Reg. No.															

Question Paper Code	14075

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC - 2025

Sixth Semester

Civil Engineering

20CEPC603 - STRUCTURAL ANALYSIS II

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The influence line for the bending moment at the center of a simply supported beam is: (a) A triangle with maximum ordinate at the center (b) A rectangle (c) A straight line (d) A parabola	1	K1	CO1
2.	For a simply supported beam, the influence line for shear force at a section is: (a) Symmetrical about the section (b) Zero throughout (c) Discontinuous at the section (d) Parabolic	1	K1	CO1
3.	The influence line for axial force in a member of a pin-jointed truss depends on: (a) The geometry of the truss (b) The location of the load (c) Both A and B (d) Neither A nor B	1	K1	CO2
4.	The influence line for a member force in a pin-jointed frame is: (a) Always a straight line (b) A curve depending on load position (c) A line segment that changes depending on the member orientation (d) Always horizontal	1	K1	CO2
5.	Influence lines for indeterminate beams are generally: (a) Straight lines (b) Nonlinear and smooth (c) Linear and discontinuous (d) Triangular	1	K1	CO3
6.	Muller-Breslau's principle is used to draw influence lines for: (a) Only determinate structures (b) Trusses only (c) Indeterminate structures (d) Arches	1	K1	CO3
7.	The line of thrust in an arch represents: (a) The geometric axis of the arch (b) The path of the centroid (c) The locus of the resultant of internal forces (d) The path of tension	1	K1	CO4
8.	In a cable subjected to a uniformly distributed load, the shape of the cable is: (a) Straight line (b) Circular (c) Parabolic (d) Hyperbolic	1	K1	CO4
9.	The plastic moment capacity of a section is: (a) Greater than its elastic moment capacity (b) Equal to the elastic moment capacity (c) Less than the elastic moment capacity (d) Independent of yield strength	1	K2	CO5
10.	The condition for a mechanism to form in plastic analysis is: (a) One plastic hinge (b) Two plastic hinges (c) Number of plastic hinges = Degree of indeterminacy + 1 (d) Number of plastic hinges = Degree of indeterminacy - 1	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Draw the influence line for shear force at a section 3 m from the left support of a simply supported beam of span 6 m.	2	K2	CO1

12.	For a simply supported beam of span 8 m, calculate the maximum bending moment due to a 20 kN point load moving across the beam.	2	K2	CO1
13.	Define Absolute Maximum Bending moment.	2	K1	CO2
14.	What do you understand by the term "reversal of stresses"?	2	K2	CO2
15.	State Muller-Breslau's principle. How is it applied to draw ILDs?	2	K2	CO3
16.	A 10 kN point load moves across a continuous beam (2 spans of 5 m each). Determine the maximum bending moment at the midspan of the first span.	2	K2	CO3
17.	Differentiate between two-hinged and three-hinged arches.	2	K2	CO4
18.	Determine the horizontal thrust in a three-hinged parabolic arch of span 10 m and rise 3 m carrying a point load of 5 kN at the crown.	2	K2	CO4
19.	Write the expression for the length of a parabolic cable with supports at the same level.	2	K2	CO5
20.	Define shape factor and give its value for a rectangular section.	2	K1	CO5
21.	A fixed beam of span 4 m carries a UDL of 20 kN/m. Determine the collapse load using plastic analysis (assume Mp = 80 kNm).	2	K2	CO6
22.	What are the upper and lower bound theorems in plastic analysis?	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	A girder having a span of 18m is simply supported at the ends. It is traversed by a train of loads 100kN, 200kN, 100kN and 50kN with 3m, 2m and 3m spacing respectively and 50kN load is leading. Find the maximum Bending moment (i) under 200kN load and (ii) 50kN load.	11	K3	CO1
		OR			
	b)	A simply supported beam of span 8 m carries two moving point loads of 40 kN and 20 kN spaced 3 m apart. Determine the absolute maximum bending moment in the beam.	11	K3	CO1
24.	a)	For a through type N girder, draw the influence line for force in any four members . The bridge has 6 bays of 3m each.	11	K3	CO2
		OR			
	b)	Explain step by step procedure in drawing the ILD for forces in members of a truss.	11	K3	CO2
25.	a)	Using Muller-Breslau's principle, draw the influence line diagram for the moment at the fixed end of a propped cantilever of span 6 m.	11	K3	CO3
		OR			
	b)	For a continuous beam with two equal spans of 5 m each, draw the influence line for reaction at 1 m interval using Muller-Breslau's principle with hinged support at B.	11	K3	CO3
26.	a)	A three-hinged parabolic arch has a span of 20 m and a central rise of 5 m. A point load of 50 kN moves across the arch. Determine the maximum bending moment in the arch.	11	K3	CO4
		OR			
	b)	A symmetrical parabolic 3 hinged arch of span 40m and rise 8m carries an udl of 30kN/m over the left half of the span. Find the bending moment, normal thrust and radial shear at D, 10m from the left support.	11	K3	CO4

27.	a)	A suspension bridge of 250m span has two numbers of three hinged stiffening girder supported by cables with a central dip of 25m. If 4 point load of 300kN each are placed at the centre line of the roadway at 20, 30, 40 and 50m from the left hand hinge, Estimate the shear force and bending moment in each girder at 62.5m from each end. Estimate also the maximum tension in the cable.	*11*	*K3*	*CO5*
		OR			
	b)	A cable of span 60 m and dip 6 m carries a uniformly distributed load of 15 kN/m. Find the maximum tension in the cable and the horizontal component of the tension.	*11*	*K3*	*CO5*
28.	a)	A fixed beam of span 6 m is subjected to a uniform load of 30 kN/m. Determine the collapse load using plastic analysis. Assume plastic moment capacity Mp=120 kNm.	*11*	*K3*	*CO6*
		OR			
	b)	A rectangular beam section has a width of 100 mm and depth of 200 mm. Calculate the plastic moment of resistance and shape factor.	*11*	*K3*	*CO6*