R20 Regulation *Subject code: 3P3CF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

MECHANICS OF SOLIDS

(ME)

Maximum Marks: 70 Date:31.07.2024 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	Bloom Tx
1	Write the different types of stresses.	1	L1
2	Define Volumetric strain and Factor of safety?	1	L1
3	Explain different types of loads.	2	L1
4	Explain shear force and bending moment	2	L1
5	What is the section modulus for a triangular cross section?	3	L1
6	What is the section modulus for circular cross section?	3	L1
7	Explain the theory of failure?	4	L1
8	What is maximum principal stress theory?	4	L1
9	What is Torsion and Torsional rigidity?	5	L1
10	Define thin cylinder?	5	L1
Part-B			
Answer All the following questions. (5X10M=50Marks)			
11	A reinforced concrete column of 400 mm x 400mm has four steel rods of 20 mm embedded in it. Find the stresses in steel and concrete when the total load on the column is 1000 kN. $E_s = 210$ kN/mm^2 and $E_c = 13.5$ kN/mm^2 [10]	1	L2
	OR		
12	A mild steel rod 1 m long and 20 mm diameter is subjected to an axial pull of 62.5 kN. What is the elongation of the rod, when the load is applied (i) gradually, and (ii) suddenly? Take E as 200 GPa. [10]	1	L2
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. Draw the shear force and bending moment diagrams. [10]	2	L2
	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 the SF and BM diagrams. [10]	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. [10]	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. [10]	3	L2
17	Determine principal stresses and its planes, If $\sigma_x = 70$ N/mm^2, $\sigma_y = 25$ N/mm^2 and $\sigma_{xy} = 30$ N/mm^2 Also determine maximum shear stress and its direction. [10]	4	L2
	OR		
18	The principal stresses of a point in the section of a member are 50 MPa and 20 MPa both tensile. If there is a clockwise shear stress of 30 MPa, find the normal and shear stresses on a section inclined at an angle of 15^0 with the normal to the major tensile stress. [10]	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%. [10]	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? [10]	5	L2