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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2020

THEORY OF STRUCTURES - II

[Maximum Marks: 100] [Time: 3 Hours]

PART-A

[Maximum Marks: 10]

(Answer ***all*** questions in one or two sentences. Each question carries 2 marks)

I. 1. Define the term section modulus.
2. What do you mean by an eccentricity?
3. Define an indeterminate structure.
4. State the differential equation on an elastic curve.
5. Define the term continuous beam. (5 x 2 = 10)

PART-B

[Maximum Marks: 30]

(Answer any ***five*** of the following questions. Each question carries ***6*** marks)

II 1. A 150mm x 250mm rectangular beam is subjected to maximum bending moment of 750kNm. Determine the maximum stresses in the beam.
2. A wooden beam 150mm wide and 300mm deep and 3m long is carrying a UDL of 15kN/m over its full length. Determine the maximum shear stress and sketch the variation of shear stress along the depth of the beam.
3. Explain the conditions of a stability of a gravity dam.
4. What are the advantages and disadvantages of a fixed beam?
5. A simply supported beam of uniform cross section and constant depth is carrying a point load of 20kN at mid span. The span of the beam is 2m & I = 80 x 10^5 mm^4 & E = 200kN/mm^2. Calculate the maximum slope & maximum deflection of the beam.
6. Write short notes on; (i) carry over factor (ii) stiffness factor (iii) distribution factor.
7. A beam ABC is simply supported at A, B & C such that AB = 6m & BC = 5m. Span AB carries a point load of 8kN at mid-point and span BC carries a point load of 10kN at mid-point. IF EI is constant, calculate the support moments. (5 x 6 = 30)

PART-C

[Maximum Marks: 60]

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

UNIT – I

III (a) Write the assumptions in the theory of simple bending. (6)

(b) A symmetrical section 200mm deep has a moment of inertia of 2.26×10^{-5} m^4 about its neutral axis. Determine the longest span over which, when simply supported, the beam would carry a UDL of 4kN/m run without the stress due to bending exceeding 125×10^3 kN/m^2. (9)

OR

IV (a) Explain the terms; (i) shear stress (ii) neutral axis (iii) moment of resistance. (6)

(b) A timber beam 150mm x 250mm deep in cross section is simply supported at its ends and has a span of 3.5m. The maximum allowable bending stress is $7500kN/m^2$. Find the maximum safe UDL with the beam can carry. What is the maximum shear stress in the beam for the UDL calculated? (9)

UNIT – II

V (a) Write short notes on;

(i) Active earth pressure (ii) passive earth pressure (iii) angle of repose. (6)

(b) A masonry dam 8m high & 1.5m wide at top & 5m wide at the base, retain water to a depth 7.5m, the water face of the dam being vertical. Find the maximum & minimum stress intensities at the base. The specific weight of water is $9.81kN/m^3$ & specific weight of masonry is $22kN/m^3$. (9)

OR

VI (a) Explain the terms; (i) limit of eccentricity (ii) middle third rule. (5)

(b) A fixed beam of 6m span carries two point loads of 300kN each at 2m from each end. Find the fixing moments at the ends & draw the SFD & BMD. (10)

UNIT- III

VII (a) A simply supported beam of span 4m carries a UDL of 20kN/m on the entire span. Find the maximum slope & deflection of the beam. $E = 200kN/mm^2$ & $I = 135 \times 10^6$ mm^4. (8)

(b) Derive an expression for the slope and deflection of a cantilever beam of span L with UDL of intensity w/m over entire span by applying moment are a method. (7)

OR

VIII (a) Explain Mohr's theorems. (6)

(b) A cantilever beam 3m long carries a concentrated load of 10kN at the free end & another point load of 20kN at a distance of 1m from the fixed end. Calculate the slope & deflection at the free end. Take E = 200kN/mm^2 & I = 150 x 10^6 mm^4. (9)

UNIT - IV

IX A continuous beam ABC 8m long consists of two spans AB = 3m & BC = 5m. The span AB carries, a UDL of 50kN/m while the span BC carries a UDL of 30kN/m. Find the support moments and reactions at the supports. Also draw the SFD & BMD. EI is constant. (15)

OR

X (a) State the Clapeyron's theorem of three moments. (3)

(b) A beam ABC is simply supported at A, B & C such that AB = 6m & BC = 4m. Span AB carries a point load 3kN at a distance 2m from left end A. Span BC carries UDL 1kN/m run. Using moment distribution method, determine the support moments and sketch the BMD. (12)
