



**R22 Regulation**

**Subject code: 4E4AB**

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

**B.Tech IV Semester Supplementary Examinations, December 2024**  
**STRENGTH OF MATERIALS – II**  
(CIVIL ENGINEERING)

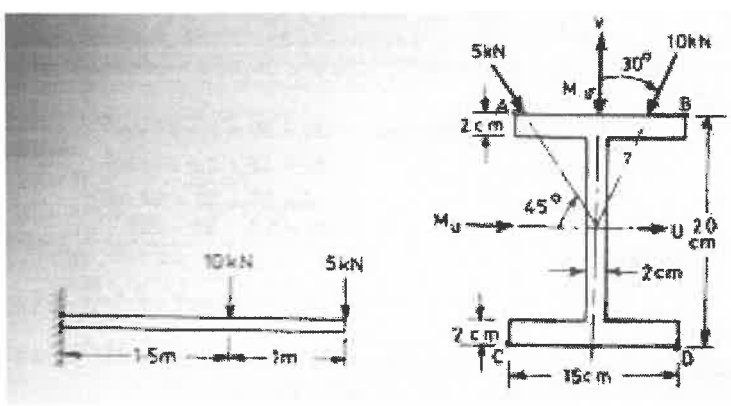
**Maximum Marks: 60**

**Date: 05.12.2024**

**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 equation for strain energy stored in a shaft due to torsion.	1	I
b)	State functions of springs.	1	II
c)	Define slenderness ratio.	2	II
d)	Distinguish between a column & a strut.	2	II
e)	Derive an expression for resultant stress of a masonry dam.	3	V
f)	Define Retaining Wall.	3	II
g)	Define shrinkage allowance.	4	II
h)	Write a short note on compound cylinders?	4	II
i)	Define flexure or bending axis.	5	II
j)	Write short notes on principal axes.	5	II
Part-B			Bloom Tx level
Answer All the following questions. (5X10M=50Marks)			
2	Calculate the maximum stress in a Hollow circular shaft with a 400mm external and 200mm internal diameter, when subjected to a twisting moment of 4650Nm. If the modulus of rigidity, $C=82\text{GN/m}^2$ , how much is the twist in a length 20 times the diameter? [10M]	1	V
OR			
3	a. Define solid length, spring rate, pitch [5M]	1	IV
	b. Distinguish between close and open helical coil springs [5M]	1	IV
4	Derive the maximum and minimum stresses developed in eccentrically loaded long columns [10M]	2	IV
OR			
5	A cast iron column with a 10cm external diameter and 8cm internal diameter is 3m long. Calculate the safe load using Rankine's formula if a) both ends hinged (b) both ends fixed (c) one end free and other end fixed (d) one end hinged and other end fixed. $\sigma_c = 600\text{N/mm}^2$ , $\alpha = 1/1600$ . Adopt factor of safety of 3. [10M]	2	IV

6	Derive the equation for maximum deflection of a strut subjected to compressive axial load and a transverse point load at centre and whose both ends are fixed. [10M]	3	IV
OR			
7	Determine the maximum stress induced in a horizontal strut of length 2.5m and of rectangular cross section 40mm wide and 80mm deep when it carries an axial thrust of 100kN and a vertical load of 6kN/m length. The strut is having pin joints at its ends. $E=208\text{GPa}$ . [10M]	3	IV
8	Derive the stresses developed in thin cylindrical vessel subjected to internal pressure. [10M]	4	IV
OR			
9	A cylindrical pressure vessel with closed ends is 25cm external diameter and 5mm thick. It is wound closely with a single layer of circular section steel wire of 1.2mm diameter under tension of $96\text{MN/m}^2$ . If the cylinder is treated as thin, calculate the (a) initial stress in cylinder, (b) initial pressure which will produce a stress of $48\text{MN/m}^2$ , Poisson's ratio = 0.30. [10M]	4	IV
10	A cantilever beam of I-section is used to support the loads inclined to the V- axis as shown in figure. Calculate the stresses at the corners A, B, C and D. Also locate the neutral axis. [10M]	5	IV
			
OR			
11	A simply supported beam T-section, 2.5m long carries a central concentrated load inclined at $30^\circ$ to the Y-axis. If the maximum compressive and tensile stresses are not to exceed $75\text{MPa}$ respectively find the maximum load the Beam can carry. [10M]	5	IV