PAPER ID-420387

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2021-22
ADVANCE STRUCTURAL ANALYSIS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

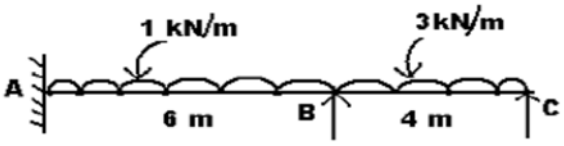
SECTION A

1. Attempt *all* questions in brief. 2*10 = 20

Qno	Questions	CO
(a)	Explain the use of slope deflection method.	1
(b)	A rigid frame is having totally 10 joints including support joints. Out of slope deflection and moment distribution methods, which method would you prefer for analysis? Why?	1
(c)	What are the applications of Muller-Breslau's Principle?	2
(d)	What is Influence Line Diagram?	2
(e)	What is the principle of suspension bridge?	3
(f)	What is the degree of indeterminacy of a suspension bridge with two hinged stiffening girder?	3
(g)	What is matrix structural analysis?	4
(h)	Define stiffness?	4
(i)	What is the main aim of plastic analysis?	5
(j)	Give the theorems for determining the collapse load.	5

SECTION B

2. Attempt any *three* of the following: 10*3 = 30

Qno	Questions	CO
(a)	Analyze the continuous beam ABC shown in figure by slope deflection method and sketch the bending moment diagram. Take EI = constant. 	1
(b)	What is Muller Breslau principle?What are its advantages for drawing influence line diagram?	2
(c)	A suspension cable of 75 m horizontal span and central dip 6 m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1500 kN. The girder carries a live load of 30 kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, calculate the shear force and bending moment in the girder at 20 m from left support. A	3
(d)	Differentiate between force method and displacement method.	4
(e)	Determine shape factor for rectangular and diamond section.	5

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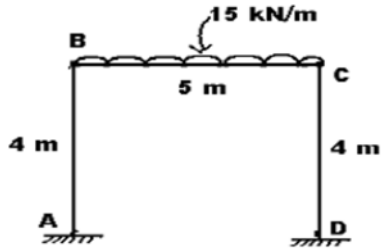
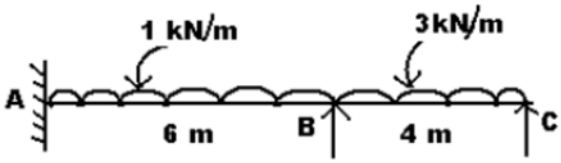
SECTION C

3. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Analyze the portal frame ABCD shown in figure by slope deflection method and draw the bending moment diagram. Take EI = constant. 	1
(b)	Analyze the continuous beam shown in figure by moment distribution method and sketch the bending moment and shear force diagrams. Take EI = constant. 	1

4. Attempt any *one* part of the following: 10 *1 = 10

Qno	Questions	CO
(a)	A semi-circular arch of radius R with the two ends hinged is subjected to a concentrated load W at the center. Obtain the horizontal thrust of the arch has the constant cross-section.	2
(b)	A two-hinged parabolic arch of span "l" and rise "h" carries a uniformly distributed load of "w" per unit run over the whole span. Find the horizontal thrust, at each support.	2

5. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	A three-hinged stiffening girder of a suspension bridge of span 100 m is subjected to two point loads of 200 kN and 300 kN at the distance of 25 m and 50 m from the left end. Find the shear force and bending moment for the girder at a distance 30 m from the left end. The supporting cable has a central dip of 10 m.	3
(b)	A suspension bridge of 12 m span has two three-hinged stiffening girders supported by two cables having a central dip of 12 m. The roadway has a width of 6 m. The dead load on the bridge is 5 kN/m² while the live load is 10 kN/m² which acts on the left-half of the span. Determine the shear force and bending moment in the girder at 30 m from the left end.	3

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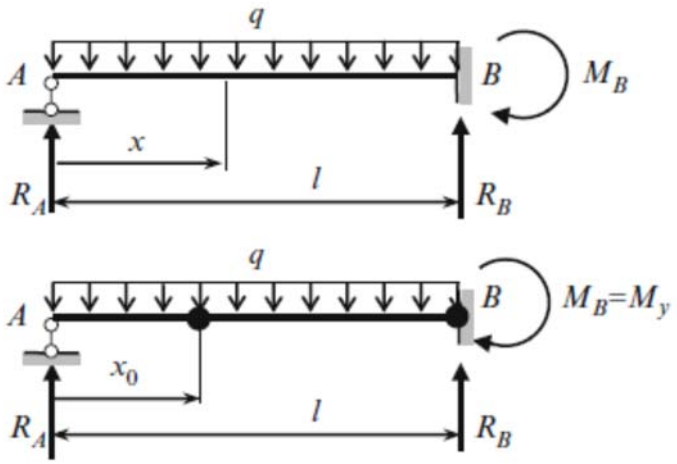
6. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Explain the Procedure of analyzing the structure by Flexibility method.	4
(b)	Explain the matrix approach to structural analysis of continuous beams.	4

7. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Design diagram of a pinned-clamped beam is presented in Figure. Calculate the limit load q and find the location of a plastic hinges. 	5
(b)	Define collapse load. Derive the relation between shape factor, load factor and factor of safety.	5