TED (15/19) -4014
(Revision- 2015/19)

A21-03420

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2021.

THEORY OF STRUCTURES II

(Maximum Marks : 75) [Time : 2.15 hours]

PART–A

Marks

I. Answer **any three** questions in one or two sentences. Each question carries 2 marks.

1. Define slenderness ratio.
2. What are the different end conditions of a column.
3. Define angle of repose.
4. Write the equation for determining slope and deflection for a fixed beam carrying a point load at the centre.
5. Define carry over factor. (3x2=6)

PART - B

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

1. Explain the assumptions made in Euler's column theory.
2. A rectangular column of width 200 mm and thickness 150 mm carries a point load of 240kN at an eccentricity of 10 mm. Determine the maximum and minimum stresses at the base of the column.
3. What do you mean by stability of a dam? What are the different conditions under which a dam is going to fail?
4. Derive an expression for the slope and deflection of a cantilever of length L, carrying a point load W at the free end by double integration method.
5. Determine the slope and deflection at the free end of a cantilever of length 3 m which is carrying a uniformly distributed load of 10 kN/m over a length of 2 m from the fixed end. Take $E=2x10^5$ N/mm^2 and $I=10^8$ mm^4.
6. Define (i) Stiffness factor (ii) Distribution factor (iii) Carry over moment.
7. Write the procedure of method of moment distribution for beams with simply supported ends.

[4x6 =24]

PART - C

(Answer **any of the three units** from the following. Each full question carries 15 marks)

UNIT I

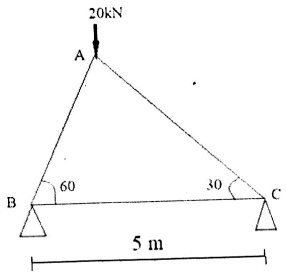
III (a) Derive Rankine's formula for columns. (8)

(b) A column of timber section 15 cm x 20 cm is 6 m long both ends being fixed. If the Young's modulus for timber=17.5 kN/mm2, determine (1) Crippling load and (ii) Safe load for the column if factor of safety = 3. (7)

OR

IV (a) What is a frame? State the difference between a perfect frame and an imperfect frame. (7)

(b) Using method of joints, determine the forces in the members of a truss shown below. (8)



UNIT- II

V (a) Find an expression for the maximum and minimum stresses when a rectangular Column is subjected to a load which is eccentric to Y-Y axis. (7)

(b) A short column of external diameter 40 cm and internal diameter 20 cm carries an eccentric load of 80 kN. Find the greatest eccentricity which the load can have without producing tension on the cross section. (8)

OR

VI (a) A trapezoidal masonry dam is of 18 m height. The dam is having water upto a depth of 15 m on its vertical side. The top and bottom width of the dam are 4 m and 8 m respectively. The weight density of the masonry is given as 19.62 kN/m^3. Determine:

(i) The resultant force on the dam per m length.

(ii) The point where the resultant cuts the base, and

(iii) The maximum and minimum stress intensities at the base. (9)

(c) What are the advantages of a fixed beam over a simply supported beam? (6)

UNIT- III

VII (a) A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the entire span of 5m. If the value of E for the beam material is $1x10^4$ N/mm^2, find: (i) the slope at the supports and (ii) maximum deflection. (8)

(b) Using moment area method, determine the maximum slope and deflection for a simply supported beam carrying a point load W at the centre. (7)

OR

VIII (a) A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3 m respectively from the left support. Use Macaulay's method and find (i) deflection under each load (ii)maximum deflection. (8)

(b) Derive an expression for the slope and deflection of a beam subjected to uniform bending moment. (7)

UNIT – IV

IX A continuous beam ABCD of length 15 m rests on four supports covering 3 equal spans and carries a uniformly distributed load of 1.5kN/m length. Calculate the moments and reactions at the support. Draw the S.F and BM diagrams also. (15)

OR

X A beam ABC is fixed at A and C and simply supported at B. The span AB carries a uniformly distributed load of 20 k N/m at a distance of 6 m from A, the span BC carries a point load of 120kN at its center. If AB = 6 m and BC=6 m, draw the SF and BM diagram by moment distribution method. (15)

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