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B.TECH
PCCE4204

4th Semester Regular / Back Examination 2015-16
STRUCTURAL ANALYSIS - I
BRANCH(S): CIVIL
Time: 3 Hours
Max Marks: 70
Q.CODE: W398

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: **(2 x 10)**

a) What is the basic difference between analysis of *two dimensional structure* and *three dimensional structure*.

b) For a propped cantilever, find the *static* and *kinematic indeterminacy*.

c) Can a fixed beam be solved by three moment theorem? Explain.

d) What do you mean by *consistent deformation*.

e) What is the importance of ILD for moving loads in structural analysis?

f) State the formula to find the normal thrust of a three hinged arch at any section. Draw a figure to show the value.

g) If a clockwise moment, M is applied at centre of a cantilever of span, L, find the slope at free end. Draw a diagram to show the deflected shape.

h) State Maxwell's theorem of reciprocal deflection.

i) Draw the BMD for a fixed beam of span, L applied with udl, w/m throughout the span.

j) Draw the figure to show a redundant plane truss and show the redundant member.

Q2 A plane truss, ABCD is square shaped having length of each side as 4 m. The truss has five members, including the diagonal member, AC. In the horizontal member, AD, the end A is hinged the end D is roller supported. The top horizontal member, BC is applied with a vertical point load of 3 kN at point C. Calculate the vertical deflection at point C. Each member has uniform c/s of 250 sq mm. $E = 2 \times 10^5$ N/sq mm. **(10)**

Q3 A three hinged parabolic arch of span 8 m and rise of 2 m carries a uniformly distributed load of 3 kN/m for the right half of the span. Calculate the horizontal thrust. Also draw the bending moment diagram showing the values at critical points. **(10)**

Q4 A simply supported beam of span, 10 m is subjected to a series of two concentrated loads of each 15 kN moving from right to left. Calculate the maximum bending moment and the corresponding load positions. The distance between two consecutive loads is 4 m which remains unchanged. Also draw the ILD for shear force at a section, 4 m from left end. **(5+5)**

Q5 A propped cantilever beam of span, 5 metres and uniform EI carries a point load of 3 kN at a distance of 2m from the fixed end. Analyse the beam by 3 moment method and calculate the S.F. and B.M. values at critical points. Draw the B.M.D and S.F.D. **(10)**

Q6 A simply supported beam of span 6 m of uniform EI carries a point load of 5 kN acting at a distance of 2 m from right . Calculate the slope at supports, slope and deflection under the point load applying strain energy method. **(10)**

Q7 A suspension bridge of 30 m span is provided with a pedestrian footway of 3 m width . The footway is supported by suspenders attached to the cables each at a distance of 6 m. The central dip of the cables is 3 m. The total load on the footway including self weight is 12 kN/sq m. Find the length of each cable and the cross-sectional area of the cable if the permissible working stress of the cable material is 10 kN/sq cm. **(10)**

Q8 A three hinged parabolic arch of span 6 m with a central rise of 2 m is having a hinge provided at the crown. If a point load of 3 kN moves from left to right, draw the ILD for B.M. at a horizontal distance of 4 m from left end. Find also the maximum positive and maximum negative bending moment values and the corresponding locations. **(10)**

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