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**BTECH**  
**(SEM IV) THEORY EXAMINATION 2021-22**  
**STRUCTURAL ANALYSIS**

**Time: 3 Hours****Total Marks: 70****Notes:**

- Attempt all Sections and Assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

SECTION-A	Attempt All of the following Questions in brief	Marks (7X2=14)
Q1(a)	What are the objectives of structural analysis?	
Q1(b)	What is the advantage of conjugate beam method over other method?	
Q1(c)	List the assumptions made in truss analysis.	
Q1(d)	What is the effect of temperature change in the cable?	
Q1(e)	Explain the uses of influence lines.	
Q1(f)	Distinguish between perfect truss and imperfect truss.	
Q1(g)	State Eddy's theorem.	

SECTION-B	Attempt ANY THREE of the following Questions	Marks (3X7=21)
Q2(a)	Write main difference between Statically Determinate and Indeterminate Structures.	
Q2(b)	Using method of tension coefficient analyse the plane truss shown in fig. and find the forces in all the members .	
Q2(c)	Explain second theorem of Castigliano.	
Q2(d)	Find the deflection for cantilever beam having span L and loaded with udl W/ unit length by conjugate beam method.	
Q2(e)	A 3 hinged arch is circular , 25 m in span with a central rise of 5 m . It is loaded with a concentrated load of 10 kN at 7.5 m from the left hand hinge. Find the Horizontal thrust and reaction at each hinge. Also find out B.M. under the load.	

SECTION-C	Attempt ANY ONE following Question	Marks (1X7=7)
Q3(a)	Determine the Kinematic indeterminacy of the structures shown in below.	
Q3(b)	A cable of span 100 m and dip of 5 m is subjected to a rise of temp. 150 C . Find the increase in dip due to rise in temp. Take $\alpha = 12 \times 10^6 / ^\circ\text{C}$ .	



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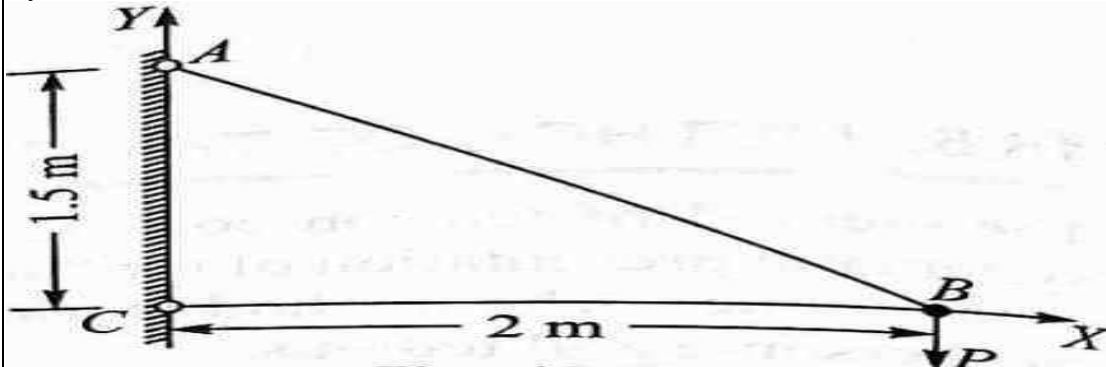
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<b>SECTION-C</b>	Attempt <b>ANY ONE</b> following Question	Marks <b>(1X7=7)</b>
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Q4(a) How you will be determine which members of a truss do not carry the forces

Q4(b) A plane frame consists of two members AB and CB, hinged at A and C to the wall , as given in fig. Determine the forces in the two members due to vertical force P applied at B . By Tension Coefficient Method.



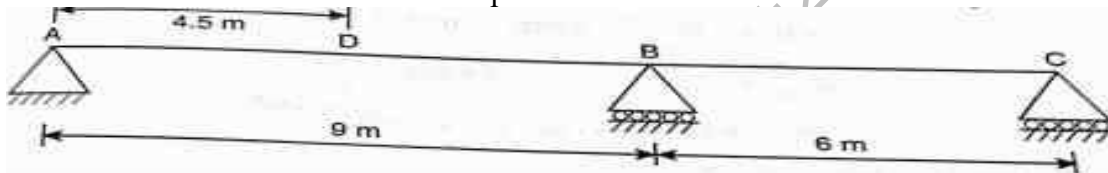
<b>SECTION-C</b>	Attempt <b>ANY ONE</b> following Question	Marks <b>(1X7=7)</b>
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Q5(a) A continuous beam ABC of uniform section has two equal spans AB and BC each of length "l" . During loading supports 'B' sinks by  $\delta_1$  and  $\delta_2$  and supports C sinks by  $\delta_2$  . Find the reactions at supports in terms of  $\delta_1$  and  $\delta_2$  and flexural rigidity EI of the beam by strain energy method.

Q5(b) What is Muller Breslau's principles? Explain with the suitable example how it is used to obtain influence line diagram in a beam.

<b>SECTION-C</b>	Attempt <b>ANY ONE</b> following Question	Marks <b>(1X7=7)</b>
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Q6(a) Using Muller Breslau principle , draw the influence line for bending moment at the mid point D of span AB of the continuous beam ABC shown in fig. Determine the influence line ordinates at suitable intervals and plot them.



Q6(b) A single rolling load of 100 kN rolls along a girder of 20m span. Draw the diagrams of maximum bending moment and shear force (positive and negative (positive and negative) ) What will be the absolute maximum positive shear force and bending moments ?

<b>SECTION-C</b>	Attempt <b>ANY ONE</b> following Question	Marks <b>(1X7=7)</b>
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Q7(a) A parabolic three hinged arch of span 'l' m is subjected to an u.d.l. of w /m run over the entire span. Find the horizontal thrust and bending moment at any section XX.

Q7(b) A three hinged parabolic arch of 40 span has abutments at unequal levels. The highest point of the arch is 4 m above left support and 9 m above the right abutement. The arch is subjected to an u.d.l. of 15 kN/m over its entire horizontal span. Find the horizontal thrust and bending moment at a point 8 m from the left support.