TED (10)–3025 Reg. No. .....

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FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—OCTOBER, 2013

THEORY OF STRUCTURES – II

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

[*Time* : 3 hours

(Maximum marks : 100)

PART—A

(Maximum marks : 10)

Marks

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

1. What is the value of the section modulus of a circular section of diameter "d" ?
2. What is meant by middle third rule ?
3. Sketch the typical shape of the bending moment diagram for a fixed beam with a central point load.
4. A simply supported beam and a fixed beam having same span is loaded with central point load of equal magnitude. What will be the ratio between the deflections ?
5. State the Clapeyron's theorem of three moments. (5×2=10)

PART—B

(Maximum marks : 30)

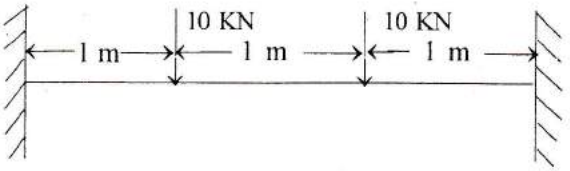
II Answer *any five* of the following. Each question carries 6 marks.

1. Draw the bending stress distribution diagram with salient values of a simply supported beam of span 3 m with a central point load of 20 KN. The depth of the beam is 200 mm. Take I = 80 × 10^6mm^4.
2. Sketch the typical shape of the shear stress distribution diagram of a symmetrical I-section.
3. Derive the equation for the maximum slope of a simply supported beam with a U.D. load for the whole span by using Mohr's theorem.
4. A fixed beam AB, 4 m long carries a point load of 70KN at its centre. I of the beam is 70 × 10^6mm^4 and E = 2 × 10^5N/mm^2. Find the fixed end moments and the deflection under the loads.
5. 3 members of uniform cross section meets at a point O are hinged at A and C and fixed at B. The length OA = 3m, OB = 4m and OC = 3m. Moment of inertias are 400 mm^4, 300 mm^4 and 500 mm^4 respectively. Tabulate the distribution factors for the members and distributed moments when a moment of 5000 KN.m is applied at O.

Marks

6. Briefly explain the conditions of stability of a dam.

7. Calculate the fixing moment value of the fixed beam shown in the figure.



(5×6=30)

PART—C

(Maximum marks : 60)

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

UNIT—I

III (a) A beam of symmetrical section 200 mm × 400 mm is simply supported at the ends. It carries a UDL of 20 KN/m over the entire span. Find the maximum permitted span, if the maximum bending stress permitted is 100 N/mm^2. 9

(b) What are the assumptions in the theory of simple bending ? 6

OR

IV (a) Derive the formulae for shear stress at the section of a loaded beam. 8

(b) The average shear stress at the section of a simply supported rectangular beam of size 100 × 200 mm is 0.4 N/mm^2. Determine :

(i) the shear force at the section

(ii) the maximum shear stress at the section

(iii) shear stress at a point on the section 50 mm above N.A. 7

UNIT—II

V (a) A square column 200 mm size is carrying a vertical load of 200 KN at an eccentricity of 70 mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress and draw the stress diagram. 8

(b) A tank 1 m deep is filled half full with a liquid having specific gravity 2 while the remaining half is filled with a liquid having specific gravity 1.2. Sketch the pressure diagram for the side of the tank. Take specific weight of water as 10KN/m^3. 7

OR

VI A concrete dam of trapezoidal section having water on vertical face 12 m high. The base of the dam is 7 m wide and top 3 m wide. Find :

(a) The resultant thrust on the base per meter length of dam.

(b) The point where the resultant thrust cuts the base; and

(c) Intensities of maximum and minimum stresses across the base.

Take weight of concrete as 25 KN/m^3 and the water level coinciding with the top. (3×5=15)

Marks

UNIT—III

VII (a) Derive an expression for the slope and deflection of a cantilever of span l with a UD load 'W' for the entire span by using Mohr's theorem. 8

(b) A steel beam, simply supported over a span of 6 m carries a point load of 50 KN at 1.2 m from the left hand support. Find the position and magnitude of the maximum deflection. Take EI = 14×10^{12} N-mm^2. 7

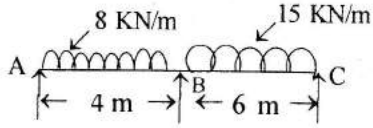
OR

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

(b) A beam of length 6 m and of uniform rectangular section is simply supported at its ends. It carries a UDL of 10 KN/m over the entire length. Calculate the depth and the breadth required if the permissible bending stress in 7 N/mm^2 and central deflection is not to exceed 10 mm. Take E = 1×10^4 N/mm^2. 10

UNIT—IV

IX A continuous beam of uniform cross section is given in the figure. Draw the bending moment and shear force diagrams.



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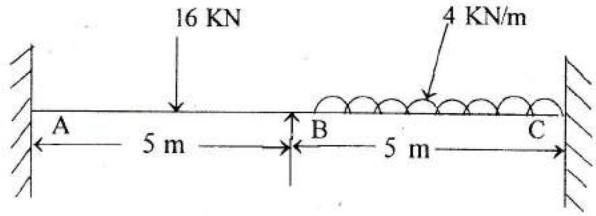
OR

X Evaluate the bending moment diagram of the beam shown in figure by using moment distribution method.



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