R20 Regulation *Subject code: 3P3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2025

STRENGTH OF MATERIALS-I

(CE)

Maximum Marks: 70 Date:22.12.2025 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	Define longitudinal strain and poisson's ratio.	2M	1	L1
3	Differentiate between a point load and a uniformly distributed.	2M	2	L1
4	Draw the SFD,BMD for a cantilever loaded with a clockwise couple of 'M' at the free end.	2M	2	L1
5	Sketch the shear stress variation across the depth of the beam of circular cross section.	2M	3	L1
6	Show the shear stress variation in the following : (i) I-section (ii) Hollow circle.	2M	3	L1
7	What is the differential equation of deflected curve of a beam?	2M	4	L1
8	List the cases where Mohr's theorem is conveniently used.	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	A hammer is having mass of 10kg falls a height of 1.5 m on a 50mm cube iron block before coming to rest. Find the amount by which the block will be compressed and the instantaneous stress induced in it. Also find the velocity with which the hammer will strike the block. Take 'E' = 200Gpa.	10M	1	L2
	OR			
12	Define the terms resilience and impact loading.	10M	1	L2
13	Differentiate between a cantilever and a simply supported beam with examples.	10M	2	L2
	OR			
14	Derive the relation between rate of loading, shear force and bending moment.	10M	2	L2
15	Prove that a rectangular section the maximum shear stress is 1.5 times the average stress.	10M	3	L2

	OR			
16	What do you mean by shear stresses in beams?	10M	3	L2
17	A cantilever of uniform cross-section of length l carries two point loads, W at the free end and 2W at a distance 'x' from the free end. Find the maximum deflection due to this loading.	10M	4	L2
	OR			
18	Derive the deflection equation for a simply supported beam of length L carrying a point load W at the centre.	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	Direct stresses of 120 MPa tension and 90 MPa compressions are applied to an elastic material at a certain point on the planes at right angles. The maximum principal stress is limited to 150 MPa. What is the corresponding shear stress on the given planes and what is the maximum shear stress at that point.	10M	5	L2