	Key competency
1	Flash and Fire point test using Cleveland Apparatus	a. Define flash and fire points b. Know the importance of flash and fire points c. Know the range of flash point measured by the meter d. Identify various parts of the apparatus
2	Flash and Fire point test using Pensky Marten Apparatus	a. Differentiate flash and fire points b. Understand factors affecting the flash point c. Identify various parts of the apparatus
3	Flash and Fire point test using Abels Apparatus	a. Identify various parts of the apparatus b. Know the Range of flash point measured by the meter c. Identify various parts of the apparatus
4	Viscosity measurement test	a. State the importance of Viscosity b. Identify various factors affecting the viscosity c. Know different types of viscometers d. Differentiate between absolute viscosity and kinematic viscosity e. Know the units of viscosity f. Find various parts of Redwood viscometer
5	Calorific value test using Bomb calorimeter	a. Understand the principle of calorimetry b. Know the applications of Junker's calorimeter c. Understand the principle of operation
6	Calorific value test using Junkers gas calorimeter	a. Understand the principle of operation b. Know various components of the calorimeter c. Know the applications of Junker's calorimeter
7	Carbon residue test using Conradson's apparatus	a. What is meant by carbon residue b. Identify various parts and accessories of Conradson's apparatus d. Understand the principle of operation e. Identify the primary components of crude oil f. Understand the importance of the test
8.	Draw valve timing diagram of 4-stroke engine	a. Define VTD b. Measure of angle of suction, compression, expansion & Exhaust c. Measure of angle of overlap

ME-308

BOARD DIPLOMA EXAMINATIONS (C21)
Model Paper MID SEM - I
DME III SEMESTER EXAMINATION
FUELS LAB

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

Answer any **one** of the following questions

1. Determine the flash and fire point of given sample using Cleveland apparatus
2. Determine the flash and fire point of given sample using Abels apparatus
3. Determine the flash and fire point of given sample using Pensky marten apparatus
4. Determine Viscosity of given sample of oil using Redwood viscometer
5. Determine Viscosity of given sample of oil using Saybolt viscometer
6. Determine Calorific value of given solid or liquid fuel using Bomb calorimeter.
7. Determine Calorific value of given gaseous fuel using Junkers gas calorimeter.
8. Determine the percentage of Carbon residue using Conradson's apparatus.
9. Draw valve timing diagram of 4- stroke engine.

Note: Mid Exam should be conducted from the trade in which student undergone training only as classes are conducted on rotation basis.

ME-308

BOARD DIPLOMA EXAMINATIONS (C21)
Model Paper MID SEM - II
DME III SEMESTER EXAMINATION
FUELS LAB

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

Answer any **one** of the following questions

1. Determine the flash and fire point of given sample using Cleveland apparatus
2. Determine the flash and fire point of given sample using Abels apparatus
3. Determine the flash and fire point of given sample using Pensky marten apparatus
4. Determine Viscosity of given sample of oil using Redwood viscometer
5. Determine Viscosity of given sample of oil using Saybolt viscometer
6. Determine Calorific value of given solid or liquid fuel using Bomb calorimeter.
7. Determine Calorific value of given gaseous fuel using Junkers gas calorimeter.
8. Determine the percentage of Carbon residue using Conradson's apparatus.
9. Draw valve timing diagram of 4- stroke engine.

Note: Mid Exam should be conducted from the trade in which student undergone training only as classes are conducted on rotation basis.

BOARD DIPLOMA EXAMINATIONS (C21)
Model Paper (SEE)
DME-III SEMESTER EXAMINATION
FUELS LAB

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

Answer any **one** of the following questions

1. Determine the flash and fire point of given sample using Cleveland apparatus
2. Determine the flash and fire point of given sample using Abels apparatus
3. Determine the flash and fire point of given sample using Pensky marten apparatus
4. Determine Viscosity of given sample of oil using Redwood viscometer
5. Determine Viscosity of given sample of oil using Saybolt viscometer
6. Determine Calorific value of given solid or liquid fuel using Bomb calorimeter.
7. Determine Calorific value of given gaseous fuel using Junkers gas calorimeter.
8. Determine the percentage of Carbon residue using Conradson's apparatus.
9. Draw valve timing diagram of 4- stroke engine.

ME-379-MATERIAL TESTING LAB

Course Title	Material Testing Lab	Course Code	ME-379
Semester	III	Course Group	Core
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60	SEE	40

PRE REQUISITES: This course requires the basic knowledge of Strength of materials.

COURSE OUTCOMES:

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

Course Outcomes		**Linked POs**	**Teaching Periods**
CO1	Analyze the various parameters in tensile testing	1,2,3,4,5	06
CO2	Determine the ultimate strength of wood	1,2,3,4,5	06
CO3	Determine the impact strength	1,2,3,4,5	06
CO4	Calculate the hardness number of the given material	1,2,3,4,5	06
CO5	Conduct torsion test on solid shaft and hollow shaft	1,2,3,4,5	06
CO6	Analyze the micro structure of the metals and alloys	1,2,3,4,5	15

BLUE PRINT OF MARKS FOR SEE

Unit No	**Unit name**	**Periods**	**Marks for SEE**			**Marks weightage**	**%Weightage**
			Handling	**Manipulation**	**Precision**		
1.	Tensile test	3	10	10	20	40	100
2.	Compression test	3	10	10	20	40	100
3.	Impact test	3	10	10	20	40	100
4.	Hardness test	3	10	10	20	40	100
5.	Torsion test	6	10	10	20	40	100
6.	Study of micro structure of metals and alloys	4	15	15	10	40	100

COURSE CONTENT:

1. Analyze the various parameters in UTM machine.
2. Determine the ultimate crushing strength of wood. When the load applied perpendicular to grains and load applied along the grains of the wooden block.
3. Determine the impact strength or toughness of material by conducting an impact test on Izod testing machine.
4. Calculate the hardness number of the specimen on Brinell's hardness testing machine.
5. Calculate modulus of rigidity by conducting torsion test on solid shaft and hollow shaft
6. Analyze the micro structure of the metals and alloys

SUGGESTED LEARNING OUTCOMES:

Up on the completion of the course the student shall able to gain the following competencies

Title of the Experiment	Competencies	Key competency
1. Tensile test	A. Fix specimen in the jaws of the machine B. Fit strain gauge to the specimen C. Apply load gradually on the specimen D. Record load, elongation, diameter without error E. Plot graph stress vs strain F. Locate points of elastic limit, yield stress, ultimate stress on the graph	- Record load, elongation, diameter without error - Plot graph stress vs strain - Locate points of elastic limit, yield stress, ultimate stress on the graph
2. Compression test	A. Place the specimen in the machine properly B. Apply load on the specimen C. Record load	- Apply load on the specimen - Record load
3. Impact test	A. Prepare specimen by making V notch at the required height B. Fix specimen on the machine C. Release load to hit the specimen precautious D. Record load	- Release load to hit the specimen precautious - Record load
4. Hardness test	A. Place the specimen on the machine at correct location B. Identify suitable indenter for the specimen C. Make indent on the specimen properly D. Measure diameter of indentation E. Calculate hardness number	- Make indent on the specimen properly - Measure diameter of indentation
5. Torsion test on mild steel bar	A. Measure diameter and length of mild steel bar. B. Take down the value of torque from the indicating dial for particular value of angle of twist. C. Calculate maximum shear stress and shear modulus.	- Measure the diameter of the MS bar with vernier callipers.
6. Study of micro structure of Metals and alloys	A. Prepare specimen B. Handling microscope to observe micro structure C. Plot microstructure	- Handling microscope to observe micro structure - Plot microstructure

CO-PO MATRIX

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

BOARD DIPLOMA EXANIMATIONS

MID-I Model Question Paper

ME-379-MATERIAL TESTING LAB

Duration: 1 hour **Max.Marks:10**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the tensile strength of the given material using UTM.
2. Determine the ultimate strength of the given material using UTM.
3. Determine the impact strength or toughness of material by conducting an impact test on izod testing machine.
4. Determine the Brinell's hardness number of a given material using BHM.
5. Determine the Rockwell hardness number of a given material.
6. Draw the micro structures of a) Mild Steel b)Pure iron c) Grey cast iron d) Brass e) Aluminum

Note: Mid Exam should be conducted from the experiments in which student undergone training only, as classes are conducted on rotation basis

BOARD DIPLOMA EXANIMATIONS

MID-II Model Question Paper

ME-379-MATERIAL TESTING LAB

Duration: 1 hour **Max.Marks:10**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the tensile strength of the given material using UTM.
2. Determine the ultimate strength of the given material using UTM.
3. Determine the impact strength or toughness of material by conducting an impact test on izod testing machine.
4. Determine the Brinell's hardness number of a given material using BHM.
5. Determine the Rockwell hardness number of a given material.
6. Draw the micro structures of a) Mild Steel b)Pure iron c) Grey cast iron d) Brass e) Aluminum

Note: Mid Exam should be conducted from the experiments in which student undergone training only, as classes are conducted on rotation basis

BOARD DIPLOMA EXANIMATIONS

SEE Model Question Paper

ME-379-MATERIAL TESTING LAB

Duration: 1 hour **Max.Marks:20**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the tensile strength of the given material using UTM.
2. Determine the ultimate strength of the given material using UTM.
3. Determine the impact strength or toughness of material by conducting an impact test on izod testing machine.
4. Determine the Brinell's hardness number of a given material using BHM.
5. Determine the Rockwell hardness number of a given material.
6. Draw the micro structures of a) Mild Steel b)Pure iron c) Grey cast iron d) Brass e) Aluminum

Note: 15 marks for the experiment and 5 marks for viva-voce

ME-389-FLUID MECHANICS & HYDRAULIC MACHINES LAB

Course Title	Fluid Mechanics & Hydraulic Machines Lab	Course Code	ME-389
Semester	III	Course Group	Core
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45
CIE	60	SEE	40

PRE REQUISITES: This course requires the basic knowledge of Strength of materials.

COURSE OUTCOMES:

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

CO1	Calibrate the venturi meter
CO2	Calculate the friction factor of a given pipe
CO3	Calculate the brake power and efficiency of Pelton turbine
CO4	Calculate the brake power and efficiency of Kaplan turbine.
CO5	Calculate the brake power and efficiency of Francis turbine
CO6	Calculate the efficiency of reciprocating Pump & Centrifugal pump

BLUE PRINT OF MARKS FOR SEE

Unit No	Unit name	Hours/ Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1	Venturi meter	3	5	7.5	7.5	20	100
2	Pipe friction	3	5	7.5	7.5	20	100
3	Pelton wheel	3	5	7.5	7.5	20	100
4	Kaplan turbine	3	5	7.5	7.5	20	100
5	Francis turbine	3	5	7.5	7.5	20	100
6	Reciprocating pump	4	5	7.5	7.5	20	100
7	Centrifugal pump	4	5	7.5	7.5	20	100
Total		**23**					

COURSE CONTENT:

1. Determination of Coefficient of discharge of Venturi meter.
2. Determination of losses in pipes due to friction.
3. Determination of B.P. and efficiency of Pelton wheel.
4. Determination of B.P. and efficiency of Kaplan turbine.
5. Determination of B.P. and efficiency of Francis turbine.
6. Determination of overall efficiency of a reciprocating pump
7. Determination of overall efficiency of the Centrifugal pump

SUGGESTED LEARNING OUTCOMES:

Up on Completion of the Lab the student shall be able to

1.0 Venturi meter

1.1 State the practical applications of venturi meter.
1.2 Record the manometric head readings from U-tube manometer
1.3 Record the time taken for collecting discharge by varying the discharge
1.3 Calculate the areas of the pipe and throat of the given venturi meter
1.4 Calculate coefficient of discharge of venturi meter.

2.0 Pipe friction

2.1 Measure the length of the given pipe
2.2 Record the manometric head readings from U-tube manometer
2.3 Record the time taken for collecting discharge by varying the discharge
2.4 Calculate the loss of head through the pipe
2.5 Calculate the friction factor

3.0 Pelton Wheel

3.1 Identify the components of Pelton wheel
3.2 Start turbine by switching on jet of water slowly
3.3 Apply load steadily
3.4 Record load, speed
3.5 Calculate power and efficiency of turbine

4.0 Kaplan Turbine

4.1 Identify the components of Kaplan Turbine
4.2 Start turbine by giving input water supply
4.3 Apply load steadily
4.4 Record load, speed
4.5 Calculate power and efficiency of turbine

5.0 Francis Turbine

5.1 Identify the components of Francis Turbine
5.2 Start turbine by switching on jet of water slowly
5.3 Apply load steadily
5.4 Record load, speed
5.5 Calculate power and efficiency of turbine

6.0 Reciprocating Pump

6.1 Identify the components of reciprocating pump
6.2 Record the suction and delivery pressures from pressure gauges
6.3 Record the time taken for collecting the discharge
6.4 Record the energy meter readings and calculate input power
6.5 Calculate the output power
6.6 Calculate the efficiency

7.0 Centrifugal Pump

7.1 Identify the components of centrifugal pump
7.2 Record the suction and delivery pressures from pressure gauges
7.3 Record the time taken for collecting the discharge
7.4 Record the energy meter readings and calculate input power
7.5 Calculate the output power
7.6 Calculate the efficiency

Key competencies to be acquired by students

Exercise	**Key competency expected**
Calculation of coefficient of discharge of Venturi meter	A. Maintain constant head B. Record readings of U- tube manometer without parallax error C. Record time taken for collection of specific quantity of water D. Calculate discharge and coefficient of discharge of venturi meter E. Repeat experiment for different heads (discharge)
Determination of pipe friction	A. Ensure flow through pipe is full to remove air bubbles B. Record time taken for collection of specific quantity of water in tank C. Calculate pipe friction using formula
Pelton wheel	A. Start turbine by switching on jet of water slowly B. Apply load steadily C. Record load, speed D. Calculate power and efficiency of turbine E. Plot performance curves
Kaplan Turbine	A. Start turbine by switching on water supply B. Apply load steadily C. Record load, speed D. Calculate power and efficiency of turbine E. Repeat experiment by Varying load/speed; Plot performance curves
Reciprocating Pump	A. Maintain steady flow in suction and delivery pipes B. Record suction and delivery pressure gauge readings C. Record time for collection of specific quantity of water, electrical meter reading (input power) D. Calculate indicated power and efficiency E. Vary the head (flow) and repeat experiment
Centrifugal Pump	A. Maintain steady flow in suction and delivery pipes B. Record suction and delivery pressure gauge readings C. Record time for collection of specific quantity of water, electrical meter reading D. Calculate indicated power and efficiency E. Vary the head (flow) and repeat experiment

CO-PO MATRIX

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

BOARD DIPLOMA EXANIMATIONS

MID-I Model Question Paper

ME-389-Fluid Mechanics & Hydraulic Machines Lab

Duration: 1 hour **Max.Marks:10**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the coefficient of Discharge of Venturi meter.
2. Determine the losses due to fiction in a pipe and find the friction factor.
3. Determine Brake Power and Efficiency of Pelton Turbine
4. Determine Brake Power and Efficiency of Francis Turbine
5. Determine Brake Power and Efficiency of Kaplan Turbine.
6. Calculate the efficiency of Reciprocating Pump.
7. Calculate the efficiency of Centrifugal Pump.

Note: Mid Exam should be conducted from the experiments in which student undergone training only, as classes are conducted on rotation basis

BOARD DIPLOMA EXANIMATIONS
MID-II Model Question Paper
ME-389-Fluid Mechanics & Hydraulic Machines Lab

Duration: 1 hour **Max.Marks:10**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the coefficient of Discharge of Venturi meter.
2. Determine the losses due to fiction in a pipe and find the friction factor.
3. Determine Brake Power and Efficiency of Pelton Turbine
4. Determine Brake Power and Efficiency of Francis Turbine
5. Determine Brake Power and Efficiency of Kaplan Turbine.
6. Calculate the efficiency of Reciprocating Pump.
7. Calculate the efficiency of Centrifugal Pump.

Note: Mid Exam should be conducted from the experiments in which student undergone training only, as classes are conducted on rotation basis

BOARD DIPLOMA EXANIMATIONS
SEE Model Question Paper
ME-389-Fluid Mechanics & Hydraulic Machines Lab

Duration: 1 hour **Max.Marks:20**

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Instructions to the Candidate:

(i) Answer any One of the following Questions.
(ii) Record the results on a graph sheet if required and conclude your observation of the experiment
(iii) Draw the diagram for illustration & choose appropriate values when not mentioned in the question

1. Determine the coefficient of Discharge of Venturi meter.
2. Determine the losses due to fiction in a pipe and find the friction factor.
3. Determine Brake Power and Efficiency of Pelton Turbine
4. Determine Brake Power and Efficiency of Francis Turbine
5. Determine Brake Power and Efficiency of Kaplan Turbine.
6. Calculate the efficiency of Reciprocating Pump.
7. Calculate the efficiency of Centrifugal Pump.

Note: 15 marks for the experiment and 5 marks for viva-voce

HU-310 - Communication and Life Skills Lab

Course Title	Communication and Life Skills Lab	Course Code	HU-310
Semester	III	Course Group	Practical
Teaching Scheme in Periods- L: T:P	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours	45
CIE	60 Marks	SEE	40 Marks

Rationale:

The course is designed to impart listening skills and life skills to the students of diploma which will help them a great deal in personal and professional fronts.

Prerequisites:

The course requires the basic knowledge of vocabulary, grammar, and four language learning skills, viz. Listening, Speaking, Reading and Writing.

Course Contents

I. Listening Skills-I

Duration: 6 (L 2 P 4)

- A paragraph
- A song
- A recipe
- A dialogue

II. Life Skills – I

Duration: 6 (L2 P 4)

1. **Introduction to Life Skills**
   - What are life skills?
   - Importance of life skills
   - Practicing life skills
2. **Attitude**
   - Features of attitude
   - Attitude and behaviour
   - Attitude formation
   - Positive attitude
   - Negative attitude
   - Overcoming negative attitude
   - Attitude at workplace
3. **Adaptability**
   - Need for adaptability
   - Willingness to experiment
   - Fear of failure

- Think ahead
- Stay positive
- Open mind
- Curiosity
- Being in present

III. Listening Skills – II

Duration: 9 (L 3 P 6)

- Biography
- Interview
- A Report
- Telephone Conversation

IV. Life Skills – II

Duration: 9 (L 3 P 6)

4. Goal setting

- Importance of setting goals
- What is goal setting
- Short term goals
- Long term goals
- Achieve goals using SMART

5. Motivation

- Why motivation
- Characteristics of motivation
- Extrinsic motivation
- Intrinsic motivation

6. Time Management

- Features of time
- Secrets of time management
- Time wasters
- Prioritisation
- Productive time
- Time Quadrant

V. Life Skills – III **Duration: 6 (L 2 P 4)**

7. Creativity

- Flexibility
- Curiosity
- Determination
- Innovative ideas

8. Critical Thinking

- Observation
- Curiosity
- Introspection
- Identify biases
- Critical Analysis

9. Problem Solving and Decision Making

- Define the problem
- Generate Options
- Evaluate and choose an option
- Implement Solution
- Monitoring and seeking feedback

VI. Life Skills – IV

Duration: 9 (L 3 P 6)

10. Leadership Qualities and Teamwork

- Significance of Leadership
- Factors of leadership
- Leadership styles
- Leadership Skills
- Importance of Teamwork
- Characteristics of a good team
- Benefits of teamwork
- Problems of teamwork
- Qualities of team player

11. Stress Management/Managing Emotions

- Components of Emotions
- Stress busters
- Managing Emotions
- Emotions at workplace

12. Core Human Values / Forming Values

- Honesty and integrity
- Work Ethics
- Ego and Respect
- Trust and Truthfulness
- Social Responsibility
- Character formation
- Designing Destiny

Course Outcomes:

	At the end of the course the students will have the ability to:
Listening Skills - I	Identify the main or the central idea. Listen for specific details. Learn the pronunciation.
Listening Skills - II	Listen for drawing inferences. Listen for accuracy. Listen to convey ideas.
Life Skills – I	Know the Life Skills. Practice life skills for a better life. Think positively. Develop positive attitude. Overcome negative attitude. Develop adaptability in any situation.
Life Skills – II	Know the importance of setting goals. Set goals using SMART features. Get inspired to get success. Get personal and professional success. Manage time effectively. Learn various time management techniques. Learn the importance of prioritisation.
Life Skills – III	Learn to be creative. Think innovatively. Know the reasons for a problem. Learn to overcome problems. Learn the various techniques to solve the problems. Learn to make proper decisions on time. Think ‘out of the box’. Think critically.
Life Skills – IV	Develop trust and confidence. To develop healthy and wealthy life. Know how to be a leader. Learn the qualities of a good leader. Learn the qualities of a good team. Learn the advantages and disadvantages of a team. Differentiate between Eu-stress and Distress. Manage stress effectively.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
310.1	-	-	-	-	3		3	5,7
310.2	-	-	-	-	3	2	3	5,6,7
310.3	-	-	-	-	3	3	3	5,6,7
310.4	-	-	-	-	2	2	3	5,6,7
310.5	-	-	-	-	2	2	3	5,6,7
310.6		-	--	--	2		3	5,7

Suggested Student Activities:

- Listening Comprehension
- Seminars
- Presentations
- Games using Online Dictionaries
- Sharing the information using emails, chats and groups
- Find a solution to the problem
- Making innovative things through recycling
- Creating advertisements
- Five-minute activities on Life Skills
- Watching videos on life skills and making presentations
- Case studies
- Role Plays
- Dialogues

Evaluation Pattern:

I. Continuous Internal Examination: 60 Marks

a. **Mid Sem- I** 20 marks
   Syllabus:
   i. Listening Skills - I
   ii. Life Skills - I

b. **Mid Sem – II** 20 Marks
   Syllabus:
   i. Listening Skills - II
   ii. Life Skills - II

c. **Internal assessment**: 20 marks

i. Seminars: 10 marks

ii. Assignments: 5 marks

iii. Lab record submission: 5 marks

II. Semester End Examination : 40 Marks

a. Listening: 10 Marks

b. Life Skills topics: 15 Marks

c. *Viva Voce* : 15 Marks

References:

a. Flint, Chrisand Jamie Flockhart*Listening: A2 (Collins English for Life: Skills)* Collins. 2013
b. Brown, Stephen E. English in Everyday Life. McGraw-Hill Education.2008
c. Mohanraj, Jayashree. *Let Us Hear Them Speak: Developing Speaking-Listening Skills in English*.Sage. 2015
d. Susan Earle – Carlin. *Q Skills for Success: Listening and Speaking 5: Student Book with Online Practice*. Oxford University Press. 2013
e. Kumar, Sanjay and Pushpa Latha. *Communication Skills: A Work Book*.Oxford University Press. 2018
f. Carnegie, Dale.*The Leader in You*. Simon & Schuster: 1995
g. Carnegie, Dale.*The Art of Public Speaking*. Prabhat Prakashan. NewDelhi.2013
h. Kaye, Martin. *Goal Setting (Workbook Included): Goals & Motivation: Introduction To A Complete & Proven Step-By-Step Blueprint For Reaching Your Goals (Goal Setting Master Plan 1)*. Kindle Edition. MK Coaching.2016.
i. West, Steven. *Critical Thinking Skills: Practical Strategies for Better Decision making, Problem-Solving and Goal Setting.* Kindle Edition.2018
j. Tracy, Brain. *Goals*. Berret-Koehler PublishersInc. San Francisco. 2017
k. Tracy, Brain. *Master your Time Master your Life.* Penguin Random House Inc. New York. 2017
l. Sean Covey. *The 7 Habits of Highly Effective Teens.* Simon and Schuster,2011

E-Learning Resources:

a. http://www.bbc.co.uk/worldservice/learningenglish/youmeus/learnit/learnitv39.shtml
b. https://www.examenglish.com/leveltest/listening_level_test.htm
c. https://www.oxfordonlineenglish.com/listening?utm_referrer=https%3A%2F%2Fwww.google.co.in%2F
d. https://takeielts.britishcouncil.org/prepare-test/free-ielts-practice-tests/listening-practice-test-1
e. https://learnenglish.britishcouncil.org/en/listening
f. https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=listening
g. https://www.businessenglishsite.com/business-english-listening.html

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION - I
HU-310- COMMUNICATION AND LIFE SKILLS LAB

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

Part – A **10 marks**

1. Listening Comprehension: 5 X 2 = 10

(Teacher should give the questions before reading the passage given below)

There are two problems which cause great worry to our educationists – the problem of religious and moral instruction in a land of many faiths and the problem arising out of a large variety of languages.

Taking up the education of children we see that they should be trained to love one another, to be kind and helpful to all, to be tender to the lower animals and to observe and think right. The task of teaching them how to read and write and to count and calculate is important, but it should not make us lose sight of the primary aim of moulding personality in the right way.

For this it is necessary to call into aid, culture, tradition and religion. But in our country. we have in the same school, to look after boys and girls born in different faiths and belonging to families that live diverse ways of life and follow different forms of worship associated with different denominations of religion. It will not do to tread the easy path of evading the difficulty by attending solely to physical culture and intellectual education.

It is not right for us in India to be dissuaded from this by considerations as to overtaking the young mind. What is necessary must be done and it is not in the fact too great a burden.

On the basis of reading the above passage, answer the following questions:

1. Which two problems have our educations to face?
2. What is the primary aim of the education of children?
3.How should the problem of religious and moral instruction be dealt with?
4. Which basic training is the writer talking about?
5. How can we serve the spiritual needs of school children?

PART- B **10 Marks**

Instruction: Answer any one of the questions in 150 words.

2. What are the benefits of developing an optimistic sense towards your life?
3. Give an instance from your life when you adapted yourself to a new situation.

BOARD DIPLOMA EXAMINATION (C-21)
MID SEMESTER EXAMINATION - II
HU-310- COMMUNICATION AND LIFE SKILLS LAB

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

Part – A **10 marks**

1. Listening Comprehension: 5 X 2 = 10

(Teacher should give the questions before reading the passage given below)

Isaac Newton figured out why objects fall to the ground and why the planets move the way they do. Isaac Newton was born in Lincolnshire, England, in 1643. His father died before he was born but, despite having a difficult childhood, he gained a place at Cambridge University. When the plague broke out he was forced to stay at home and, with so much free time on his hands, Newton started to wonder about what made things fall.

Newton said that he was inspired to think about forces when he saw an apple fall from a tree. He came up with the theory of gravity, an invisible force that pulls all of the objects in the Universe together, and the reason things don't float off into the sky.

In 1685, Newton described his Laws of Motion – a mathematical guide to how an object's movement is affected by speed and mass. Two years later, Newton published his ideas about gravity in a book which contains many of the foundations of modern science.

Newton also invented a new kind of telescope called a reflector. It used a mirror to collect light instead of lenses, and was much more powerful than existing telescopes. He also showed that white light was made up of all the colours of the rainbow.

1. What did Isaac Newton find?
2. Where did Isaac Newton born?
3. Which disease broke out in his childhood?
4. What was the telescope that Isaac Newton invented?
5. From which colour rainbow is made up of?

PART- B **10 Marks**

Instruction: Answer any one of the questions in 150 words.

2. What were the short term goals which you set to yourself and how you managed to achieve them in the recent past?
3. Explain - i) how you prioritise your tasks.
   ii) how you manage your time in the best possible way.

BOARD DIPLOMA EXAMINATION (C-21)
SEMESTER END EXAMINATION
HU-310- COMMUNICATION AND LIFE SKILLS LAB

Time: 3 Hours **Total Marks: 40 Marks**

Part – A **10 marks**

1. *Listen to the following passage and answer the questions give below it.* **5 X 2 = 10**
(Teacher should give the questions before reading the passage)

Some of us think that writing is only for writers. But writing is for all of us. As Julia Cameron notes in her book The Right to Write: An Invitation and Initiation into the Writing Life, "I believe we all come into life as writers." Writing can be beneficial for all of us, because it can be therapeutic. One of the most powerful parts of therapy is cultivating the ability to observe our thoughts and feelings, said Elizabeth Sullivan, a licensed marriage and family therapist in San Francisco. And that's what writing helps us do.

"Most of us do not think in complete sentences but in self-interrupted, looping, impressionistic cacophony," she said. Writing helps us track our spinning thoughts and feelings, which can lead to key insights (e.g., I don't want to go to that party; I think I'm falling for this person; I'm no longer passionate about my job; I realize how I can solve that problem; I'm really scared about that situation.) Writing is "speaking to another consciousness – 'the reader' or another part of the self. We come to know who we really are in the present moment," she said. Writing also creates a mind-body-spirit connection, she said. "When you use your hands to pen or type something directly from your brain, you are creating a powerful connection between your inner experience and your body's movement out in the world." We hold worries, fears and memories in our bodies, Sullivan said. When we use the body in positive ways – such as dancing or writing — we stay in the present moment, we inhabit our bodies, and we can heal ourselves, she said. "Writing is a small movement but it is incredibly powerful when you are writing down what is in your mind."

Free writing or journaling is simply writing what's on your mind. It's letting it all hang out without censoring yourself. According to Sullivan, this could be: "Today I woke up and found the car window smashed and I wondered if the glass replacement guys go out at night and do it."

"Poetry is a natural medicine; it is like a homeopathic tincture derived from the stuff of life itself–your experience," writes John Fox in Poetic Medicine: The Healing Art of Poem-Making.

Sullivan suggested writing a short letter to a loved one. Imagine this person has written to you and asked you: "How are you doing, really?" Another exercise is to "write to someone with whom you have 'unfinished business' without sending it." The goal is for you to gain a clearer understanding of your own thoughts and feelings about the person, she said.

Answer the following questions:

1. Why does Julia Cameron believe that we all come into life as writers
2. What is the most important therapeutic quality of writing?
3. Whose consciousness does a writer touch through his or her writing?
4. How does Elizabeth Sullivan describe our thinking? Why does she say so?
5. Which word in the passage means ‘a coarse unpleasant noise’?

Part – B **15 marks**

2. Seminar Presentations on Life Skills topics:

Part – C **15 marks**

3. Viva Voce.

ME-311 SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	ME-311
Semester	III	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	0:0:8	Credits	2.5
Methodology	Lecture + Practice	Total Contact Hours	120

Applied Engineering Mathematics Model Rubric

Suggested Student Activities:

1. Prepare a presentation to describe various types of integrals.
2. Prepare a detailed study report on integration using different methods.
3. List out and explain the applications of integration.
4. Apply the integration to determine areas, volumes of regular & irregular shapes.
5. List out and explain the practical applications of mean & RMS values.
6. Prepare a presentation to describe various types of differential equations.
7. List out and explain different practical applications of 1^{st} order differential equations

Solid Mechanics Model Rubric

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. Using internet record various properties of commonly used materials and compare their strengths.
4. How a corrugated roof sheet differs from plain roof sheet? Demonstrate with models.
5. List out the applications of shafts in our daily activity as well as in industries.
6. Collect the pictures of various types of beams which practically exist.

Thermodynamics Model Rubric

Suggested Student Activities:

1. Make a list of different bikes available in market and know their capacities.
2. Make list of different cars available in market and know their capacities.
3. Visit to automobile workshops /service centers and see how an IC engine works
4. Make a note on the solid, liquid fuels available in market and know their calorific values.
5. Collect the data of pressure required in tyres of a two wheeler and four wheeler
6. Collect data of different engine oils used in automobiles.
7. Collect information of different liquid coolants used in automobiles.
8. Study of cut-out models of IC engines.

Engineering Materials Model Rubric

Suggested Student Activities:

1. Make a list of commonly used materials in daily life like blade, knife, scissors etc and write the material used.
2. Study microstructure of given specimen.
3. Study micro structure of given specimen after it is welded and notice the difference.
4. Visit to a steel plant
5. Compare hardness of commonly available materials and interpret.
6. Make a list of major parts of a two wheeler and know the material used.
7. Visit a heat treatment plant

Fluid Mechanics and Hydraulic Machinery Model Rubric

Suggested Student Activities:

1. Visit nearby Hydroelectric power station and observe dam, penstock, turbines, generators etc.
2. Visit nearby pumping station and identify the pumps used
3. Prepare a tabulated summary for types of fluid which is available around you
4. Identify any one hydraulic pump and one prime mover available in market in a group of five students with detail specifications and current price.
5. List out any five pressure measuring devices available in market with its specifications and current market price
6. Prepare a tabulated summary for types of pipes available in market
7. Visit a nearby related industry and prepare a summary of hydro-pneumatic devices used along with their specifications.