R18 Regulation *Subject code: 2P3CE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, March/April 2023

MECHANICS OF SOLIDS

(Mechanical Engineering)

Maximum Marks: 70 Date: 10.04.2023 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)

1 Define poisons ratio.
2 Define strain energy,
3 Write the different types of beams?
4 What is point of contraflexture?
5 What are the assumptions in pure bending?
6 What is section the modulus for rectangular section?
7 A cantilever beam of length 2m fails when a load of 2 kN is applied at the free end. If the section of beam is 40mm X 60mm, find the stress at the failure
8 Define the terms Principal planes and principal stresses
9 What is Torsion and Torsional rigidity?
10 Define thin cylinder.

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

OR

12 An axial pull of 40000Nis acting on a bar consisting of three sections of length 30 cm,25cm and 20cm and diameters 2cm,4cm and 5cm respectively. If the young's modulus=2x10^5 N/mm^2,determine (i) stress in each section and (ii) total extension of the bar. 10

13 A cantilever beam of length 2m carries the point loads 300N,500N,800N at 0.8m,0.7m, 0.5m from the fixed end. Draw SFD and BMD for cantilever beam. 10

OR

14 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

15 Derive and expression for distribution of shearing stress over a rectangular section? 10

OR

16 A beam of I-section, 60 cm deep and 19 cm wide, has flanges 4 cm thick and web 1.6 cm thick. It carries a shearing force of 400 KN at a section. Draw shear stress distribution diagram. 10

17 The tensile stresses at a point across two mutually perpendicular planes are 120 N/mm^2 and 60 N/mm^2.Determine the normal, tangential and resultant stresses on a plane inclined at 30^0 to the axis of the minor stress 10

OR

18 Derive an expression for maximum shear stress theory. 10

19 Derive the relation for a circular shaft when subjected to torsion as given below $T/J=\tau/R=C\Theta/L$ 10

OR

20 A thin cylindrical shell of 0.6m diameter and 0.9 m long is subjected to an internal pressure $1.2N/mm^2$. Thickness of cylinder wall is 15mm. Determine change in diameter, length and volume. Take E=200GPa and poisson's ratio=0.3 10