PAPER ID-310672

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

BTECH
(SEM V) THEORY EXAMINATION 2023-24
STRUCTURAL ANALYSIS

TIME: 3 HRS **M.MARKS: 100**

Note: *Attempt all Sections. If require any missing data; then choose suitably.*

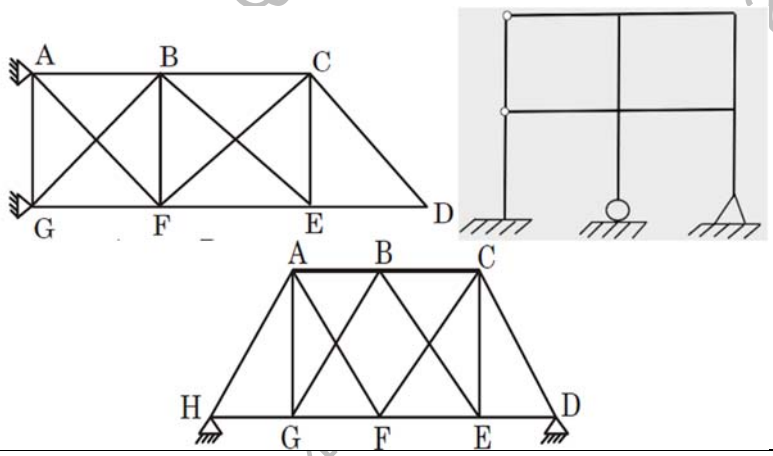
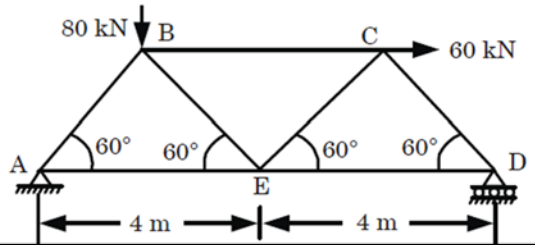
SECTION A

1. Attempt *all* questions in brief.

Q no.	Question	Marks	CO
a.	What do you understand by the term structural load?	2	1
b.	Discuss the cable.	2	1
c.	What do you mean by compound and complex space truss?	2	2
d.	What are the various types of supports?	2	2
e.	Define the term strain energy or resilience of the member.	2	3
f.	Write the statement of Castigliano's first theorem.	2	3
g.	What do you understand by influence line?	2	4
h.	State Muller-Breslau's principle for determinate structure.	2	4
i.	What are the different types of arches?	2	5
j.	Define horizontal thrust.	2	5

SECTION B

2. Attempt any *three* of the following:

Q no.	Question	Marks	CO
a.	Find the SI & KI of the following truss and frame. 	10	1
b.	Analyze the truss shown in Fig. by the method of tension coefficient and determine the forces in all the members. 	10	2
c.	State and prove the Maxwell's reciprocal theorem.	10	3

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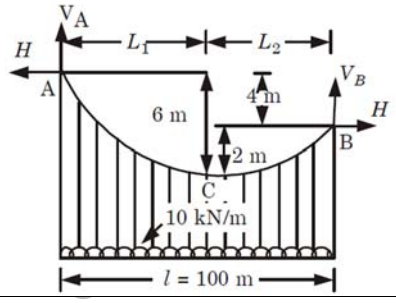
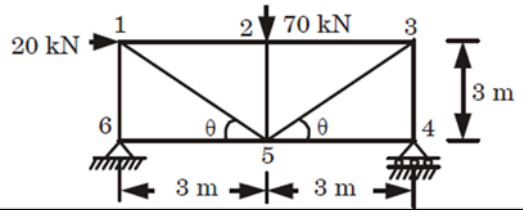
d.	A single load of 150 kN moves on a girder or span 30 m. Construct the influence line for shear force and bending moment for a section 10 m from the left support.	10	4
e.	A three hinged semicircular arch of radius R carries a UDL of w per run over the whole span. Find Horizontal thrust & Location and magnitude of maximum bending moment.	10	5

SECTION C

3. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	A cable of uniform cross-sectional area is stretched between two supports 100 m apart with one end 4 m above the other end as shown in Fig. The cable is loaded with a UDL of 10 kN/m and the sag of cable measured from higher end is 6 m. Find the horizontal tension in the cable. Also find the maximum tension in the cable. 	10	1
b.	Derive the expression for Length of the Cable if Both ends are at the Same level.	10	1

4. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Explain in detail about method of substitution and method of tension coefficient with examples.	10	2
b.	Find the forces in the members of the given truss. 	10	2

5. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Determine the vertical deflection at point C in the frame shown in Fig. Given E = 200 kN/mm2 and I = 30 × 106 mm4.	10	3

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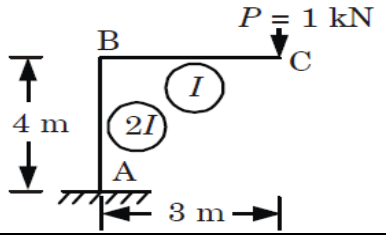
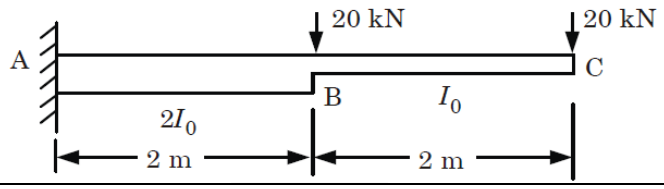
			
b.	Determine the deflection and rotation at the free end of the cantilever beam shown in Fig. Use unit load method. Given $E = 2 \times 105$ N/mm^2, and I = 12 × 106 mm^4. 	10	3

6. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	What are the propositions used for several point loads moving over a simply supported beam? Explain and prove propositions1.	10	4
b.	A Uniformly distributed load of intensity 30 kN/m crosses a simply supported beam of span 60 m from left to right. The length of UDL is 15m. Find the value of maximum bending moment for a section 20 m from left end. Find also the absolute value of maximum bending moment and shear force in the beam.	10	4

7. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Show that the parabolic shape is a funicular shape for a three hinged arch subjected to a uniformly distributed load over its entire span.	10	5
b.	A three hinged parabolic arch of 60 m span and a rise of 12 m are subjected to a uniformly distributed load of 30 kN/m intensity over its left half portion and point load of 120 kN at right quarter span. Calculate the bending moment, normal thrust and radial shear at a section 15 m from the left support.	10	5