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FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—MARCH, 2014

THEORY STRUCTURES II

[Common for CE, AR, EN, QS and WR]

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

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

1. Point out the positions and value of maximum shear stress in the cross section of a beam with an I shape.
2. Explain the term middle third rule.
3. What is the relation for active earth pressure by Rankines formula ?
4. What is meant by the term strength of a beam ?
5. Explain the term Distribution factor. (5×2=10)

PART—B

(Maximum marks : 30)

II Answer *any five* questions. Each question carries 6 marks.

1. What are the assumptions in the theory of simple Bending ?
2. A Timber beam rectangular in section is simply supported over a span is 4m. It carries a UDL of 20 KN/m over the entire span. Calculate the width and depth of a beam, if the bending stress is not to exceed $8N/mm^2$. Take ratio of depth to width as 1.5.
3. Prove that the limit of eccentricity at the base of a solid circular column under eccentric loading is d/8.
4. A rectangular strut is 200mm wide and 150mm thickness. It carries a load of 200KN at an eccentricity if 20mm. in a plane bisecting the thickness. Find the maximum and minimum intencities of stress in the section.
5. What are the conditions to be satisfied for the stability of a Retaining wall ? Explain one by one.
6. By using Mohr's theorem, derive the relation for maximum slope and maximum deflection for a cantilever carrying point load at the free end.
7. A continuous beam ABC, AB = 4m, BC = 4m, simply supported at A,B and C. It is carrying a UDL of 10KN/m throughout the span. Calculate the support moment by the theorem of three moments. (5×6=30)

Marks

PART—C
(Maximum marks : 60)
(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT—I

III (a) Derive equations for bending stress and moments of resistance for the cross section of a loaded beam. 8

(b) Two wooden planks 150mm × 50mm each is connected to form a T section of a Beam. If a moment of 3.4 KNM is applied arround the horizontal neutral axis iducing tension below the neutral axis. Find the stresses at the extreme fibers of the cross section. 7

OR

IV (a) Derive equation of shear stress at any point in the cross section of a Beam. 8

(b) A wooden beam 150mm wide 300mm deep is subjected to a maximum shearing force of 45000N. Determine the maximum shear stress and sketch the variation of shear stress along the depth of the beam. 7

UNIT—II

V (a) Derive the relations for maximum and minimum stress intensities at the base of a rectangular symmetric column carrying an eccentric load. 8

(b) A concrete Dam trapezoidal in section having water on its vertical face is 16m height. The base width of the Dam is 8m and top width is 3m. Find the resultant thrust per meter length of the Dam and the maximum and minimum intensities of stress at the base of the Dam. Take specific weight of concrete as 25KN/m^3 and specific weight of water as 9.810KN/m^3. Water level coinsides with the top of the Dam. 7

OR

VI (a) A rectangular column 200mm wide 150mm thick carries a load of 200KN at an eccentricity of 20mm in the plane bisecting the thickness. Find the maximum and minimum intensities of the stress at the section. 8

(b) A masonry Dam 8m height and 1.5m top width 5m bottom width, retain water to a depth of 7.5m. The water force of the Dam is vertical. Find the maximum, and minimum stress intensities at the base. Take specific weight of water as 9.81KN/m^3 and a specific weight of masonry as 22KN/m^3. 7

UNIT—III

VII (a) Derive the expression for maximum slope and minimum deflection for a simply supported beam carrying a UDL, w/unit length throughout the span by double integration method. . 8

(b) A cantilever of span 1 is acted upon by a point load of W at a distance of 1_1 from the fixed end by using Mohr's Theorems, deduce expressions for maximum slope and maximum deflection. 7

OR

Marks

VIII (a) A cantilever beam of span 3m carries a point load of 100KN at a distance of 2m from the fixed end. Determine the slope and deflection at the free end. Take $E = 200KN/mm^2$ and $I = 400 \times 10^6 mm^4$ 8

(b) A beam of uniform section 200mm × 300mm is supply supported at the ends. It carries a UDL of 9KN/m over the entire span 4m. Find the maximum slope and maximum deflection. Take $E - 1 \times 10^4 N/mm^2$. 7

UNIT—IV

IX A continuous beam ABC fixed at A and C, AB = 6m, BC = 6m is carrying a UDL of 2KN/m over the entire span AB. BC carries a point load of 12KN at the centre. Draw the bending moment diagram and shear force diagram by the theorem of three moments. 15

OR

X A continuous beam ABC 10 metre span, AB = 6m, BC = 4m. AB carries a point load of 3KN at a distance of 2m from A, BC carries a UDL of 1KN/m throughout the span. Using the moment distribution method determine the moments over supports. Draw bending moment and shear force diagrams. 15