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Total No. of Questions : 09

B.Tech. (CE) (Sem.–4)

STRUCTURAL ANALYSIS-I

Subject Code : CE-208

Paper ID : [A0609]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

I. Answer briefly :

a. State the Muller Breslau's principle for plotting influence line diagrams.

b. Draw the conjugate beam for a beam fixed at one end and propped at the other end.

c. Is a two hinged arch statically indeterminate? Comment.

d. What do you mean by the term *'elastic curve of a beam'*?

e. Briefly explain the concept of geometric stability of a structural system.

f. State the *'Second moment area theorem'*.

g. What do you know by the term *'rolling loads'*?

h. What is the difference between *a two hinged arch* and *a three hinged arch?*

i. What do you understand by the term *'degree of kinematic indeterminacy'*?

j. Briefly explain the *"Maxwell's law of reciprocal deflections"* as applicable to beams.

SECTION - B

2. Draw the influence line diagrams for reactio
for bending moment at support B for the bea
is an internal hinge at D.

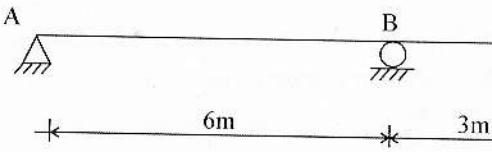

Fig. 1.

3. A thin cylinder *150mm* internal diameter, *2*
closed by rigid plates and is then filled with wa
pull of *37kN* is applied to the ends, the water p
by *0.1N/mm²*. Determine the value of
$E = 140{,}000N/mm^2$ and $K = 2200N/mm^2$.

4. A masonry retaining wall of trapezoidal secti
wide at the top and *4m* wide at the bottom. Th
vertical. The soil is level with the top of the wa
minimum pressure intensities at the base o
$16.5kN/m^3$ and masonry weighs $22.5kN/m^3$.

5. A three hinged parabolic arch *ACB* of span *50*
uniformly distributed load of *50kN/m* on *AC* an
of *100kN* each at distances *5m* and *10m* fron
thrust, bending moment and radial shear at a sec

6. The three hinged stiffening girder of a suspensio
subjected to two point loads of *250kN* and *360*
120m from the left end. Find the shear force and
girder at a distance of *45m* from the left end. Th
central dip of *18m*.

SECTION-C

7. Three wheel loads *60kN*, *40kN* and *50kN* spaced *2m* and *2m* respectively roll on a simply supported girder of span *20m* from left to right with the *60kN* load leading, find the following:

   a) Maximum bending moment that can occur at a section *8m* from the left support.

   b) Maximum bending moment that can occur under the *40kN* load.

   c) Absolute maximum bending moment for the girder.

8. Analyze the truss as shown in *Fig. 2* using the method of joints. Also determine the vertical displacement of the point *A* using the unit load method. Assume the members to be pin connected at their ends. The cross-sectional area of each member of the truss is shown alongside in the figure and $E = 200GPa$ for each member.

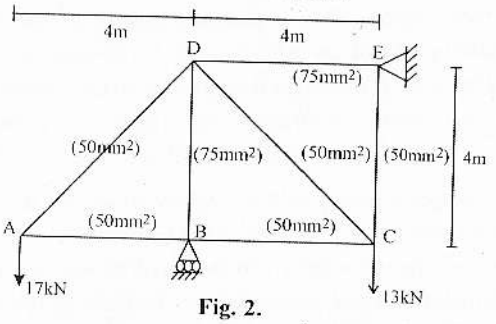

Fig. 2.

9. A cantilever *4m* long is supported at the free end by a prop, at the same level as the fixed end. A uniformly distributed load of *60kN/m* is carried along the middle half of the beam, as shown in *fig. 3*, together with a central concentrated load of *50kN*. Determine the load on the prop and the maximum bending moment in the beam. *EI* is constant throughout the length of the beam. Use Macaulay's method.

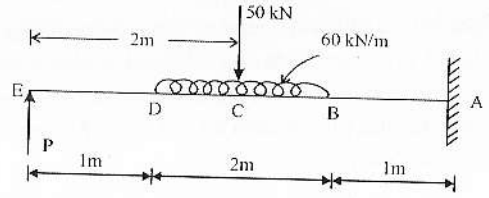

Fig. 3