Reg. No.												

Question Paper Code	12022

18 .IIII 2023

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Third Semester

Civil Engineering

20CEPC301 - STRENGTH OF MATERIALS - I

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Show the relationship between modulus of elasticity & modulus of rigidity.	2,K1,CO1
2.	Determine the Poisson's ratio and bulk modulus of material for which young's modulus is 1.2 x 10^5 N/mm^2 and modulus of rigidity is 4.8 x 10^4 N/mm^2.	2,K2,CO1
3.	Differentiate between hogging and sagging bending moment.	2,K2,CO3
4.	How to classify the beams according to its supports?	2,K2,CO3
5.	State the two theorems in moment area method.	2,K1,CO4
6.	Write the relation between deflection of bending moment and flexural rigidity for a beam.	2,K2,CO4
7.	Summarize the assumptions made in torsional equation.	2,K2,CO5
8.	Write short note on buffer springs.	2,K1,CO5
9.	Define degree of indeterminacy.	2,K1,CO6
10.	What are the equilibrium conditions for analyzing determinate truss?	2,K2,CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Estimate the values of change in length, breadth and thickness of steel bar 4.2 m long, 35 mm wide and 25 mm thick. When subjected to an axial pull of 130 kN in the direction of its length. Take E = 200 GPa and Poisson's ratio = 0.3.	13,K2,CO1
		OR	
	b)	Draw the stress-strain diagram for mild steel and for a brittle material and indicate salient points.	13,K2,CO1
12.	a)	Derive an expression for shear force and bending moment of a simple supported beam carrying a UDL of w/m length throughout its span with neat sketch.	13,K2,CO3
		OR	

b) A cantilever beam of 2 m long carries a UDL of 1.5 kN/m over a length of 1.6 m from the fixed end and 2 kN at free end. Draw the SFD and BMD for the beam. *13,K2,CO3*

13. a) Derive an expression for deflection of a simply supported beam carrying UDL throughout its span. *13,K2,CO4*

OR

b) A Cantilever of length 2.5 m is loaded with a UDL of 10 kN/m over a length 1.5 m from the fixed end and point load of 2 kN at 2 m from the free end. Use Moment area method. *13,K2,CO4*

(i) Design the beam for slope.

(ii) Design the beam for deflection at free end.

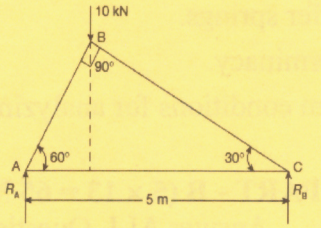
14. a) Derive the following torsional equation. *13,K2,CO5*

$$\frac{T}{J}=\frac{G\theta}{L}=\frac{\tau}{r}$$

OR

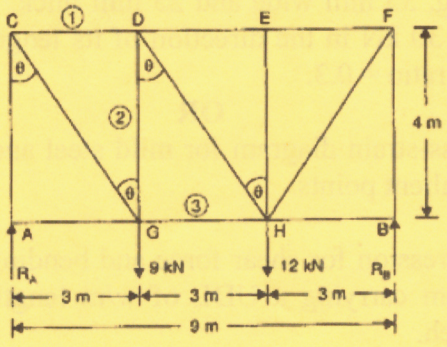
b) Two close coiled helical springs wound from the same wire, but with different core radii having equal no. of coils are compressed between rigid plates at their ends. Calculate the maximum shear stress induced in each spring, if the wire diameter is 10mm and the load applied between the rigid plates is 500N. The core radii of the springs are 100 mm and 75mm respectively. *13,K2,CO5*

15. a) Determine the forces in the members of the truss shown in Figure using Method of Joints. *13,K2,CO6*



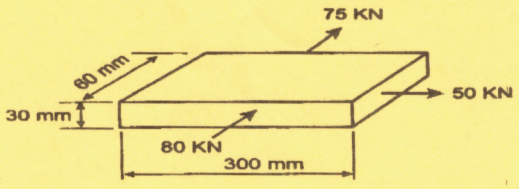
OR

b) A Truss of span 9 m is loaded as shown in Figure. Find the reactions and forces in the members marked 1, 2 and 3 using method of section. *13,K2,CO6*



PART - C (1 × 15 = 15 Marks)

16. a) Acted upon by the forces shown in Figure. Determine the change in volume. Take E = 200 kN/mm^2 and Poisson's ratio=0.3. *15,K2,CO2*



OR

b) The stress on two mutually perpendicular planes through a point on a body are 30 N/mm^2 and 20 N/mm^2 both tensile, along with a shear stress of 15 N/mm^2, find the normal and tangential stresses on a plane inclined at 40^o to the axis of minor principal stress. *15,K2,CO2*