Reg. No.												

Question Paper Code	12698

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Sixth Semester

CIVIL ENGINEERING

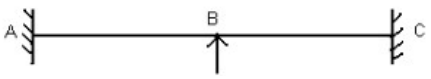
20CEPC603 - STRUCTURAL ANALYSIS II

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

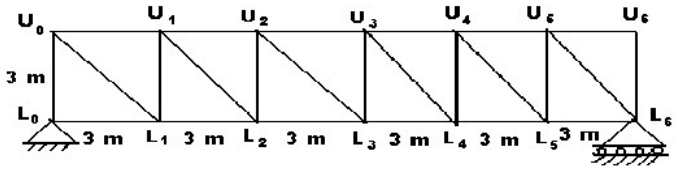
		Marks	K – Level	CO
1.	What are Influence Lines?	2	K1	CO1
2.	Draw ILD for Bending moment in a SSB.	2	K2	CO1
3.	List any 2 uses of ILD.	2	K1	CO2
4.	Sketch the shapes of the influence lines for the support reaction and the hogging moment at the continuous support B of a two span continuous beam ABC. Assume the extreme ends A and C to be fully fixed. 	2	K2	CO2
5.	Write the types of arches based on the number of hinges.	2	K2	CO4
6.	Write the difference between circular arch and parabolic arch.	2	K2	CO4
7.	What is the nature of forces in the cables?	2	K2	CO5
8.	Briefly explain cable over a guide pulley.	2	K2	CO5
9.	State upper bound theorem.	2	K1	CO6
10.	Define plastic hinge with an example.	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

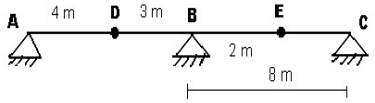
			Marks	K – Level	CO
11.	a)	Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system.	13	K3	CO1
		OR			
	b)	A girder having a span of 20m is simply supported at the ends. It is traversed by a train of loads 150kN, 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) 100kN load.	13	K3	CO1

12. a) Draw the ILD for the forces in members U2L2 and U2L3 of the truss shown in figure. *13 K3 CO2*

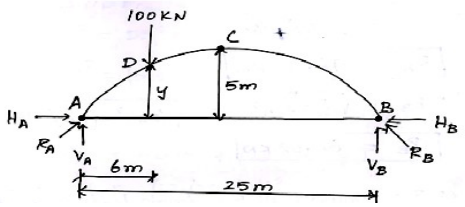


OR

b) A beam ABC is supported at A, B and C as shown in Fig. It has the hinge at D. Draw the influence lines for *13 K3 CO2*
(i). Reactions at A, B and C
(ii). Shear to the right of B
(iii). Bending moment at E

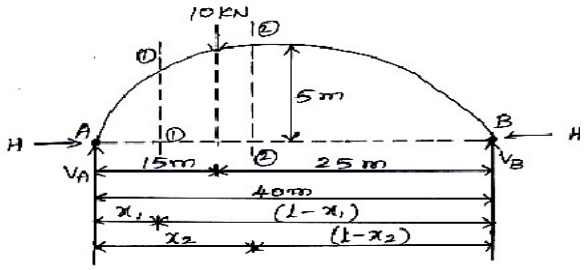


13. a) A circular (three hinged) arch of span 25 m with a central rise of 5 m is hinged at the crownand the end supports. It carries a point load of 100 kN at 6 m from the left support. Calculate *13 K3 CO4*
(i). The reaction at the supports and
(ii). Moment at 5 m from the left support.



OR

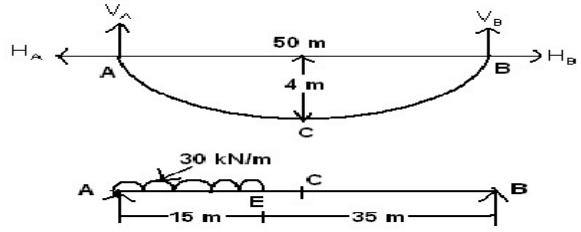
b) A parabolic two hinged arch has a span of 40 m and a rise of 5 m. concentrated load 10 kN acts at 15 m from the left support. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also calculate maximum bending moment at the section. *13 K3 CO4*



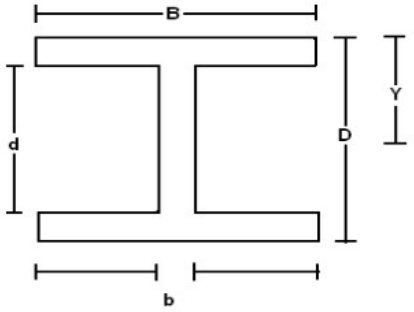
14. a) A suspension cable of span 200 m is subjected at the same level. It is subjected to a udl of 25.5 kN/m. If the maximum tension in the cable is limited to 4500kN. Calculate the minimum central dip needed. *13 K3 CO5*

OR

b) A suspension bridge has a span 50 m with a 15 m wide runway. It is subjected to a load of 30 kN/m including self weight. The bridge is supported by a pair of cables having a central dip of 4 m. find the cross sectional area of the cable necessary if the maximum permissible stress in the cable materials is not to exceed 600 MPa. *13 K3 CO5*

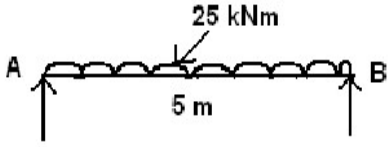


15. a) Derive the shape factor for I section *13 K3 CO6*



OR

b) A simply supported beam AB of span 5 m is to be designed for an udl of 25 kN/m. Design a suitable I section using plastic theory, assuming yield stress in steel as fy = 250 N/mm^2. *13 K3 CO6*



PART - C (1× 15 = 15 Marks)

16. a) Using Muller Breslau principle, draw the IL for bending moment at the mid-point D of the span AB of the continuous beam ABC, hinged at A and C, with roller at B. AB = 9m and BC = 6m. *15 K3 CO3*

OR

b) Determine the influence line for RA for the continuous beam ABC, roller at A and C with hinge support at B. Compute the IL at every 1m interval. AB = BC = 4m.Using Muller Breslau principle. *15 K3 CO3*