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Total number of printed pages – 2

B. Tech
PCCI 4304

Sixth Semester Examination – 2013

STRUCTURAL ANALYSIS – II

BRANCH : CIVIL

QUESTION CODE : A 165

Full Marks – 70

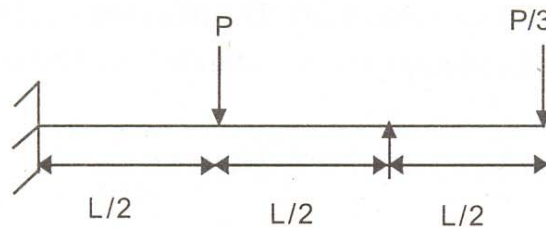
Time : 3 Hours

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

1. Answer the following questions : 2 × 10
- (a) Define carry over theorem.
 - (b) State upper bound theorem.
 - (c) A fixed beam has three spans. AB = 4m, BC = 4m and CD = 3m. At 2.5 m from end A a point load of 50 KN acts. On BC a udl of 80 KN/m acts. A point load of 100 KN acts at the centre of CD. The moment of inertia of the three spans are 1, 2I, 1.5I respectively. Find the rotation factor for the members.
 - (d) Define stiffness.
 - (e) Define the degree of indeterminacy with reference to a pin jointed structure.
 - (f) Define form factor.
 - (g) Write the expression for horizontal thrust in a two hinged arch.
 - (h) What is meant by equilibrium condition in plastic analysis ?
 - (i) Find the shape factor for a rectangle.
 - (j) A fixed beam is subjected to a point load at the centre. Find the collapse load.
2. A continuous beam ABC has two spans, AB = 4m, BC = 6m. It has a overhanging portion of 2m at C, end A is fixed. On AB a point load of 20 KN acts at the center. On BC a udl of 10 KN/m acts throughout the span. At 2m from C a load of 20 KN is acting. Analyse the beam by moment distribution method. Support B sinks by 10 mm.
- $E = 200 \times 10^6 \text{ KN/m}^2$, $I = 100 \times 10^6 \text{ m}^4$ 10

P.T.O.

3. A continuous beam ABCD has three spans AB = 6m, BC = 12 m, CD = 6m. End A and D are fixed. On AB a udl of 30 KN/m is acting. On BC and CD udl of 60 KN/m and 45 KN/m are acting respectively. The moments of inertia of span AB, BC, CD are 4I, 8I, 5I respectively. Analyse the beam using Kani's method. 10
4. A fixed beam ABC has two spans. AB = 5m, BC = 4m. End A is fixed. C has a overhanging portion of 0.6m, where a point load of 50 KN is acting. On AB two point loads of 200 KN each acts at 1.5m from A and B respectively. On BC a 75KN/m is acting throughout the span. Analyse the beam using slope deflection method.
Assume uniform flexural rigidity. 10
5. A suspension cable 120 m span and 12m central dip carries a load of 2 KN/m. Calculate the maximum and minimum tension in a cable. Find the horizontal and vertical forces in each pier under the following conditions :
- (a) If the cable passes over a frictionless roller on the top of the piers 5
(b) If the cable is firmly clamped to saddles carried on frictionless roller on top of the piers. 5
6. A two hinged semi circular arch of radius R carries a concentrated load W at the crown. Show that the horizontal thrust at each support is W/π .
Assume uniform flexural rigidity. 10
- 7 (a) Calculate the collapse load for the beam shown below. 5



- (b) Differentiate between flexibility and stiffness method. 5
8. Write Notes on any **two** : 5×2
- (a) mechanism condition
(b) Plastic hinge
(c) flexibility matrix
(d) collapse load