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Reg. No……………………
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022

THEORY OF STRUCTURES-II

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

PART-A

[Maximum Marks: **10**]

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

1. Define slenderness ratio of a column.
2. What is meant by a perfect frame?
3. Define a fixed beam.
4. State Mohr's Theorem I.
5. State the Clapeyron'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. Discuss the equivalent length of a column under different end conditions.
2. Calculate the safe compressive load on a solid column, one end fixed and the other end hinged of 120mm diameter and 10m long. Use Euler's Formula with a factor of safety 5. Take E as 100GPa.
3. With the help of a neat sketch, explain the direct and bending stress distribution at the base of a Rectangular column due to eccentric load.
4. State the conditions for the stability of a dam.
5. A cantilever beam of length ‘L’ carries a uniformly distributed load of w/unit length through out the Length. Using moment area method determine the slope and deflection at the free end.
6. A cantilever beam 120mm wide and 150mm deep is 1.6m long. Determine the slope and deflection at the free end of the beam, when it carries a point load of 10KN at its free end. Take Young's modulus as 200GPa.
7. Define the terms (a) Carry over factor (b) Stiffness factor (c) Distribution factor.

(5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

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

UNIT – I

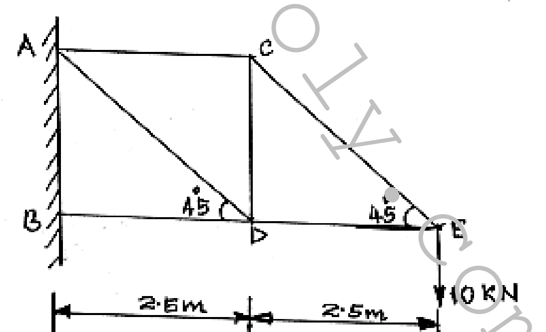
III. (a) A built up column consisting of 140mm x 100mm RSJ with 120mm x 12mm plate riveted to each flange. Calculate the safe load the column can carry, If it is 4m long having one end fixed and other end hinged with a factor of safety 4. Take the properties of the built up column as Area = 5201mm^2, I_{xx}= 27.32 x 10^6 mm^4 and I_{yy} =4.104 x 10^{6}mm^4. Assume crushing strength of the column 315 MPa and Rankine's constant, a= 1/7500 (8)

(b) A column 10m long has a cross section 250 x 300mm. The column is made of a metal having modulus of elasticity as 2 x 10^5 N/mm^2. Using Euler's formula and a factor of safety 3. Determine the safe load to be applied on the column if, (i) Both the ends are hinged (ii) One end fixed and other end free. (7)

OR

IV. (a) Describe the method of sections for the analysis of truss. (6)

(b) Determine the magnitude and nature of forces in all the members of a cantilever truss as shown in figure by using method of joints. (9)



UNIT – II

V. (a) A hollow circular column 300mm external diameter and 250mm internal diameter carries a vertical load of 100KN at the outer edge of the column. Calculate the maximum and minimum intensities of stress at the base section. (9)

(b) Define (a) Angle of repose (b) Active earth pressure (c) Passive earth pressure. (6)

OR

VI. (a) A masonry dam 8m high, 1.5m wide at the top and 5m wide at the base retains water to a depth of 7.5m, the water face of the dam being vertical. Find the maximum and minimum stress intensities at the base. The weight of water is 9810 N/m^3 while the weight of masonry as 22000N/m^3. (9)

(b) Determine the fixing moments and draw the BM and SF diagram of a fixed beam AB of span 4m carrying a point load of 30KN at its centre. (6)

UNIT- III

VII. (a) Using Moment area method, determine the maximum slope and deflection for a simply supported beam carrying a point load 'W'at the centre. (9)

(b) A timber beam of rectangular section 120mm wide and 240mm deep is simply supported over a span of 4m. If the deflection of the beam is not to exceed 4mm. Find the maximum value of central point load the beam can support. Take young's modulus E=110KN/mm^2. Also calculate the slope at the ends when this load is carried. (6)

OR

VIII. (a) A fixed beam of length 5m carries a point load of 40KN at mid span. The beam also carries a uniformly distributed load of 20KN/m on the entire length. Find the maximum deflection at mid span due to the loads, Take EI = 10×10^9 $KNmm^2$. (9)

(b) A cantilever 2m long carries a load of 30KN at its free end. Find the deflection at the free end, if E=2×10^5 N/mm^2 and I = 120×10^6 mm^4. Also find the slope at the free end. (6)

UNIT - IV

IX. A continuous beam ABC, A and C are fixed and simply supported at B. The span AB carries a point load of 10 KN at its centre, the span BC carries a uniformly distributed load of 10KN/m throughout the length of BC. If AB= 4m, BC= 3m. Draw SFD and BMD by moment distribution method. (15)

OR

X. A continuous beam ABC is simply supported at A, B and C. Span AB = 6m and it carries a central point load of 8KN and BC = 5m, it carries a central point load of 10KN. Find the supports moment at B and reaction at the supports, also draw SFD and BMD. (15)

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