(Please write your Exam Roll No.) Exam Roll No. 40818003416

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2018

Paper Code: ETCE-204 **Subject: Structural Analysis**

[Batch 2013-Onward]

Time : 3 Hours **Maximum Marks :75**

Note: Attempt all question as directed. Internal choice is indicated. Assume missing data suitably.

Q1 Attempt **any five** parts:

(a) What is equivalent length of a column? What is the relation between equivalent length and actual length of a column. **(5)**

(b) State the assumptions used in Euler's column theory. **(5)**

(c) What is the use of influence line diagram (ILD)? State Muller Breslau's principle. **(5)**

(d) Name the type of rolling loads for which the absolute maximum bending moment occurs at the mid span of a beam? **(5)**

(e) Define carry over moment and distribution factor. What are the quantities in terms of which the unknown moments are expressed in slope deflection methods? **(5)**

(f) How do you account for sway, in slope deflection method, for portal frames? What are the situations wherein sway will occur in portal frames? **(5)**

(g) A simply supported beam carries two equal concentrated loads W at distances L/3 from either support. Find the maximum bending moment M. **(5)**

Q2 A hollow circular column of internal diameter 20 mm and external diameter 40 mm has a total length of 5m. One end of the column is fixed and the other end is hinged. Find out the crippling stress of the column if $E = 2 \times 10^5 N/mm^2$. Also find out the shortest length of this column for which Euler's formula is valid taking the yield stress equal to 250 N/mm^2. **(12.5)**

OR

Q3 A long closed cylinder has an internal radius a = 100 mm and an external radius b = 250 mm. It is subjected to an internal pressure of 80 MPa. Determine the maximum radial, circumferential and axial stresses in the cylinder. **(12.5)**

Q4 A simply supported beam has a span of 16 m is subjected to a UDL (dead load) of 5 kN/m and a UDL (live load) of 8 kN/m (longer than the span) traveling from left to right. Draw the ILD for shear force and bending moment at a section, 4 m from the left end. Use these diagrams to determine the maximum shear force and bending moment at this section. **(12.5)**

OR

Q5 A live load of 15 kN/m, and 5m long moves on a girder simply supported on a span of 13 m. Find the maximum bending moment that can occur at a section 6 m from the left end. **(12.5)**

Q6 A single bay single storey portal frame ABCD is fixed at A and D. AB and DC are the columns and BC is the beam. The height of the column AB is 6 m and that of DC is 7 m. Span of the beam BC is 10 m. A uniformly distributed load of 60 kN/ m is acting on the span BC. All members have the same flexural rigidity. Calculate the support reactions and draw the bending moment diagram for the portal frame. Use slope deflection method. **(12.5)**

OR

Q7 Show the analyses of the building frame for vertical loads using approximate methods. **(12.5)**

Q8 Determine the end moments of member of frame as shown in figure-1 below by moment distribution method. EI is constant for all members. **(12.5)**

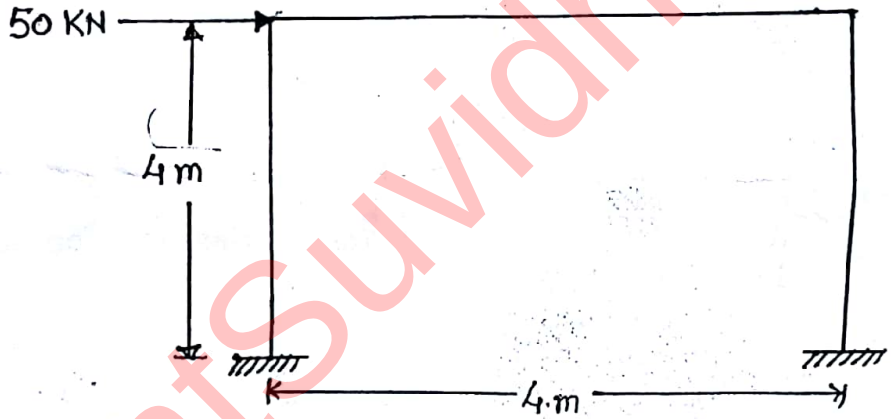

Figure 1

OR

Q9 Analyse the continuous beam as shown in figure-2 below, using moment distribution Method. Draw shear force and bending moment diagram for the continuous beam. **(12.5)**

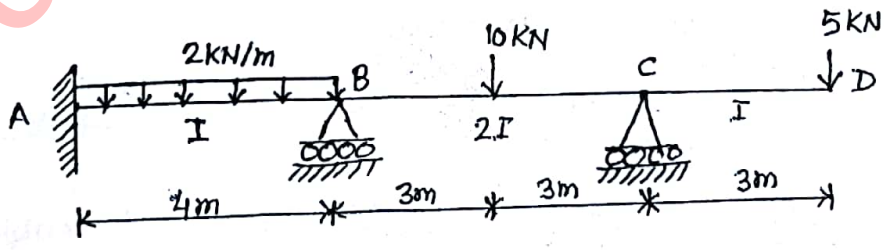

Figure-2

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