STRUCTURAL ANALYSIS – II
(Civil Engineering)

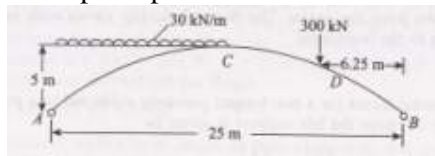Time: 3 hours   Max. Marks: 70

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) Define Eddy's Theorem.   [4M]
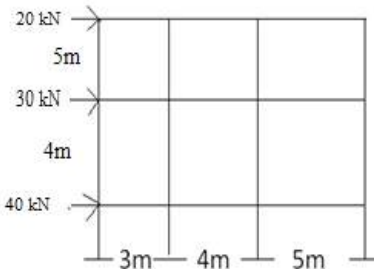   b) Write the formula of Portal frame method.   [3M]
   c) What is difference between Cable and Suspension bridge?   [4M]
   d) List the important steps in the moment distribution method?   [4M]
   e) What is rotational factor?   [3M]
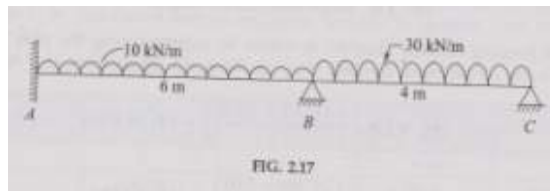   f) What is kinematic indeterminacy?   [4M]

PART -B

2 a) A two hinged parabolic arch is loaded as shown in the figure below. Compute the   [8M]
       horizontal thrust from the first principles.
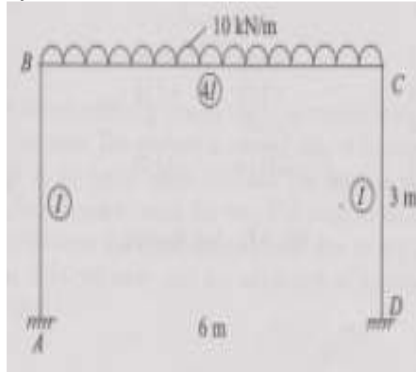

   b) Differentiate between Three Hinged Arches and Two Hinged Arches.   [8M]

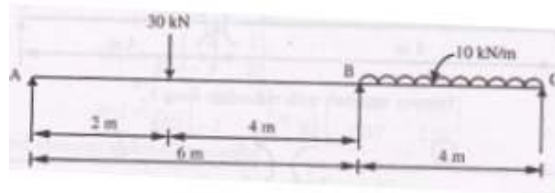3 a) Analyse the frame shown in the figure by Portal Frame method.   [8M]

4   Analysis the continuous beam shown in figure by the moment distribution method.   [16M]
        Draw the bending moment diagram and shear force diagram. The beam is of uniform
        section.

FIG. 2.17

1 of 2

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5   Analyze the given frame by Kani's method. Sketch the bending moment diagram.   [16M]

6   Analyse the continuous beam shown in figure by the flexibility method and draw the   [16M]
bending moment diagram.

7   Two hinged girders of a suspension bridge have a span of 100m,the dip of the   [16M]
supporting cable being 10m.If the girder is subjected to two point loads of 300kN and
100kN at distances of 20m and 80m from the left end , find the S.F and B.M for the
girder at 25m from the left end. Find also the maximum tension in the cable.

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PART –A

|			
1	a)	Write about fixed arches.	[3M]
	b)	What are the different characteristics of cable?	[4M]
	c)	State two assumptions made in the analysis of Cantilever method?	[4M]
	d)	Draw the bending moment diagrams for a portal frame of two bay two storey with and without sway.	[4M]
	e)	What is displacement factor?	[3M]
	f)	Name the unknown to be determined in the stiffness method?	[4M]

PART -B

2 a) A symmetrically loaded arch with uniformly distributed load throughout the span. Calculate the horizontal thrust.   [4M]
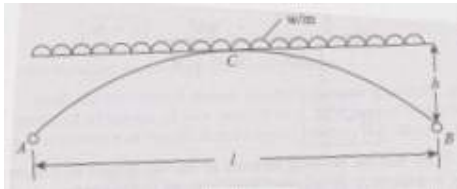

   b) What is normal thrust and redial shear in three hinged arch?   [8M]

3 a) Analyze a multistoried building of two bays and two span of height 5m with a span length of 5m each for a lateral load of 50kN at the top bay of the portal frame by Portal method.   [16M]

4   Analyse the continuous beam by moment distribution method. Draw the shear force diagram and bending moment diagram.   [16M]
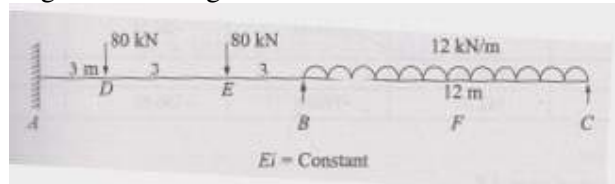
5   Analyse the portal frame shown in figure by Kani's method and draw the bending moment diagram.   [16M]

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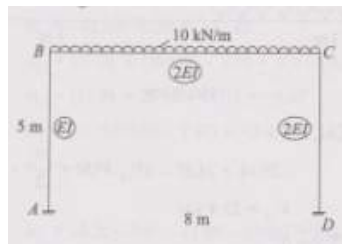
6   Analyse the continuous beam in figure by flexibility method.   [16M]
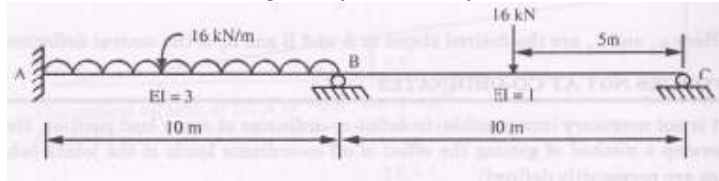
7   A cable is used to support five equal and equidistant loads over a span of 50m. Find   [16M]
the length of the cable required and its sectional area if the safe tensile stress is 200
N/mm^2. The central dip is 4.0m and loads are 5kN each.

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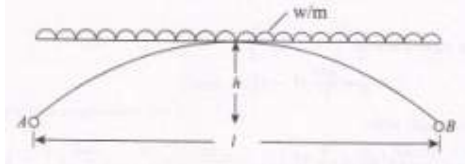
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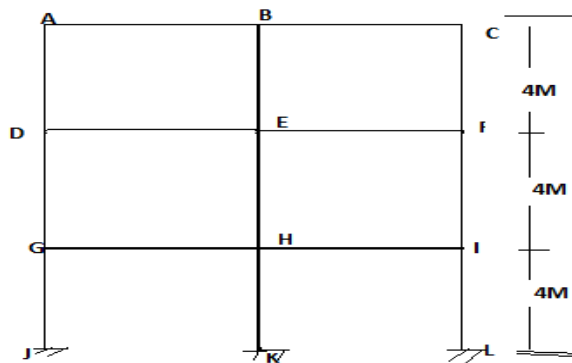   3. Answer any **THREE** Questions from **Part-B**
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PART –A

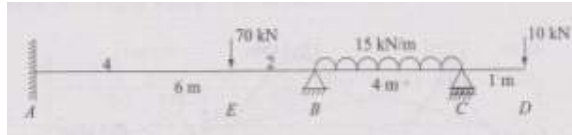|			
1	a)	Give the example of an statically indeterminate arch.	[3M]
	b)	State two assumptions made in the analysis of cables.	[4M]
	c)	State two assumptions made in the analysis of Portal frame method?	[4M]
	d)	Define distribution factor at a joint.	[3M]
	e)	Mention the characteristics of stiffness matrix.	[4M]
	f)	What are the steps involved in Kani's method?	[4M]

PART -B

2   a)   Prove that the bending moment in the two hinged arch is zero everywhere if it   [8M]
         is carrying a uniformly distributed load over its entire span.

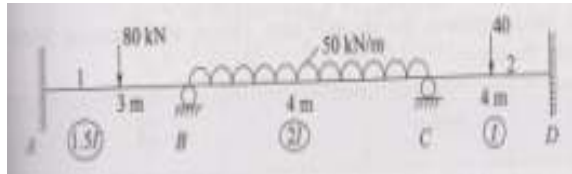   b)   State and prove Eddy's Theorem.   [8M]

3   Analyse the portal frame shown below by cantilever method which carries a   [16M]
         lateral load of 40kN at the top bay of the frame and 30kN at middle bay of the
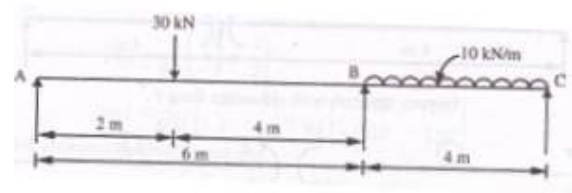   frame

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4   Analyse the beam shown in figure by the moment distribution method.   [16M]
Support B sinks by 10 mm. $E = 200$ kN/mm^2. $I = 4000 \times 10^4$ mm^4. Draw
BMD and SFD.

5   Determine the support moments for the continuous beam shown in figure by   [16M]
Kani's method. The relative I values are indicated along the member in each
span. EI is constant. Sketch the BMD and SFD.

6   Analyse the continuous beam shown in figure by the Stiffness method and   [16M]
draw the bending moment diagram.

7   A light cable 24m long is supported at two ends at the same level. The   [16M]
supports are 20m apart. The cable supports three loads 12, 14 and 16N
dividing the 20m distance in four equal parts. Find the shape of the string and
the tension in various portions.

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PART –A

|			
1	a)	State and prove Eddy's theorem.	[3M]
	b)	Define arch and how it differs from beam?	[4M]
	c)	State two assumptions made in the analysis of Portal frame method?	[4M]
	d)	Derive an expression for distribution factor.	[3M]
	e)	Mention the characteristics of stiffness matrix.	[4M]
	f)	Derive an expression for shear force and bending moment at any section for a three hinged stiffening girder.	[4M]

PART -B

2 a) A three hinged parabolic arch of span 30 m and rise 5m carries a uniformly   [10M]
distributed load of 30 kN per m on the whole span and a point load of 90kN at a
distance of 5m from the right end. Find the horizontal thrust. Also, find the
bending moment, normal thrust and radial shear at a section 5m from the left end.

   b) Determine the horizontal Thrust for a Three Ringed arch.   [6M]

3   Analyze a multistoried building of two bays and two span of height 6m with a   [16M]
span length of 5m each for a lateral load of 60kN at the top bay of the portal frame
and 50kN at the middle bay of the portal frame. Use Cantilever method .

4   Analyse the given frame by the moment distribution method. Sketch the bending [16M]
moment diagram.
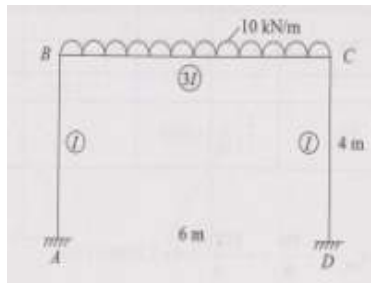
5   Analyse the three span continuous beam using Kani's method. The values of   [16M]
second moment area of each span are indicted along the members. EI is constant.
Calculate the end moments.

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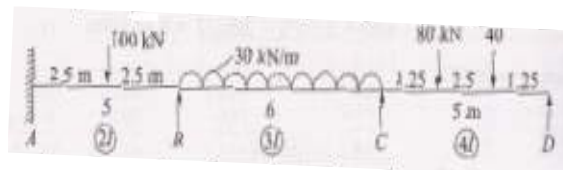
6   Analyse the continuous beam in figure by stiffness method.   [16M]
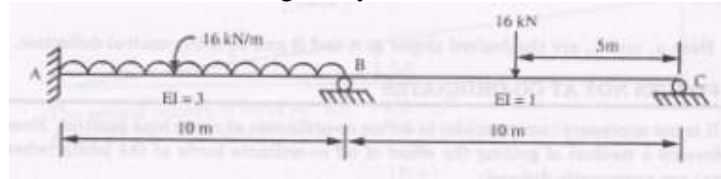
7   A light cable 26m long is supported at two ends at the same level. The supports   [16M]
are 24m apart. The cable supports three loads 7, 9 and 11 N dividing the 24m
distance in to four equal parts. Find the shape of the string and the tension in
various portions.

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