R22

R22

Code No: R22A0308

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, June 2024

Thermal Engineering-I

(ME)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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Note: Steam Tables and Molliar charts are permitted

		PART-A (10 Marks) (Write all answers of this part at one place)	BCLL	CO(s)	Marks
1	A	Why mountings are essential in boilers?	L1	CO-I	[1M]
	B	Differentiate between the fire and water tube boilers.	L1	CO-I	[1M]
	C	What do you understand by nozzle?	L1	CO-II	[1M]
	D	What are the advantages of condenser in steam power plant?	L1	CO-II	[1M]
	E	What is the main difference between impulse and reaction turbines?	L1	CO-III	[1M]
	F	What is the effect of blade friction on steam turbine performance?	L1	CO-III	[1M]
	G	What is the purpose of regeneration in the gas turbine?	L1	CO-IV	[1M]
	H	List out the merits and demerits of closed cycle gas turbine.	L1	CO-IV	[1M]
	I	What are the types of jet propulsion systems?	L1	CO-V	[1M]
	J	How are rockets classified?	L1	CO-V	[1M]
		PART-B (50 Marks)			
		SECTION-I			
2	A	With the help of neat sketch explain the working of Rankine Cycle.	L2	CO-I	[5M]
	B	Draw the line diagram and explain the working principle of economizer and discuss the precautions to be made in usage.	L3	CO-I	[5M]
		OR			
3		Sketch and describe the operation of Babcock and Wilcox boiler and explain its limitations.	L2	CO-I	[10M]
		SECTION-II			
4		Calculate the throat and exit diameters of a convergent-divergent nozzle, which will discharge 820 kg of steam per hour at a pressure of 8 bar superheated to 220^0C into a	L3	CO-II	[10M]

		chamber having a pressure of 1.5 bar. The friction loss in the divergent portion of the nozzle may be taken as 0.15 of the isentropic enthalpy drop.			
		OR			
5		Discuss the classification of condensers and explain working principle of Surface Condenser with neat sketch.	**L3**	**CO-II**	**[10M]**
		SECTION-III			
6	A	Derive the condition for maximum efficiency of a reaction turbine.	**L3**	**CO-III**	**[5M]**
	B	In a Parson reaction turbine, the angles of receiving tips are 35^0 and of discharging tips, 20^0. The blade speed is 100 m/s. Calculate the tangential force, power developed, diagram efficiency and axial thrust of the turbine, if its steam consumption is 1 kg/min.	**L3**	**CO-III**	**[5M]**
		OR			
7	A	Explain the working principle of an impulse turbine with neat sketch.	**L2**	**CO-III**	**[5M]**
	B	Explain the working of single stage reaction turbine. Sketch the pressure and velocity variations along the axis of the turbine.	**L3**	**CO-III**	**[5M]**
		SECTION-IV			
8		Explain the closed cycle gas turbine with neat sketch and write its advantages and disadvantages.	**L2**	**CO-IV**	**[10M]**
		OR			
9		Explain the working of a gas turbine with Inter cooling and Reheating with the help of P-V and T-S diagram.	**L3**	**CO-IV**	**[10M]**
		SECTION-V			
10	A	Discuss the desirable properties of a liquid propellant for a rocket engine.	**L2**	**CO-V**	**[5M]**
	B	A turbo jet engine consumes air at the rate of 60.2 kg/s when flying at a speed of 1000 km/hr. Calculate (i) Fuel flow rate in kg/s, when air fuel ratio is 70:1 (ii) propulsive power (iii) propulsive efficiency.	**L3**	**CO-V**	**[5M]**
		OR			
11		Describe with a sketch a liquid propellant rocket and what are the applications of liquid propellant rockets?	**L2**	**CO-V**	**[10M]**

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Code No: R22A0310

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, June 2024

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) (Write all answers of this part at one place)	BCLL	CO(s)	Marks
1	A	What is Gyroscopic couple?	L1	CO-I	[1M]
	B	Write the equation for Gyroscopic couple?	L2	CO-I	[1M]
	C	Define angle of repose?	L1	CO-II	[1M]
	D	Write the equation for radius of a friction circle for a shaft of radius r rotating inside a bearing?	L2	CO-II	[1M]
	E	Distinguish between brakes and dynamometers?	L2	CO-III	[1M]
	F	Define the maximum fluctuation of energy?	L1	CO-III	[1M]
	G	Why is balancing of rotating parts necessary for high-speed engines?	L2	CO-IV	[1M]
	H	What is the function of a governor?	L1	CO-IV	[1M]
	I	Define damped vibration?	L1	CO-V	[1M]
	J	What are the effects of vibrations?	L1	CO-V	[1M]
		PART-B (50 Marks)			
		SECTION-I			
2		An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it	L3	CO-I	[10M]
		OR			
3		The rotor of a turbine installed in a boat with its axis along the longitudinal axis of the boat makes 1500 r.p.m. clockwise when viewed from the stern. The rotor has a mass of 750 kg and a radius of gyration of 300 mm. If at an instant, the boat pitches in the longitudinal vertical plane so that the bow rises from the horizontal plane with an angular velocity of 1 rad /s, determine the torque acting on the boat and the direction in which it tends to turn the boat at the instant.	L3	CO-I	[10M]
		SECTION-II			
4		A body, resting on a rough horizontal plane required a pull of 180 N inclined at 30º to the plane just to move it. It was found that a push of 220 N inclined at 30º to the	L2	CO-II	[10M]

	plane just moved the body. Determine the weight of the body and the coefficient of friction.			
	OR			
5	Determine the maximum, minimum and average pressure in plate clutch when the axial force is 4 k N. The inside radius of the contact surface is 50 mm and the outside radius is 100 mm. Assume uniform wear.	**L3**	**CO-II**	**[10M]**
	SECTION-III			
6	A band brake acts on the 3/4th of circumference of a drum of 450 mm diameter which is keyed to the shaft. The band brake provides a braking torque of 225 N-m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, find the operating force when the drum rotates in the (a) anticlockwise direction, and (b) clockwise direction.	**L3**	**CO-III**	**[10M]**
	OR			
7	Describe with sketches one form of torsion dynamometer and explain with detail the calculations involved in finding the power transmitted.	**L2**	**CO-III**	**[10M]**
	SECTION-IV			
8	Four masses m1, m2, m3 and m4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m, and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.	**L2**	**CO-IV**	**[10M]**
	OR			
9	The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified.	**L3**	**CO-IV**	**[10M]**
	SECTION-V			
10	Calculate the whirling speed of a shaft 20 mm diameter and 0.6 m long carrying a mass of 1 kg at its mid-point. The density of the shaft material is 40 Mg/m^3, and Young's modulus is 200 GN/m^2. Assume the shaft to be freely supported.	**L3**	**CO-V**	**[10M]**
	OR			
11	A flywheel is mounted on a vertical shaft . The both ends of a shaft are fixed and its diameter is 50 mm. The flywheel has a mass of 500 kg and its radius of gyration is 0.5 m. Find the natural frequency of torsional vibrations, if the modulus of rigidity for the shaft material is 80 GN/m^2.	**L3**	**CO-V**	**[10M]**

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R22

R22

Code No: R22A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, June 2024

Manufacturing Processes

(ME)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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			BCLL	CO(s)	Marks
		PART-A (10 Marks)			
		(Write all answers of this part at one place)			
1	A	Classify the different types of patterns.	**L2**	**CO-I**	**[1M]**
	B	What are the pattern materials?	**L1**	**CO-I**	**[1M]**
	C	Describe flame characteristics.	**L2**	**CO-II**	**[1M]**
	D	What is weld porosity? How is it caused?	**L1**	**CO-II**	**[1M]**
	E	List two main classifications of forging operations.	**l2**	**CO-III**	**[1M]**
	F	Describe the difference between piercing and punching in metal forming.	**l2**	**CO-III**	**[1M]**
	G	What is strain hardening in metals?	**L1**	**CO-IV**	**[1M]**
	H	What is high energy rate forming?	**L1**	**CO-IV**	**[1M]**
	I	What is rapid prototyping in the context of additive manufacturing?	**L1**	**CO-V**	**[1M]**
	J	What is a primary limitation of additive manufacturing in terms of material properties?	**L1**	**CO-V**	**[1M]**
		PART-B (50 Marks)			
		SECTION-I			
2	A	Describe the significance of patterns in the casting process. What are the main factors to consider when designing a pattern?	**L3**	**CO-I**	**[5M]**
	B	Analyze common casting defects, their causes, and the remedial measures that can be implemented to prevent these defects.	**L4**	**CO-I**	**[5M]**
		OR			
3	A	Describe the injection molding process with neat sketch.	**L3**	**CO-I**	**[5M]**
	B	Discuss the types of materials suitable for injection moulding process and the common products manufactured using injection moulding	**L3**	**CO-I**	**[5M]**
		SECTION-II			
4	A	Analyze various types of oxy-acetylene flames with sketches.	**L4**	**CO-II**	**[5M]**

	B	Evaluate the principle and application of Friction welding process.	**L5**	**CO-II**	**[5M]**
		OR			
5	A	Evaluate the effectiveness of laser beam welding in automotive manufacturing. How does it compare to traditional welding techniques in terms of precision and cost?	**L5**	**CO-II**	**[5M]**
	B	Describe the principles of spot welding and seam welding. How do these resistance welding processes differ in terms of application and efficiency?	**L3**	**CO-II**	**[5M]**
		SECTION-III			
6	A	Describe the different types of extrusion processes used in manufacturing. What are the key differences between them?	**L3**	**CO-III**	**[5M]**
	B	What is wire drawing and how does it differ from tube drawing in terms of process and applications?	**L3**	**CO-III**	**[5M]**
		OR			
7	A	Explain how water plasma cutting works and discuss its benefits over traditional mechanical cutting methods.	**L3**	**CO-III**	**[5M]**
	B	Explain the soldering and brazing processes and write merits, demerits and applications these two processes?	**L3**	**CO-III**	**[5M]**
		SECTION-IV			
8	A	Describe the bending process in metal forming. What are the key parameters that affect the quality of the bend?	**L4**	**CO-IV**	**[5M]**
	B	What are roll mills, and what role do they play in the rolling process?	**L2**	**CO-IV**	**[5M]**
		OR			
9	A	Explain the concept of strain hardening and its significance in metal forming.	**L2**	**CO-IV**	**[5M]**
	B	Explain the principle of electromagnetic forming and discuss its advantages over traditional mechanical forming methods.	**L3**	**CO-IV**	**[5M]**
		SECTION-V			
10	A	Explain the process of photopolymerization in additive manufacturing	**L4**	**CO-V**	**[5M]**
	B	What are the advantages and limitations of photopolymerization technique compared to other additive manufacturing processes?	**L3**	**CO-V**	**[5M]**
		OR			
11	A	Discuss Selective Laser Sintering (SLS) and its impact on the production of functional parts	**L3**	**CO-V**	**[5M]**
	B	What types of materials are typically used in SLS, and why	**L3**	**CO-V**	**[5M]**

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R22

Code No: R22A0026

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, June 2024

Probability, Statistics and Queueing Theory

(ME & AE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) (Write all answers of this part at one place)	**BC LL**	**CO(s)**	**Marks**
1	A	Define probability	**L1**	**CO-I**	**[1M]**
	B	Define random variable with an example.	**L1**	**CO-I**	**[1M]**
	C	Define Poisson distribution.	**L1**	**CO-II**	**[1M]**
	D	Define mean and variance of normal distribution.	**L1**	**CO-II**	**[1M]**
	E	Define rank correlation coefficient properties.	**L1**	**CO-III**	**[1M]**
	F	Define rank correlation coefficient.	**L1**	**CO-III**	**[1M]**
	G	Define Type-I and Type-II errors.	**L1**	**CO-IV**	**[1M]**
	H	Write test statistics for single mean.	**L1**	**CO-IV**	**[1M]**
	I	Define traffic intensity.	**L1**	**CO-V**	**[1M]**
	J	Define jockeying.	**L1**	**CO-V**	**[1M]**

PART-B (50 Marks)

SECTION-I

2	A	A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items.			**L3**	**CO-I**	**[5M]**
	B	A random variable X has the following probability function :			**L5**	**CO-I**	**[5M]**

X	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

Determine K (ii) Evaluate P(X<6), P(0<X<5)

OR

3	A	If a random variable has the probability density f(x) as $f(x) = \begin{cases} 2e^{-2x}, for\ x > 0 \\ 0, \quad for\ x \le 0 \end{cases}$ find the probabilities that it will take on a value (i) between 1 and 3 (ii) greater than 0.5	**L5**	**CO-I**	**[5M]**
	B	A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that the red ball drawn is from bag B	**L3**	**CO-I**	**[5M]**

SECTION-II

4	A	Ten coins are thrown simultaneously. Find the probability of getting at least (i) seven heads (ii) six heads	**L5**	**CO-II**	**[5M]**
	B	If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals	**L3**	**CO-II**	**[5M]**

(i) exactly 3 (ii) more than 2 individuals (iii) none (iv) more than one individual suffers a bad reaction

OR

5 If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs , how many students have masses **L3 CO-II [10M]**

(i) Greater than 72 kgs
(ii) Less than or equal to 64 kg
(iii) Between 65 and 71 kg inclusive.

SECTION-III

6 Find coefficient of correlation between X and Y for the following data **L5 CO-III [10M]**

X	10	12	18	24	23	27
Y	13	18	12	25	30	10

OR

7 If $X = 2Y + 3$ and $Y = kX + 6$ are the regression lines of X on Y and Y on X respectively. **L5 CO-III [10M]**

Show that $0 \leq k \leq \frac{1}{2}$ (b) If $k = \frac{1}{8}$ find r and $(\bar{x}, \bar{y})$

SECTION-IV

8 A A sample of 64 students has a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs. LOS= 5% **L3 CO-IV [5M]**

B In sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice eaters and wheat eaters are equally popular in this state of Karnataka . LOS= 5% **L3 CO-IV [5M]**

OR

9 The life of electric bulbs for a random sample 10 from a large consignment gave the following data. Can we accept the hypothesis that the average life time of bulbs is 4000hrs **L3 CO-IV [10M]**

Item	1	2	3	4	5	6	7	8	9	10
Life in 1000 Hrs	1.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

SECTION-V

10 A bank plans to open a single server drive- in banking facility at a certain centre. It is estimated that 20 customers will arrive each hour on average. If on average, it requires 2 minutes to process a customers transaction, determine **L5 CO-V [10M]**

(i) The proportion of time that the system will idle
(ii) On the average, how long a customer will have to wait before reaching the server.
(iii) The fraction of customers who will have to wait.

OR

11 A one person barber shop has six chairs to accommodate people waiting for haircut. Assume who arrive when all the six chairs are full leave without entering the shop. Customers arrive at the average rate of 3 per hour and spend an average of 15 minutes for service. Find **L5 CO-V [10M]**

(i) The probability that a customer can get directly into the barber chair upon arrival.
(ii) Expected number of customers waiting for a haircut.
(iii) Effective arrival rate.
(iv) The time a customer can expect to spend in the barber shop.

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R22

Code No: R22A0309

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, June 2024

Strength of Materials

(ME)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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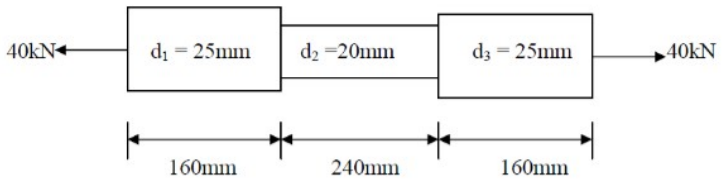
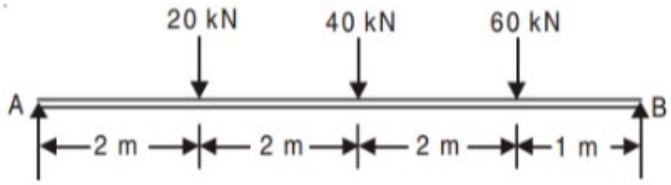
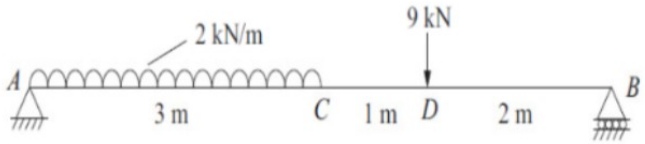
			BCLL	CO(s)	Marks
		PART-A (10 Marks)			
		(Write all answers of this part at one place)			
1	A	State Hook's Law	**L1**	**CO-I**	**[1M]**
	B	Define Factor of Safety	**L1**	**CO-I**	**[1M]**
	C	What is a beam	**L1**	**CO-II**	**[1M]**
	D	Illustrate point of contra-flexure	**L1**	**CO-II**	**[1M]**
	E	Give the SI unit for area moment of inertia of a beam cross-section	**L1**	**CO-III**	**[1M]**
	F	Give expression of section modulus of a beam	**L1**	**CO-III**	**[1M]**
	G	How many reaction forces does a hinged support have	**L2**	**CO-IV**	**[1M]**
	H	What is meant by overhanging beam	**L2**	**CO-IV**	**[1M]**
	I	Give expression of polar section modulus of a shaft	**L1**	**CO-V**	**[1M]**
	J	If inner diameter of a cylinder is 100 mm and its wall thickness is 25 mm is it considered as a thin cylinder or a thick cylinder	**L2**	**CO-V**	**[1M]**
		PART-B (50 Marks)			
		SECTION-I			
2		A stepped bar as shown in figure below, is subjected to a tensile force of 40 kN. Estimate the modulus of elasticity of the material if the total extension of the bar is 0.3 mm. Also calculate the stress induced in each segment of the bar.	**L3**	**CO-I**	**[10M]**



OR

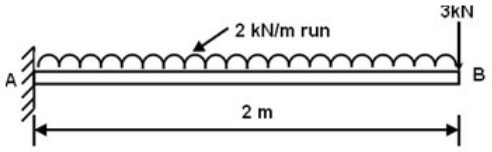
3		A bar of 40 mm diameter is subjected to a pull of 50kN.	**L3**	**CO-I**	**[10M]**

		The measured extension on gauge length of 250 mm is 0.1 mm and the change in diameter is 0. 025 mm. Calculate the value of Poisson's ratio and the three moduli.			
		SECTION-II			
4		Draw the shear force and bending moment diagrams for the simply supported beam loaded as shown in the figure below. Find the value of the maximum bending moment.	**L3**	**CO-II**	**[10M]**
					
		OR			
5	A	Draw the Bending Moment Diagram for a simply supported beam carrying uniformly distributed load throughout the beam	**L2**	**CO-II**	**[5M]**
	B	A cantilever beam of length 2 m carries an uniformly distributed load of 3kN/m over a length of 1.5 m from its fixed end and a point load 5 KN at its free end. Draw the shear force and bending moment diagrams.	**L3**	**CO-II**	**[5M]**
		SECTION-III			
6	A	List out the assumptions made in theory of simple bending?	**L2**	**CO-III**	**[5M]**
	B	A rectangular beam of 200 mm deep and 300 mm wide is simply supported over a span of 8 m. What uniformly distributed load per meter the beam may carry, if the bending stress is not to exceed 120 N/mm^2	**L3**	**CO-III**	**[5M]**
		OR			
7	A	Derive and show that the distribution of shear stress across a rectangular cross-section of a beam is parabolic.	**L3**	**CO-III**	**[5M]**
	B	A cantilever beam of length 2 m fails when a load of 2 kN is applied at the free end. If the section of the beam is 40 mm × 60 mm, estimate the value of shear stress at the failure.	**L3**	**CO-III**	**[5M]**
		SECTION-IV			
8		Estimate the deflection at the points C and D for the beam shown in the Figure below. Also find slopes at the supports A and B. Use Macaulay's method. Take $E=2.1\times10^5$ N/mm^2 and $I=2\times10^8$ mm^4.	**L4**	**CO-IV**	**[10M]**



OR

9		Compute the maximum slope and maximum deflection of the cantilever shown in figure below. Take $E=2.1\times10^5 N/mm^2$ and $I=2\times10^8 mm^4$.	**L3**	**CO-IV**	**[10M]**



SECTION-V

10	A	Derive the expression for the stresses developed in a thin sphere subjected to internal fluid pressure.	**L2**	**CO-V**	**[5M]**
	B	A cylindrical pipe of diameter 1.5m and thickness 15mm is subjected to internal fluid pressure of 1.2 N/mm2. Determine longitudinal stress and hoop stress developed in the pipe.	**L3**	**CO-V**	**[5M]**

OR

11	A	Explain the terms in the torsion equation	**L1**	**CO-V**	**[5M]**
	B	A Shaft rotating at a speed of 8000 rpm has to transmit a power of 15 kW. If the permissible shear stress is 50 N/mm2, then find the diameter of the shaft in mm.	**L3**	**CO-V**	**[5M]**

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