Reg. No.																

Question Paper Code	13012

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Sixth Semester

Civil Engineering

20CEPC603 - STRUCTURAL ANALYSIS II

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The influence line for bending moment at a given section of a simply supported beam is typically: (a) A straight line (b) A parabolic curve (c) A triangle with zero values at supports and maximum at the section (d) Constant along the span	1	K2	CO1
2.	In the case of a concentrated moving load on a simply supported beam, where will the maximum bending moment occur? (a) Near the supports (b) At the midpoint of the beam (c) At the point of application of the load (d) Uniformly distributed along the span	1	K2	CO1
3.	In a simply supported beam, where is the maximum influence for the reaction at the left support located? (a) At the right support (b) At the midpoint of the beam (c) At the left support (d) Uniform along the beam	1	K2	CO1
4.	For a simply supported beam with a moving uniform load, the absolute maximum bending moment occurs at: (a) The supports (b) The midpoint (c) The one-third span (d) The end of the load's position	1	K2	CO2
5.	In an influence line for bending moment in a simply supported beam, the maximum influence occurs when the load is positioned: (a) Close to the point of interest (b) At the point of interest (c) At the midpoint (d) At any position	1	K2	CO2
6.	In a simply supported beam, an absolute maximum bending moment due to a distributed load occurs: (a) At the support (b) At midspan (c) At quarter span (d) Anywhere along the beam	1	K2	CO2
7.	For a continuous beam with one degree of redundancy, where is the maximum influence on the bending moment likely to occur? (a) At the center of the span (b) At the fixed or continuous supports (c) Near the midpoint of any span (d) At the midpoint of the entire beam	1	K2	CO3
8.	According to Muller-Breslau's principle, to draw the influence line for a bending moment at a section, what type of displacement is applied? (a) A unit rotation at the section (b) A unit vertical displacement at the section (c) A unit horizontal displacement at the section (d) A combination of horizontal and vertical displacements	1	K2	CO3
9.	In a propped cantilever beam, the influence line for the reaction at the prop shows: (a) A straight line with zero values at both ends (b) A positive and negative region, reflecting support reactions (c) Only a positive region, representing upward support reaction (d) A parabolic curve due to the fixed support	1	K2	CO3

10.	In a two-hinged arch, the degree of static indeterminacy is typically: (a) Zero (b) One (c) Two (d) Three	1	K1	CO4
11.	Which type of arch can resist both horizontal and vertical loads while allowing some degree of rotation at the supports? (a) Three-hinged arch (b) Two-hinged arch (c) Fixed arch (d) Cantilever arch	1	K2	CO4
12.	Which type of arch is best suited for resisting large temperature variations without inducing significant stress? (a) Fixed arch (b) Two-hinged arch (c) Three-hinged arch d) Hingeless arch	1	K2	CO4
13.	In the equilibrium of a cable, the shape of the cable under a uniformly distributed load is generally: (a) Parabolic (b) Circular (c) Triangular (d) Straight	1	K2	CO5
14.	The length of a suspension cable between two supports depends primarily on: (a) The material of the cable (b) The span length and sag (c) The wind loads acting on the cable (d) The inclination of the supports	1	K2	CO5
15.	For a suspension cable subjected to a uniformly distributed load, the horizontal tension in the cable is: (a) Maximum at the supports (b) Maximum at the midpoint (c) Zero at the supports (d) Constant throughout	1	K2	CO5
16.	What is the effect of temperature changes on a cable with a three-hinged stiffening girder? (a) No effect on cable forces (b) Only affects the girder's support reactions (c) Can be accommodated without inducing large additional stresses (d) Causes excessive bending moments in the cable	1	K2	CO5
17.	For a circular cross-section, the shape factor is typically: (a) 1.5 (b) 1.7 (c) 2.0 (d) 1.0	1	K1	CO6
18.	The shape factor of a cross-section is the ratio of: (a) Plastic modulus to elastic modulus (b) Plastic moment to yield moment (c) Yield moment to plastic modulus (d) Elastic moment to plastic moment	1	K2	CO6
19.	The point at which a structure forms a sufficient number of plastic hinges to become a mechanism and collapse is known as: (a) Yield load (b) Collapse load (c) Service load (d) Ultimate load	1	K2	CO6
20.	In plastic analysis of a two-span continuous beam, the minimum number of plastic hinges required for collapse is: (a) One (b) Two (c) Three (d) Four	1	K1	CO6

PART - B (10 × 2 = 20 Marks)

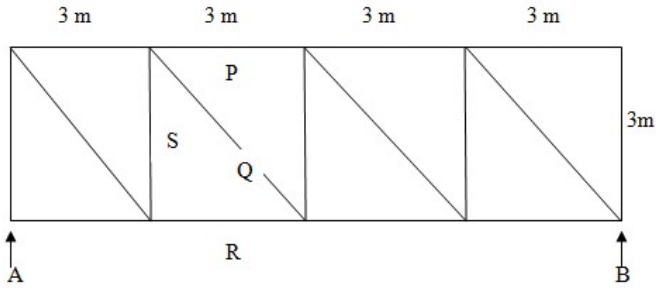
Answer ALL Questions

21.	What are the shapes obtained in influence lines for bending moment at the same location on a beam?	2	K2	CO1
22.	Draw the influence line for a support reaction for simply supported beam subjected to a unit load.	2	K2	CO1
23.	List two key factors that influence the value of the absolute maximum bending moment in a beam subjected to moving loads.	2	K1	CO2
24.	What is meant by the term "absolute maximum bending moment" in the context of structural analysis?	2	K1	CO2
25.	What is a propped cantilever, and how does it differ from a simply supported beam in terms of support conditions?	2	K2	CO3
26.	How do intermediate supports in continuous beams affect the distribution of bending moments and support reactions compared to a simple beam?	2	K2	CO3
27.	List out the types of arches used in construction.	2	K1	CO4
28.	List two advantages of using parabolic arches in structural design compared to circular arches.	2	K1	CO4
29.	Calculate the length of the cable having the span of 20m and dip of 2.5m.	2	K2	CO5
30.	Determine the shape factor for Rectangular section having breath b & depth d.	2	K2	CO6

PART - C (6 × 10 = 60 Marks)

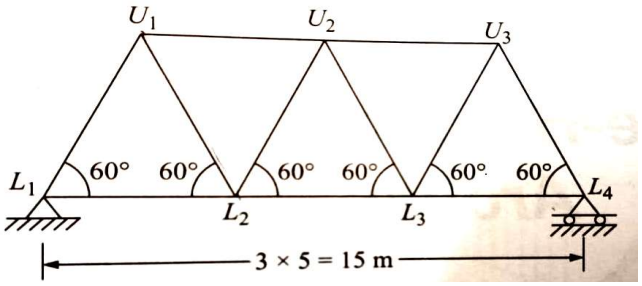
Answer ALL Questions

31.	a)	Determine maximum shear force and maximum bending moment at quarter span from left end when a uniformly distributed load longer that the span of intensity 20kN/m, accompanied by a 100kN concentrated load crosses the span of 12m. Use influence lines, the concentrated load can occupy any position.	*10*	*K3*	*CO1*
		OR			
	b)	Draw the influence line diagram for bending moment at a point 10m distance from the left-hand abutment on a bridge girder of span 25m. Find the maximum bending moment at the point due to a series of wheel loads 100kN, 200kN, 200kN at center to center distance of 4m, 2.5m and 2.5m. The loads can cross in either direction, 100kN load leading in each case.	*10*	*K3*	*CO1*
32.	a)	Draw ILD for forces in P and Q	*10*	*K3*	*CO2*



OR

	b)	Draw the influence line diagrams for the forces in the members U_1L_2 of the truss shown in Fig. Determine the maximum forces in these members when uniformly distributed load of intensity 8kN/m and length 5m traverses the span.	*10*	*K3*	*CO2*



33.	a)	Using Muller-Breslau principle, compute the influence line ordinates at 1m interval for bending moment and shear force of Propped cantilever beam having the span of 6m.	*10*	*K3*	*CO3*
		OR			
	b)	Using Muller-Breslau principle, compute the influence line ordinates at 2m interval for bending moment and shear force of two span continuous beam having the span of AB=6m, BC=4m. Support A is hinged and B&C are roller supports.	*10*	*K3*	*CO3*
34.	a)	A three-hinged circular arch hinged at the springing and crown points has a span of 40m and a central rise of 8m. It carries a uniformly distributed load of 20kN/m over the left-half of the span together with a concentrated load of 100kN at the right quarter span point. Find the reactions at the supports, normal thrust and shear at a section 10m from left support.	*10*	*K3*	*CO4*
		OR			

b) A two-hinged symmetric parabolic arch of span 40m and rise 5m is subjected to rolling loads. Determine the maximum moment at a section 10m from the left support due to a concentrated load of 40kN at 10m from the left support. *10 K3 CO4*

35. a) A cable is suspended from the points A and B which are 80m apart horizontally and are at different levels, the point A being 5m vertically higher than the point B and the lowest point in the cable is 10m below A. The cable is subjected to a uniformly distributed load of 30kN/m over the horizontal span. Determine the horizontal and vertical reactions at each end and also the maximum tension in the cable. *10 K3 CO5*

OR

b) A light flexible cable 18m long is supported at two ends at the same level. The supports are 16m apart. The cable is subjected to uniformly distributed load of 1kN/m of horizontal length over its entire span. Determine the reactions developed at the support. *10 K3 CO5*

36. a) Calculate the shape factor of the I-section shown in Fig 3. If the value of the yield stress is 250N/mm^2, find the plastic moment capacity of the section. *10 K3 CO6*

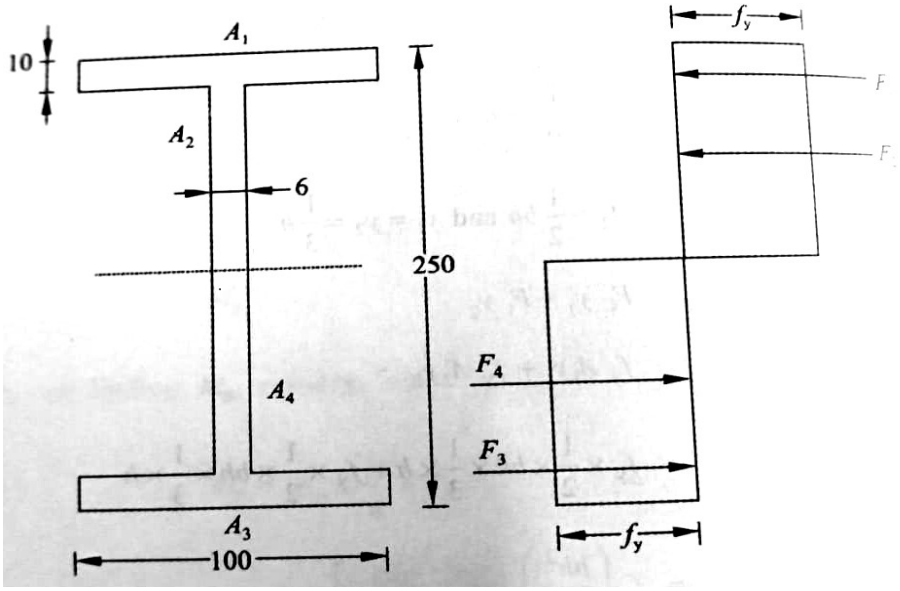


Fig 3

OR

b) Determine the collapse load in case of a fixed beam shown in Fig 4. *10 K3 CO6*

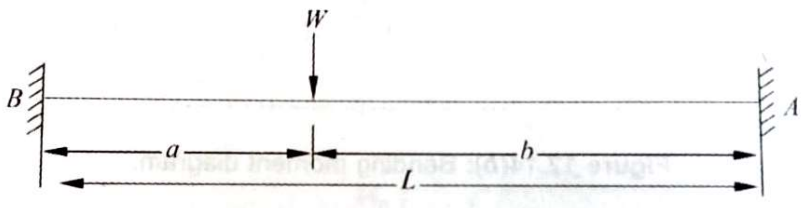


Fig 4