R22 Regulation *Subject code: 4E3AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular/Supplementary Examinations, December 2024

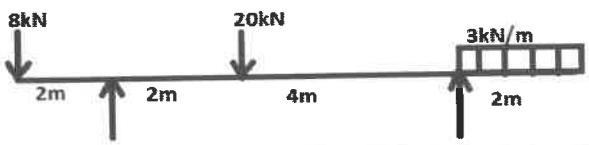
STRENGTH OF MATERIALS - I

(Civil Engineering)

Maximum Marks: 60 Date:04.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 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	CO	Bloom Tx
All the following questions carry equal marks	(10X1M=10 Marks)		
1.a)	Write the types of stresses and strains.	1	L1
b)	Define Poisson's ratio and Strain energy.	1	L1
c)	List out different types of beams based on support conditions.	2	L1
d)	What do you mean by Point of Contra flexure?	2	L1
e)	Write section modulus formula for circular and rectangular section	3	L1
f)	Sketch the shear stress distribution for an equally Distributed I-Section.	3	L1
g)	Mention different methods used to calculate deflection in beams.	4	L1
h)	How do you differentiate a real beam and conjugate beam?	4	L1
i)	List out the various theories of failure available.	5	L1
j)	Define Principal Stress and Principal strain.	5	L1

	Part-B	CO	Bloom Tx
Answer All the following questions.	(5X10M=50Marks)		
2	Derive the relationship between Elastic Moduli E, G and K from fundamentals of solid mechanics. [10M]	1	L4
	OR		
3	Derive the equation for strain energy stored in a body for a) Gradually applied loading b) Impact loading. [5M+5M]	1	L4
4	A simply supported beam of length 8m is loaded with uniformly varying load of 10kN/m for left half span and a concentrated load of 25kN at the centre of span. Calculate the support reactions & draw the shear force and bending moment diagrams for the beam. [10M]	2	L4
	OR		
5	Draw the shear force and bending moment diagrams and indicate point of contra flexure for An over-hanging beam shown below. [10M] 	2	L4

6	What are assumptions made in Theory of Simple Bending & also derive the equation for same. [10M]	3	L3
	OR		
7	A simply supported beam of 2m span carries a U.D.L. of 140 KN/m over the whole span. The cross section of the beam is I-section with a flange width of 120mm, web and flange thickness of 20mm and overall depth of 360mm. Determine the maximum shear stress in the beam and draw the shear stress distribution for the section. [10M]	3	L3
8	Derive the equation for maximum slope and deflection for a simply supported beam of span L meters carrying a uniformly distributed load over entire span using moment area method. [10M]	4	L4
	OR		
9	A simply supported beam 8 m long carries two concentrated loads of 80 kN each at a distance 3 m from both the ends and concentrated load of 50 kN Calculate the following (a) Maximum slope and deflection for the beam, and (b) Slope and deflection under load at the centre of beam. Take: EI = 2.1 X 10^5 N/mm^2. [5M+5M]	4	L3
10	Determine the concept of Mohr's stress and strain circles in two dimensions. [10M]	5	L3
	OR		
11	Discuss in detail about various prominent theories of failures [10M]	5	L3