R18 Regulation *Subject code:2P3CE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, June 2026

MECHANICS OF SOLIDS

(ME)

Maximum Marks: 70 Date: 20.06.2026 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 lateral strain, longitudinal strain and Poisson's ratio.	2M	1	L1
2	Explain the following terms (i) Strain Energy and (ii) Proof Resilience	2M	1	L1
3	Explain different types of beams	2M	2	L1
4	What is point of contraflexture?	2M	2	L1
5	What are the assumptions in pure bending?	2M	3	L1
6	What is the section modulus for rectangular cross section?	2M	3	L1
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	2M	4	L1
8	Define the terms Principal planes and Principal stresses	2M	4	L1
9	What is Torsion and Torsional rigidity?	2M	5	L1
10	Define thin cylinder.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Draw stress-strain curve for ductile material and explain its salient futures	10M	1	L2
	OR			
12	An axial pull of 40 kN is 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.	10M	1	L2
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.	10M	2	L2
	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.	10M	2	L2

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.	10M	3	L2
	OR			
16	Derive an expression for distribution of shearing stress over a rectangular section.	10M	3	L2
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.	10M	4	L2
	OR			
18	Derive an expression for stresses on an oblique section of a body subjected to a simple shear stress.	10M	4	L2
19	Derive the relation for a circular shaft when subjected to torsion as given below $T/J=\tau/R=C\Theta/L$.	10M	5	L2
	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 $E=2x10^5$ $N/mm^2$and Poisson's ratio 0.3.	10M	5	L2