TED (10)–3025 Reg. No. .....

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FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—OCTOBER, 2012

THEORY OF STRUCTURES–II

(Common for CE, AR, EN, QS and WR)

[*Time* : 3 hours

(Maximum marks : 100)

PART—A

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. What is meant by the term moment of resistance of a beam ?
2. What is the condition to avoid tension in the masonry at the base of the dam ?
3. Sketch the typical shape of the bending moment diagram for a fixed beam with a u.d. load for the entire span.
4. A fixed beam and a simply supported beam having equal spans is loaded with a u.d load of equal intensity for the entire span. What will be the ratio between the deflections ?
5. Explain the term stiffness factor. (5×2=10)

PART—B

II Answer *any five* of the following. Each question carries 6 marks.

1. The depth of an I- beam is 280 mm. Its position of neutral axis is at a depth of 120 mm from the top edge. Sketch the bending stress distribution diagram. Take B.M = 70 kNM and I = 200×10^6 mm^4.
2. The maximum shear force in a rectangular beam is 20 kN. The cross sectional area of the beam is 45×10^3 mm^2. Sketch the shear stress distribution diagram.
3. By using Mohr's theorem, derive the relations for the maximum deflection in the simply supported beam of span 'l' acted upon by a point load 'W' at the centre.
4. A beam 5 m long, simply supported at its ends carry a point load 'W' at its centre. If the slope at the ends of the beam is not to exceed 1°, find the deflection at the centre of the beam.
5. A continuous beam ABC with simple end supports is having spans AB=BC=3 m. It is applied with a UDL of 8 kN/m for the entire length. Calculate the support moments.
6. Sketch and explain the direct and bending stress distribution diagram at the base of a column due to eccentric load.
7. Calculate the horizontal water pressure acting on a concrete dam of trapezoidal section, with the following data. Locate its point of action also.
   Water face — vertical, Height — 16m, Base width — 8m, Top width — 3 m.
   Water level coincides with the top of the dam. (5×6=30)

Marks

PART—C

(Answer *one* full question from each unit. Each question carries 15 marks.)

UNIT—I

III (a) A rectangular beam 100 mm wide is subjected to a maximum shear force of 150 kN. Find the depth of the beam, if the maximum shear stress is 3.00 mPa. 6

(b) A timber beam (75 × 250 mm) in cross section spans 2 m between simple supports. What safe UD load the beam can carry, if the permissible bending stress is 8N/mm^2 ? For the calculated safe UD load, what will be the average and maximum shear stress in the section near supports ? 9

OR

IV (a) A timber joist is 100 mm wide and 200 mm deep is used as a cantilever of length 2 m. What is the maximum concentrated load that the beam can carry at its free end in addition to its self weight of 0.2 kN/m so that the maximum bending stress is not to exceed 6 N/mm^2 ? 8

(b) A beam of I section 400 × 200 mm has a web and flange thickness of 20 mm. Calculate the shear stresses across the section and sketch the diagram. The shear force at the section is 300 kN. Take I = 3.668 × 10^8 mm^4. 7

UNIT—II

V (a) A rectangular column 200 mm wide and 150 mm thick is carrying a vertical load of 120 kN at an eccentricity of 50 mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in the section. 8

(b) A beam of span 6 m is fixed at both ends. It is loaded with point loads of 10 kN each at a distance of 2 m and 4 m from LHS. By equating the areas of μ diagram and μ' diagram, find the magnitudes of fixing moments at the ends. 7

OR

VI (a) What are the advantages of fixed beam over simply supported beams ? 6

(b) A concrete dam of rectangular section 15 m high and 6 m wide contains water up to a height of 13 m. Draw the pressure diagram at the base. Assume weight of water and concrete as 10 kN/m^3 and 25 kN/m^3 respectively. 9

UNIT—III

VII (a) Define the terms slope and deflection in beams. 5

(b) A cantilever of span 'l' is acted upon by a point load 'W' at a distance 'l_1' from fixed end. By using Mohr' theorem deduce an expression for the slope and deflection for the cantilever. 10

OR

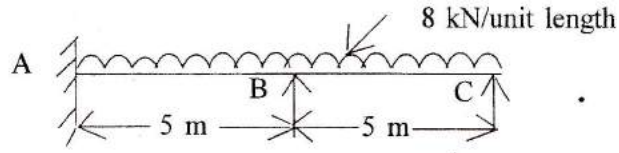
VIII (a) A fixed beam of span 6 m applied with a uniformly distributed load of 10 kN/m over the entire span. If I = 5 × 10^8 mm^4 and E = 1 × 10^7 N/mm^2, find the fixing moments and the deflections at the centre. 5

(b) A simply supported beam of span 'l' is acted upon by a U.D. load of 'W' per unit length for the entire length. Derive an equation for slope at any point by using double integration method. 10

Marks

UNIT—IV

IX A continuous beam ABC is given in the figure. By using theorem of three moments prepare the bending moment diagram for the beam.



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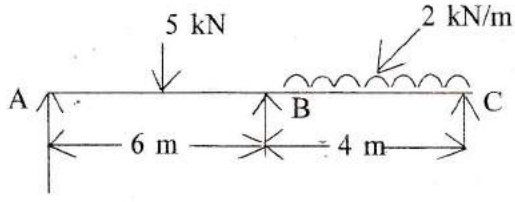
OR

X Determine the moments over the beam ABC shown in figure and draw the bending moment diagram. Use moment distribution method.



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