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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL - 2025

THEORY OF STRUCTURES - II

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

PART – A
Maximum marks: 10

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

1. Define a column.
2. Define eccentric load.
3. Define fixed beam.
4. State Mohr's theorem I.
5. State the Claypeyron's theorem of three moments. **(5 x 2 = 10)**

PART – B
Maximum marks: 30

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

1. State four different end conditions and corresponding Eulers Crippling load for a long column.
2. A mild steel rod of 100 mm diameter and 5 m long is used as a column whose one end is fixed and the other end is hinged. If $E = 2 \times 10^5$ N/mm^2 and the factor of safety = 4. Determine the compressive load on the column.
3. What are the three assumptions made in the Rankine's theory for active earth pressure on retaining wall?
4. Write any three advantages of fixed beams.
5. Derive the equation for maximum slope and deflection of cantilever beam with UDL over the entire length.
6. A simply supported beam of 2m length is subjected to a central point load of 20KN. Find the slope and deflection of the beam. Take $E = 200$ GN/m^2, $I = 12.1 \times 10^6$ mm^4.
7. Define the terms (a) distribution factor (b) fixed end moments.

(5 x 6= 30)

PART – C

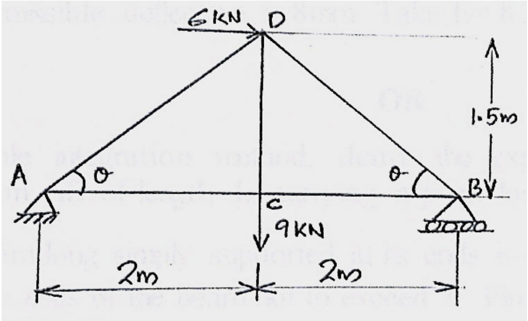
Maximum marks: 60

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

UNIT – I

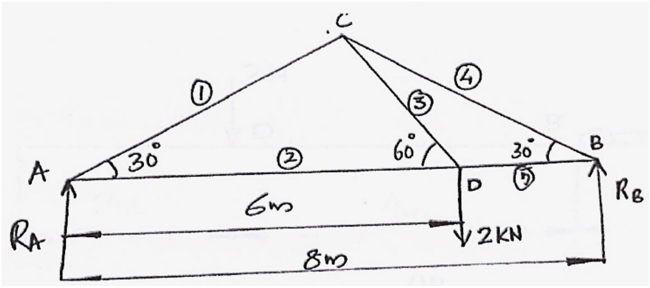
III. (a) A solid round bar 3m long and 80mm in diameter is used as a strut. Determine the crippling load for the condition both ends fixed. Take E = 2 X 10^5 N/mm^2. (6)

(b) Calculate the magnitude and identify the nature of member forces of truss given in figure. (9)



OR

IV. A truss of span 8m carries a point load of 2 KN at joint D as shown in the figure. Find the reaction and forces in the members of truss. (15)



UNIT – II

V. (a) Explain the term limit of eccentricity and derive the expression for eccentricity for a solid circular section. (9)

(b) A masonry dam of rectangular cross section 12m high and 6m wide has water up to the top on its one side. If the weight density of masonry is 22 KN/m^3. Find the pressure force due to water per meter length of the dam. (6)

OR

VI. (a) A rectangular column of width 250 mm and of thickness 175 mm carries a point load of 300 KN at an eccentricity of 8mm. Determine the maximum and minimum stresses on the section. (9)

(b) Explain the stability conditions of a dam. (6)

UNIT - III

VII. (a) Derive the differential equation for slope and deflection of elastic curves of beams. (6)

(b) A timber beam of rectangular section 150mm wide and 300mm deep is simply supported at its ends and having a span of 6m. Find the magnitude of central point load it can carry if the maximum permissible deflection is 8mm. Take $E = 8 \text{ X } 10^4 \text{ N/mm}^2$. (9)

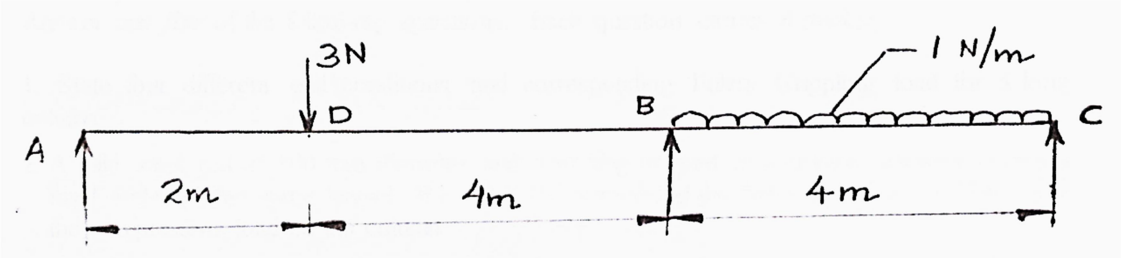
OR

VIII. (a) Using double integration method, derive the expression for slope and deflection for a cantilever beam AB of length L, carrying a point load at free end. (7)

(b) A beam 5m long simply supported at its ends is carrying a point load W at the centre. If the slope at the ends of the beam not to exceed 2°. Find the deflection at the centre of beam. (8)

UNIT – IV

IX. A continuous beam ABC 10m long rests on supports A, B and C at the same level and is loaded as shown in figure. Determine the moments over the beam and draw the bending moment diagram. (15)



OR

X. A continuous beam is simply supported at A B and C. Span AB = 8m and it carries a central point load of 9 KN and BC = 6m, it carries a central point load of 14 KN. Find the support moment at B and the reactions at the supports. Also draw the SFD and BMD. (15)
