



R20 Regulation

Subject code: 3P3CF

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, December 2025

MECHANICS OF SOLIDS

(ME)

Maximum Marks: 70

Date: 27.12.2025

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)		Marks	CO	BTL
1	Define linear strain and lateral strain.	2M	1	L1
2	How the thermal stresses are induced in the body?	2M	1	L1
3	List the different types of loads.	2M	2	L1
4	What is significance of point of contra flexure?	2M	2	L1
5	What is the section modulus for a triangular cross section?	2M	3	L1
6	What assumptions are made in theory of simple bending?	2M	3	L1
7	What are the axial stresses and compound stresses?	2M	4	L1
8	What is maximum principal stress theory?	2M	4	L1
9	What is polar modulus?	2M	5	L1
10	What is hoop-stress and volumetric strain in shells?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
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.	10M	1	L2
OR				
12	A straight bar 500 mm long is 25 mm diameter and 300 mm length is 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 $E = 200 \text{ Gpa}$.	10M	1	L2
13	A cantilever beam 2m long is subjected to a gradually varying load from zero at the free end to 2kN/m at the fixed end. Find the values of maximum shear force and bending moment also draw the shear force and bending moment diagrams.	10M	2	L2
OR				
14	Draw the shear force and bending moment diagrams for the beam loaded and supported as shown in figure.	10M	2	L2

15	A beam 3 m long has rectangular section of 80 mm width and 120 mm depth. If the beam is carrying a uniformly distributed load of 10 kN/m. Find the maximum bending stress developed in the beam.	10M	3	L2
	OR			
16	A circular beam of 100 mm diameter is subjected to a shear force of 30 kN. Calculate the value of maximum shear stress and sketch the variation of shear stress along depth of the beam.	10M	3	L2
17	A point in a strained material is subjected to a tensile stress of 120 MPa and a clockwise shear stress of 40 MPa. What are the values of normal and shear stresses on a plane inclined at 45° with the normal to the tensile stress.	10M	4	L2
	OR			
18	A plane element in a boiler is subjected to tensile stresses of 400 MPa on one plane and 150 MPa on the other at right angles to the former. Each of the above stresses is accompanied by a shear stress of 100 MPa such that when associated with the minor tensile stress tends to rotate the element in anticlockwise direction. Find (a) Principal stresses and their directions. (b) Maximum shearing stresses and the directions of the plane on which they act.	10M	4	L2
19	A cylindrical shell of 1.3 m diameter is made up of 18 mm thick plates. Find the circumferential and longitudinal stress in the plates, if the boiler is subjected to an internal pressure of 2.4 MPa. Take efficiency of the joints as 70%	10M	5	L2
	OR			
20	A hollow shaft is to transmit 400 KW power at 120 rpm. If the shear stress in 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?	10M	5	L2