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SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October- 2016
STRUCTURAL ANALYSIS – II
(Civil Engineering)

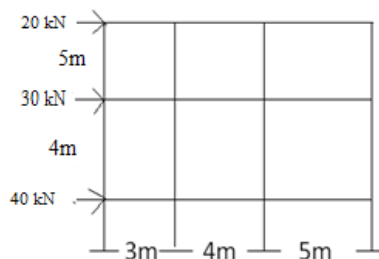Time: 3 hours   Max. Marks: 70

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 the term an arch?	[3M]
	b)	State two assumptions made in the analysis of cables.	[4M]
	c)	Define absolute stiffness of members?	[4M]
	d)	Define carry over factor.	[3M]
	e)	Mention the characteristics of the stiffness matrix?	[4M]
	f)	Mention two advantages of Kani's method over moment distribution method.	[4M]

PART –B

2	a)	How are arches classified based on shape and end conditions?	[8M]
	b)	State and prove Eddy's theorem.	[8M]
3	a)	Obtain an expression to find the length of a cable, carrying u.d.l. of "w" per unit length supported from two points distance "L" apart not at the same level, the lowest point being h_1 below left support and h_2 below right support.	[8M]
	b)	What will be the horizontal support reactions?	[8M]
4		Using moment distribution method analyze the two span continuous beam. The moment of inertia of AB = I while that of BC = 2I. The ends A and C are Fixed. Sketch the B.M. and S.F. diagram. Span AB carries a concentric load of 36 kN with a span of 6m and span BC carries an udl of 20 kN/m over a span of 8m.	[16M]
5		Using Kani's method, determine the support moments for the three-span continuous beam with fixed end supports, having spans AB, BC and CD. Span AB carries an eccentric point load of 80kN, 4m span and a load at 1m from point A. Span BC carries an udl of 20 kN/m of 6m span and span CD carries a concentric point load of 60 kN having a span of 4m (EI constant). Sketch the B.M. and S.F.D.	[16M]
6		Explain the difference between flexibility method and stiffness method when applying to analysis of continuous beam	[16M]
7		Analyse the portal frame by Portal method	[16M]

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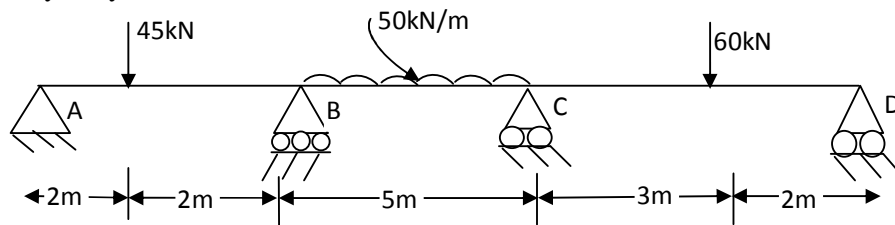Time: 3 hours   Max. Marks: 70

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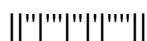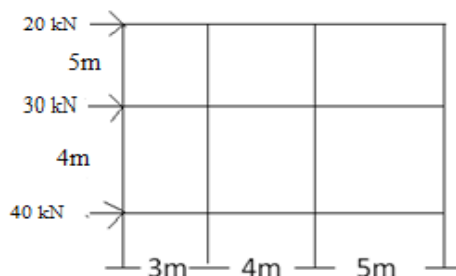3. Answer any **THREE** Questions from **Part-B**
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Part-B

1	a)	Define the term three hinged arch?	[3M]
	b)	State two assumptions made in the analysis of cables.	[4M]
	c)	Define stiffness factor for members?	[4M]
	d)	Define distribution factor at a joint.	[3M]
	e)	Mention the characteristics of the flexibility matrix?	[4M]
	f)	Write two advantages of Kani's method over moment distribution method.	[4M]

PART –B

2   A three hinged parabolic arch has a span of 10m. The central rise of the arch is 2m. It is   [16M]
loaded with a uniformly distributed load of intensity 1 kN/m at the left 4m length.
(a) Calculate the maximum positive and negative bending moments.
(b) Calculate the bending moment, normal thrust and shear at 2m and 7.5m form left end.

3   A light cable 18m long is supported at two ends at the same level. The supports are 16m   [16M]
apart. The cable supports three loads 8, 10 and 12 N dividing the 16m distance in to four
equal parts. Find the shape of the string and the tension in various portions.

4   Analyze the portal frame by moment distribution method. Draw the bending moment   [16M]
diagram and sketch the deflected shape of the structure. The two columns of AB and CD
of 4m height with I, Beam BC of span 4m, with 2I. The beam BC carries an udl of 10
kN/m. The supports at A and D are fixed.

5   Analyze the portal frame using Kani's procedure. The two columns of AB and CD of 6m   [16M]
height, Beam BC of span 8m, with EI constant. The column AB carries an udl of 10
kN/m. The supports at A and D are fixed.

6   Analyze by stiffness method the beam shown below   [16M]

7   Analyse the portal frame by Cantilever method   [16M]

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PART –A

1   a)   Give an example for a statically indeterminate arch?   [4M]
    b)   State two assumptions made in the analysis of cables.   [3M]
    c)   State two assumptions made in the analysis of Portal method?   [5M]
    d)   Define distribution factor at a joint.   [4M]
    e)   Mention the characteristics of the flexibility matrix?   [3M]
    f)   Write two advantages of Kani's method over moment distribution method.   [3M]

2   A parabolic arch rib, 20m span and 3m rise is hinged at the abutments and the crown end carries a point load of 10KN at 7.5m from the left hand hinge.
    a)   Calculate the horizontal thrust and bending moment at a section 7.5m from right hand hinge.   [8M]
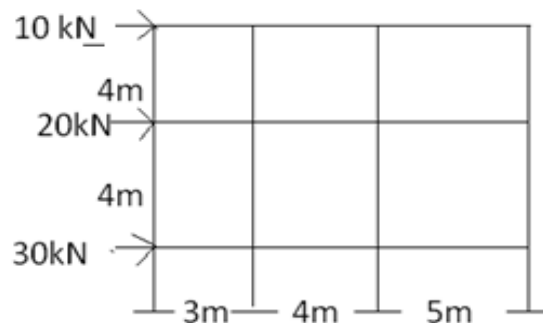   b)   What is the value of the greatest bending moment in the arch?   [8M]

3   A cable is used to support five equal and equidistant loads over a span of 40m. Find the length of the cable required and its sectional area if the safe tensile stress is 150 N/mm^2. The central dip is 3.0m and loads are 6kN each.   [16M]

4   Analyze the portal frame by moment distribution method. Draw the bending moment diagram and sketch the deflected shape of the structure. The two columns of AB and CD of 5m height with I, Beam BC of span 5m, with 2I . The beam BC carries an udl of 15 kN/m. The supports at A and D are fixed.   [16M]

5   Analyze the portal frame using Kani's procedure. The two columns of AB and CD of 6m height, Beam BC of span 10m, with EI constant. The column CD carries an udl of 20 kN/m. The supports at A and D are fixed.   [16M]

6   Explain the matrix approach to structural analysis of continuous beams.   [16M]

7   Analyse the portal frame by Cantilever method   [16M]

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PART –A

1	a)	State Eddy's theorem?	[3M]
	b)	State two assumptions made in the analysis of cables.	[4M]
	c)	State two assumptions made in the analysis of Cantilever method?	[4M]
	d)	Define rotational factor at a joint.	[3M]
	e)	Mention the characteristics of the flexibility matrix?	[4M]
	f)	Mention two advantages of Kani's method over moment distribution method.	[4M]

PART –B

2   Derive the expression for normal thrust, radial shear and horizontal thrust for a two   [16M]
hinged circular arch.

3   A light cable 24m long is supported at two ends at the same level. The supports   [16M]
are 20m apart. The cable supports three loads 10, 12 and 14N dividing the 20m
distance in four equal parts. Find the shape of the string and the tension in various
portions.

4   Analyze the portal frame by moment distribution method. Draw the bending   [16M]
moment diagram and sketch the deflected shape of the structure. The two columns
of AB and CD of 4m height with 2I, Beam BC of span 5m, with I . The beam BC
carries an udl of 20 kN/m. The supports at A and D are fixed.

5   Analyze the portal frame using Kani's procedure. The two columns of AB and CD   [16M]
of 5m height, Beam BC of span 8m, with EI constant. The column AB carries an
udl of 15 kN/m. The supports at A and D are fixed.

6   Discuss the flexibility and stiffness method with specific application to continuous   [16M]
beam.

7   Discuss the difference between Portal method and Cantilever method with an   [16M]
example.

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