R20 Regulation *Subject code: 3P3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, June 2026

STRENGTH OF MATERIALS-I

(CE)

Maximum Marks: 70 Date: 18.06.2026 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 elasticity and plasticity.	2M	1	L1
2	State Hooke's law.	2M	1	L1
3	What are the different types of loads acting on a beam?	2M	2	L1
4	Define the terms (a) Shear force (b) Bending moment.	2M	2	L1
5	What are the assumptions made in the theory of Simple bending?	2M	3	L1
6	Define the terms bending stresses and section modulus.	2M	3	L1
7	Name the methods of finding the slope and deflection at a section in a loaded beam.	2M	4	L1
8	Write the Moment-Area theorem.	2M	4	L1
9	Define the terms principal planes and principal stresses.	2M	5	L1
10	Define the term 'obliquity' and write how it is determined.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Draw the stress strain diagram for mild steel and identify the significant points.	10M	1	L2
	OR			
12	A steel rod of 20mm diameter passes centrally through a copper tube of 50mm external diameter and 40mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly on the projecting parts of the rod. If the temperature of the assembly is raised by 50^0C, calculate the stresses developed in copper and steel. Take E for steel and copper as 200GN/m^2 and 100GN/m^2 and α for steel and copper as 12×10^{-6} per ^{0}C and 18×10^{-6} per ^{0}C.	10M	1	L2
13	What are the different types of beams?	10M	2	L2
	OR			
14	A cantilever beam of length 2m carries the point loads 200N, 400N and 700N at distances 0.5m, 1.2m and 2m respectively from the fixed end. Draw the SF and BM diagrams for cantilever beam.	10M	2	L2

15	Prove the relation between M/I = F/Y = E/R .	10M	3	L2
	OR			
16	(a) Prove that an eccentric load causes a direct stress as well as bending stress. (b) Define section modulus and obtain the expression for circular section.	5M 5M	3	L2
17	Derive the deflection equation for a simply supported beam of length L carrying a point load W at the centre.	10M	4	L2
	OR			
18	A simply supported beam of length 4m carries a point load of 3kN at a distance of 1m from each end. Take $E=2\times10^5 N/mm^2$ and $I=1X10^8\ mm^4$ for the beam. Using conjugate beam method, determine: (a) Slope at each end and under each load. (b) Deflection under each load and at the center.	10M	4	L2
19	A rectangular bar of cross-sectional area $10000mm^2$ is subjected to a tensile load of P. The permissible normal and shear stresses on the oblique plane which is inclined at 60^0 are $8N/mm^2$ and $8N/mm^2$. Determine the safe value of P.	10M	5	L2
	OR			
20	Discuss in detail various prominent theories of failures.	10M	5	L2