STRUCTURAL ANALYSIS – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is the effect of temperature on three hinged arch?	[3M]
	b)	What are the steps involved in portal frame method?	[4M]
	c)	What is a suspension bridge? What is its limitation of span over a waterway?	[3M]
	d)	Define and explain stiffness, carry over factor and distribution factor.	[5M]
	e)	What is Kani's method and what is the terminology used in Kani's method?	[4M]
	f)	Write the steps involved in flexibility matrix method.	[3M]

PART -B

2	a)	A three hinged parabolic arch rib has a span of 84m and a rise 18m to the central pin at the crown. The rib carries load of intensity 2kN/m uniformly distributed horizontally over a length of 1/3 of the span from the left hand. Calculate the bending moments in the rib at the quarter span points.	[12M]
	b)	What is the difference between three hinge arch and two hinge arch?	[4M]
3	a)	Explain the portal method for analyzing a building frame subjected to horizontal forces.	[12M]
	b)	What do you understand by substitute frame method?	[4M]
4	a)	What is a general cable theorem? Deduce an expression.	[12M]
	b)	What are stiffening girders? Discuss their types.	[4M]
5		A simply supported beam ABC is continuous over two spans AB and BC of 6m and 5m respectively. Span AB is carrying a uniformly distributed load of 2kN/m and span BC carries point load of 5kN at a distance of 2m from B. Find the support moment at B if EI of the beam is constant. Use moment distribution method.	[16M]

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6 Using the Kani's method analyse the frame shown in fig.1. [16M]

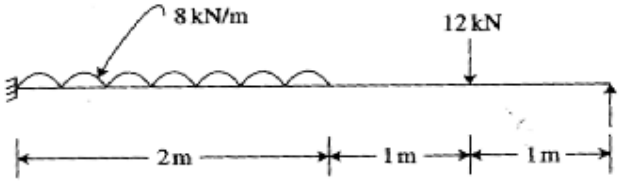

Fig.1

7 a) Write the steps involved in analyzing the stiffness method. [6M]

b) Using stiffness matrix method find the end moments at A and B for the given beam as shown in fig.2 [10M]

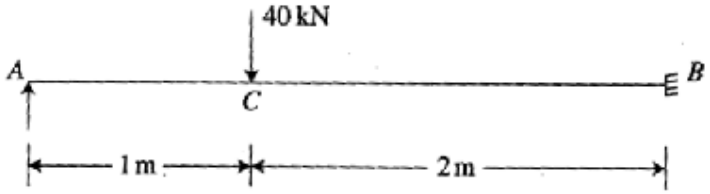

Fig.2

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PART –A

1	a)	What is the effect of rib shortening on two hinged arch?	[3M]
	b)	What are the steps involved in cantilever method?	[4M]
	c)	Explain suspension cable on roller support with figures.	[3M]
	d)	What is a portal frame? Distinguish between symmetrical and unsymmetrical portal frame.	[5M]
	e)	What is Kani's method and what is the terminology used in Kani's method?	[4M]
	f)	Write the steps involved in Stiffness matrix method.	[3M]

PART -B

2	a)	A two hinged parabolic arch rib has a span of 10m has a central rise 2.5m. It is loaded with uniformly distribute load 2kN/m over a half of the span from the left support. Determine the end reactions, horizontal thrust, maximum and minimum B.M of the arch.	[12M]
	b)	Explain briefly what do you understand by an arch?	[4M]
3	a)	Explain the cantilever method for analyzing a building frame subjected to horizontal forces.	[12M]
	b)	What are the different types of substitute frames?	[3M]
4	a)	What is a general cable theorem? Deduce an expression.	[8M]
	b)	What are stiffening girders? Discuss their types.	[5M]
5		A simply supported beam ABC is continuous over two spans AB and BC of 8m and 6m respectively. Span AB is carrying a uniformly distributed load of 3kN/m and span BC carries point load of 4kN at midpoint of BC. Find the support moment at B if EI of the beam is constant. Use moment distribution method.	[16M]

6 Using the Kani's method analyse the frame shown in fig.1. [16M]

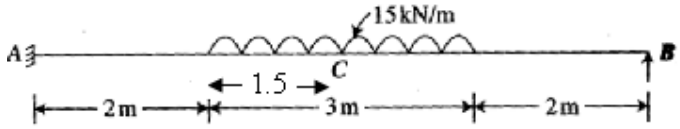

Fig.1

7 a) Write the steps involved in analyzing the flexibility matrix method. [8M]

b) Using flexibility matrix method, find the end moments at A and B for the beam shown in fig.2. [8M]

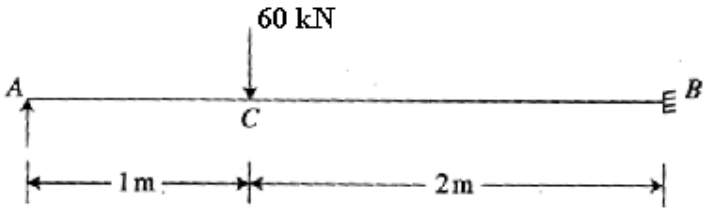

Fig.2

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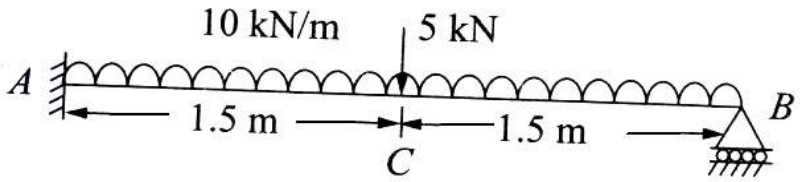
PART –A

1	a)	Find the horizontal thrust of a two hinged semi circular arch of radius R carries a concentrated load of W.	[4M]
	b)	Differentiate between portal frame method and cantilever method.	[4M]
	c)	What is a simple suspension bridge?	[3M]
	d)	Write the equations for continuous beam with and without sway.	[4M]
	e)	What is Kani's method? What are the limitations of this method?	[4M]
	f)	Differentiate between stiffness matrix method and flexibility matrix method.	[3M]

PART –B

2	a)	State and prove Eddy's theorem.	[8M]
	b)	A three hinged parabolic arch rib has a span of 20m and a rise 4m to the central pin at the crown. The rib carries load of intensity 2kN/m uniformly distributed horizontally on the left 3m. Calculate the maximum and minimum bending moments.	[8M]
3		Analyse a portal frame of two stroyed, two bay of 5m bay length each and height 5m.A horizontal force of 120kN is applied at top storey and 240kN is applied at lower storey. Use portal frame method	[16M]
4		A beam ABC 8m long is fixed at A and simply supported at B with an overhang BC 2m long. The beam carries a uniformly distributed load of 12kN/m on AB and a point load of 12kN at C. Find the support moments and the support reaction. Use moment distribution method.	[16M]

5 Analyse the beam shown below by Kani's method. [16M]



6 A three hinged suspension girder bridge has a span of 200m over the supports at same level. It has a central dip of 20m.The girder carries three point loads of 15kN, 25kN and 20kN acting at 35m, 80m and 150m respectively from the left end. Draw the B.M.D. [16M]

7 a) Using flexibility matrix method, find the end moments at A and B for a fixed beam carrying udl 4kN/m throughout. [10M]

b) Which method is advantageous among stiffness method and flexibility method? [6M]

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*****

PART –A

1	a)	What is a horizontal thrust, normal thrust and radial thrust in a three hinged arch?	[3M]
	b)	What is a building frame? What are the different methods available for analyzing a frame?	[4M]
	c)	What is the effect of temperature on the cables?	[4M]
	d)	What is a carryover factor and distributor factor in a moment distribution method?	[4M]
	e)	What are the steps involved in the Kani's method?	[3M]
	f)	What are the steps involved in Stiffness matrix method.	[4M]

PART -B

2		A three hinged parabolic arch rib has a span of 50m and a rise 20m to the central pin at the crown. The rib carries load of intensity 3kN/m uniformly distributed horizontally on the left 4m. Calculate the (i) maximum and minimum bending moments, (ii) horizontal thrust, (iii) Normal thrust and radial shear at a section 15m from A.	[16M]
3		Write the steps involved in the Portal frame method and Cantilever method.	[16M]
4		A fixed beam of span 6m carries a uniformly distributed load of 18kN/m. If the right support sinks by 6.5mm, find the fixing moment of the supports. Draw S.F.D and B.M.D. Take E =200kN/mm^2 and I= 5 x 10^7 mm^4. Analyse by moment distribution method	[16M]
5		A cable hangs between two supports at a distance 120m apart. One end of the support is 3m above the other. The cable is loaded with a udl of 1 kN/m. The sag of the cable from higher end is 5m. Find the horizontal thrust and the maximum tension in the cable.	[16M]
6	a)	Write the steps for analyzing a portal frame carrying a udl by Kani's method.	[8M]
	b)	Draw S.F.D and B.M.D of the fixed beam of span 'l', carrying u.d.l for a distance of 'a' from one end. Use Kani's method.	[8M]

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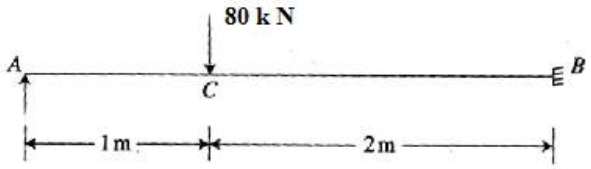
7 a) Write the steps involved in analyzing the stiffness matrix method. [8M]

b) Using stiffness matrix method find the end moments at A and B for the given beam [8M]



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