



B.Tech III Semester Supplementary Examinations, February 2024

MECHANICS OF SOLIDS
(ME)

Maximum Marks: 70

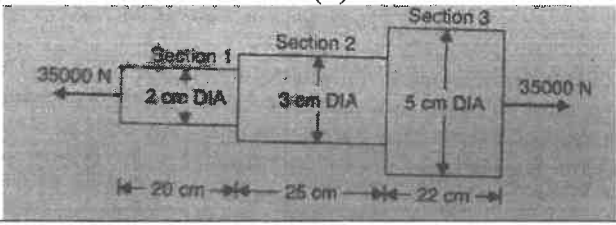
Date: 26.02.2024 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		CO	BTL
1	Define stress and strain .Write down SI units of stress and strain.	1	1
2	Define the term (a)Resilience (b)Elastic limit	1	1
3	Differentiate between cantilever and simply supported beams.	2	2
4	What is point of contraflexure.	2	2
5	Define the terms (i)Bending stress in a beam (ii)Neutral axis.	3	1
6	Explain the terms (i)Modular ratio (ii)Flitched beams.	3	2
7	Define the terms (i)Principal planes (ii)Principal stresses.	4	1
8	Write a note on Mohr's circle of stress.	4	2
9	Define the term (i)Torsional rigidity (ii)Polar moment of Inertia.	5	1
10	What do you mean by strength of a shaft.	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		M	CO	BTL
11	An axial pull of 35,000 N is acting on a bar consisting of three lengths as shown in figure. If the Young's Modulus is equal to $2.1 \times 10^5 \text{ N/mm}^2$. Determine (i) Stresses in each section (ii)Total extension of the bar . 	10M	1	3
OR				
12	A)What do you mean by a bar of uniform strength. (B)Find the Young's Modulus of a brass rod of diameter 25mm and of length 250mm which is subjected to a tensile load of 50kN when the extension of the rod is equal to 0.3mm.	5M 5M	1	3
13	A cantilever of length 2m carries a uniformly distributed load of 1kN/m run over a length of 1.5m from the free end. Draw the shear force and bending moment diagrams for the cantilever	10M	2	4

	OR			
14	A Simply supported beam of length 6m carries point load of 3kN and 6kN at distances of 2m and 4m from the left end. Draw the shear force and bending moment diagrams for the beam.	10M	2	3
15	What do you mean by section modulus. Find an expression for section modulus for a rectangular section.	10M	3	3
	OR			
16	A cantilever of length 2m fails when a load of 2kN is applied at the free end. If the section of the beam is 40mm x 60mm .Find the stress at the failure.	10M	3	3
17	A Body is subjected to direct stresses in two mutually perpendicular directions accompanied by a simple shear stress. Draw the mohrs circle of stresses and explain how to obtain the principal stresses and principal planes.	10M	4	4
	OR			
18	At a certain point in a strained material, the intensities of stresses on two planes at right angles to each other are 20 N/mm ² and 10 N/mm ² both tensile. They are accompanied by a shear stress of magnitude 10 N/mm ² . Find graphically or otherwise, the location of principal planes and evaluate the principal stresses.	10M	4	4
19	Derive from the first principles the expression for circumferential and longitudinal stresses in a thin cylinder closed at both ends and subjected to internal fluid pressure.	10M	5	4
	OR			
20	Two shafts of the same material and of the same lengths are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of a hollow circular section, whose internal diameter is 2/3 of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts.	10M	5	4