



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 3P3CF

B.Tech. III Semester Supplementary Examinations, July 2022
MECHANICS OF SOLIDS

(Mechanical Engineering)

Maximum Marks: 70

Date: 01.08.2022 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

(10 X 2M=20 Marks)

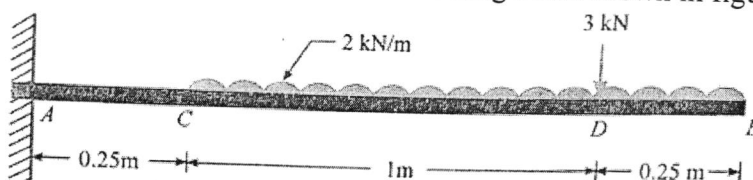
- 1 Define lateral strain, longitudinal strain and Poisson's ratio.
- 2 Explain the following terms
(i) Strain Energy and (ii) Proof Resilience
- 3 Explain different types of beams
- 4 What is point of contraflexure?
- 5 What are the assumptions in pure bending?
- 6 What is the section modulus for rectangular cross 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 principal stresses and principal planes
- 9 What is the volumetric strain of thin cylinders
- 10 Derive torsion equation of circular shaft

Part-B

Answer All the following questions.

(5 X 10M=50Marks)

- 11 Draw stress-strain curve for ductile material and explain its salient features 10
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
- 13 Draw SFD and BMD of the following beam shown in figure 10



OR

- 14 A simply supported beam ABCD of 5 m span, such that AB = 2 m, BC = 1 m and CD = 2 m. It is loaded with 5 kN/m over AB and 2 kN/m over CD. Draw SFD and BMD for the beam. 10

- 15 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

- 16 Derive an expression for distribution of shearing stress over a Rectangular section? 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° to the axis of the minor stress 10

OR

- 18 The principal stresses or 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° with the normal to the major tensile stress. 10
19 A hollow shaft with inner diameter to outer diameter ratio of 0.8 is to transmit a torque of 2600Nm. Taking the allowable shear stress for the shaft material as 46 MPa and the limiting angle of twist in 2 m length of shaft as 1.6° . Determine the inner and outer diameters of the shaft take $G=81 \text{ KN/mm}^2$ 10

OR

- 20 Calculate (i) the change in diameter, (ii) change in length and (iii) change in volume of a thin cylindrical shell 100 cm diameter, 1cm thickness and 5m long when subjected to internal pressure of 3 N/mm^2 , Take the value of $E=2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio 0.3. 10