



B.Tech II Year I 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.
 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)

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| 1 | Draw the stress-strain curve for mild steel and indicate salient points. |
| 2 | How the temperature stresses are created? |
| 3 | Draw the shear force and bending moment diagram for a cantilever beam of length L and carrying a point load F at the free end. |
| 4 | What is beam ? types of beams |
| 5 | Derive the section modulus expression for a circular cross section. |
| 6 | What assumptions are made in theory of simple bending? |
| 7 | What are the axial stresses and compound stresses? |
| 8 | What is maximum principal stress theory? |
| 9 | What is polar modulus? |
| 10 | What is hoop-stress and volumetric strain in shells |

Part-B

Answer All the following questions. (5X10M=50Marks)

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| 11 | A bar of 25 mm. diameter is subjected to a pull of 70 kN. The extension measured on a gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Find poisson's ratio and values of three moduli. [10] |
| | OR |
| 12 | a) How the stresses in composite bars are found? [5]
b) A straight bar 500 mm long is 25 mm diameter for 300 mm length and 15 mm dia. for the remaining length. If the bar is subjected to an axial pull of 15 kN, find the extension of the bar. Take E = 200 Gpa. [5] |
| 13 | A horizontal beam 10 m long carries a uniformly distributed load of 100 N/m over its entire span and in addition a concentrated load of 200 N at the left end. The beam is supported at two points 8 m apart, so chosen that each support carries half the total load. Draw the shear force and bending moment diagrams. [10] |
| | OR |
| 14 | A simply supported beam of span, 9 m has UDL of 15 kN/m over 4 m from left support and a concentrated load of 20 kN at the centre. Draw SF and BM diagrams. [10] |

15	A steel beam of I-section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a bending moment of 200 kN m at a critical section. Determine the maximum bending stress if the web of the beam is kept horizontal. [10]
	OR
16	(i) What are the applications of bending equation? [5] (ii) A cantilever of length 10 m has a cross section of 100 mm × 130 mm has UDL of 10 kN/m over a length of 8 m. from the left support and a concentrated load of 10 kN at the right end. Find bending stress in the beam. [5]
17	A steel tube of 10 mm. bore with a wall thickness of 1 mm is 1 m. long is full of mercury in the tube. It is placed horizontally and supported at the ends. If the density of steel and mercury is 7.5 and 13.6, find the maximum stress in the tube. [10]
	OR
18	Draw “Mohr’s stress circle” for principal stresses of 80 N/mm ² tensile and 40 N/mm ² compressive and find the resultant stresses on planes making 25° and 60° with the major principal plane. Find also normal and tangential stresses on these planes? [10]
19	A steel specimen is subjected to the following principal stresses 120N/mm ² (Tensile) 50 N/mm ² (compressive). If the proportionality limit for the steel specimen is 225N/mm ² , find the factor of safety according to: a) Maximum principal stress theory b) Maximum principal strain theory. c) Maximum shear stress theory. [10]
	OR
20	A hollow shaft is to transmit 400 KW power at 120 rpm. if the shear stress is not to exceed 60 N/mm ² and internal dia. is 0.65 of the external dia. Find internal and external diameters assuming that the maximum torque is 1.5 times the mean? [10]