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Paper Code : CE(PE)602B Structural Analysis-II

UPID : 006738

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]
- (I) The maximum bending moment due to a moving load on a fixed ended beam occurs at the _____.
 - (II) Name formula for stresses in a curved beam.
 - (III) A simply supported beam of span 6 m carries an ultimate UDL of 25 kN/m. The plastic moment capacity of the same is _____.
 - (IV) Portal method is more suitable for building having _____.
 - (V) The flexibility matrix method is also known as _____.
 - (VI) A fixed beam AB is subjected to a triangular load varying from zero at end A to W per unit length at end B. What is the ratio of fixed end moment at A to B?
 - (VII) In arches and lintels, arch ring is the _____.
 - (VIII) In a steel beam, when the width to thickness ratio of the compression flange is sufficiently large, local buckling of compression flange may occur even before extreme fibre yields. Such sections are generally known as _____.
 - (IX) How does axial stress vary from neutral axis?
 - (X) Determination of B.M. of structures by slope deflection method falls in the category of _____.
 - (XI) Maximum stress in the curved beam is in the _____.
 - (XII) As per IS 800 : 2007, the value of imperfection factor for buckling class "b" is _____.

Group-B (Short Answer Type Question)

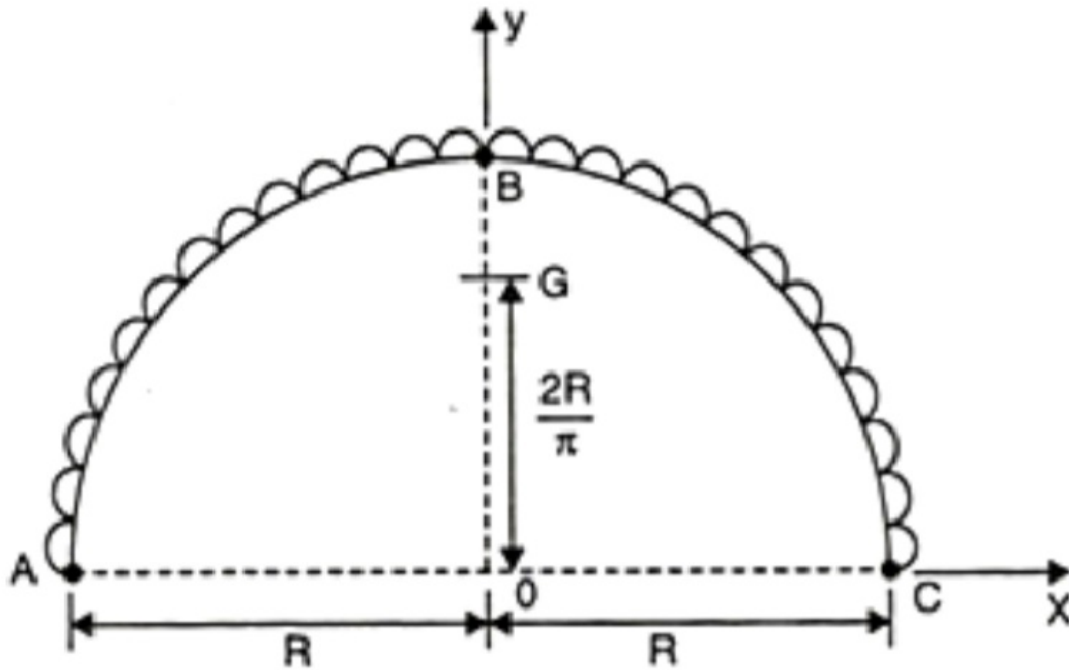
Answer any three of the following : [5 x 3 = 15]

2. Describe carryover factor with an example. [5]
3. Analyse a curved beam with one end fixed and other end free. The beam has one point load at the free end. Draw SFD and BMD diagrams. [5]
4. A cable carrying a load of 10 kN per metre run of horizontal span, is stretched between supports 100 metres apart. The supports are at the same level and the central dip is 8 metres. Find the horizontal reaction developed at the support. [5]
5. If for a curved beam of trapezoidal cross section, radius of neutral axis is 89.1816mm and radius of centroidal axis is 100mm, then find the bending stress at inner fibre whose radius is 50mm. Area of cross section of beam is 7200mm² and the beam is loaded with 100kN of load. [5]
6. Explain approximate method for analysing building frame. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. Analyse a quarter curved beam with one end fixed and other end free. There is an UDL with intensity w/unit run acting through the beam. Draw SFD, BMD, TMD and deflection at the free end. [15]
8. (a) Mention the section having maximum shape factor. [2]
 (b) Define load factor. [3]
 (c) What are symmetric frames and how they analyzed? [5]
 (d) What are unsymmetrical frames and how are they analyzed? [5]
9. A semicircular beam of radius R in plan is subjected to udl and simply supported by three columns spaced equally. Derive the expression for bending moment and torsional moment at x be a point on the beam making an angle α with axis passing through the base of the circle. [15]

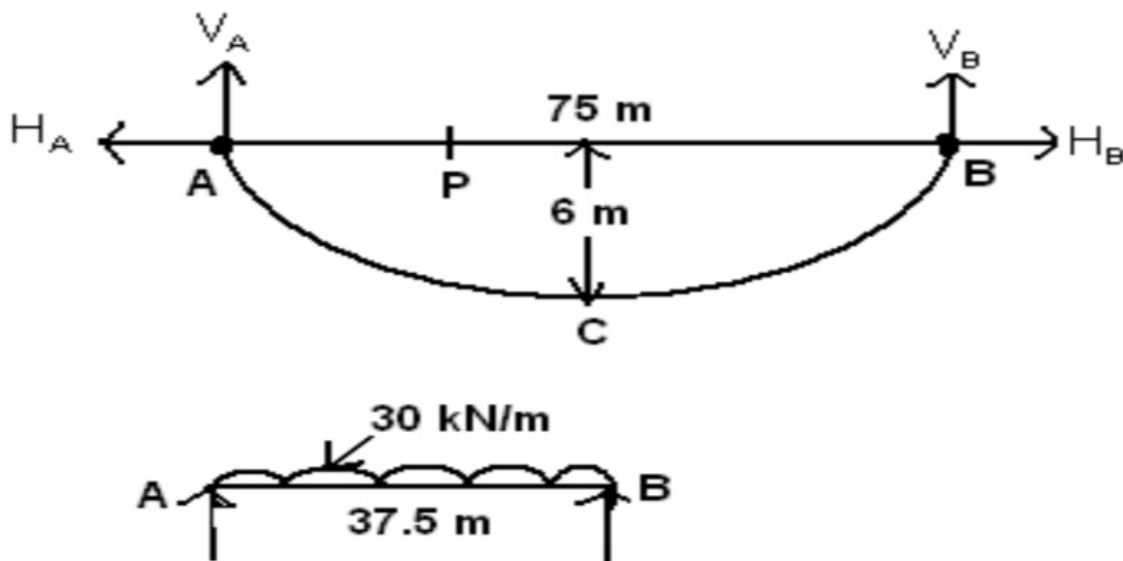


10. (a) Define the following terms [9]

- 1) Plastic hinge
- 2) Mechanism of plastic hinge
- 3) Collapse load

(b) Write down the difference between plastic hinge and mechanical hinge. [6]

11. A suspension cable of 75 m horizontal span and central dip 6 m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1500 kN. The girder carries a live load of 30 kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, calculate the shear force and bending moment in the girder at 20 m from left support. Also calculate the maximum tension in the cable. [15]



*** END OF PAPER ***