

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC-Semester –III (May-2012) Examination****Subject code: X30603****Subject Name: Structural Analysis- II****Date: 16 /05/2012****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Analyze the continuous beam as shown in **figure-1** by Slope Deflection Method. Find the end moments of the beam and draw bending moment diagram. **07**
- (b) A three hinged arch of span (l) and rise (h) carries a uniformly distributed load of w per unit run over the whole span. Show that the horizontal thrust at each support is $wl^2 / 8h$ and also show that the arch is not subjected to any bending moment at any section. **07**
- Q.2** Define the below: **04**
- (a) 1. Statically Indeterminacy 2. Distribution Factor 3. Carry over factor 4. Influence line Diagram
- (b) State Muller – Breslau's Principle **03**
- (c) A three hinged parabolic arch has span 20 m and central rise 3.0 m. It carries a point load of 10 kN at 7.5 m from the left hinge. Calculate the normal thrust, shear and B.M at section 7.5 m from right end hinge. **07**
- OR**
- (c) A light cable, 18 m long, is supported at two ends at the same level. The supports are 16 m apart. The cable supports three loads of 8, 10 and 12 N dividing the 16 m distance in four equal parts. Find the shape of the string. **07**
- Q.3** (a) Analyze the beam shown in **figure (2)** by Moment distribution method and draw only the bending moment diagram. **07**
- (b) Analyze the frame as shown in **figure (3)** by Moment Distribution Method and draw only the bending moment diagram. **07**
- OR**
- Q.3** (a) State the assumptions of Euler's formula. **04**
- (b) Define: 1. Radius of gyration 2. Effective length 3. Crippling load **03**
- (c) A hollow rectangular column having outside dimension 200 mm x 150 mm and inside dimension 150 mm x 100 mm. Its length is 6.0m and both ends are fixed. Find Euler's load if $E = 2 \times 10^5 \text{ N/mm}^2$ **07**
- Q.4** (a) Draw influence line diagram for a propped cantilever beam of span $l = 10.0 \text{ m}$ for 1. Reaction at A (V_a) 2. Reaction at B (V_b) **07**
- (b) A hollow circular pipe having internal dia 400 mm and 50 mm thickness is used as a column. Find critical load it can carry if Slenderness ratio = 90. Take Rankine's constant as 320 N/mm² and $\alpha = 1/4800$, what will be the length of the column if it is fixed at one end and free at the other end. **07**

OR

- Q.4 (a)** Differentiate between (**any two**) **07**
1. Slope deflection and Moment distribution.
 2. Strut and Column
 3. Stiffness and Flexibility matrix
 4. Long column and Short column
- (b)** A cable is used to support five equal and equidistant loads over a span of 30 m. **07**
Find the length of the cable required and its sectional area if the safe tensile stress is 140 N/mm^2
The central dip of the cable is 2.5 m and loads are 5 kN each.
- Q.5 (a)** Describe the various end conditions of the column and their effective lengths. **07**
- (b)** A three hinged parabolic arch has span of 20 m and rise of 5 m. It carries u.d.l of 20 kN/m on left half span and a point load of 120 kN at 5m from right end. **07**
Calculate B.M, normal thrust and radial shear at 4m from left end.
- OR**
- Q.5 (a)** Determine the reactions and moments over the supports for the beam as shown in **figure (4)** using Flexibility method **07**
- (b)** Determine the end moments for the frame shown in **figure (5)** using Stiffness method. **07**

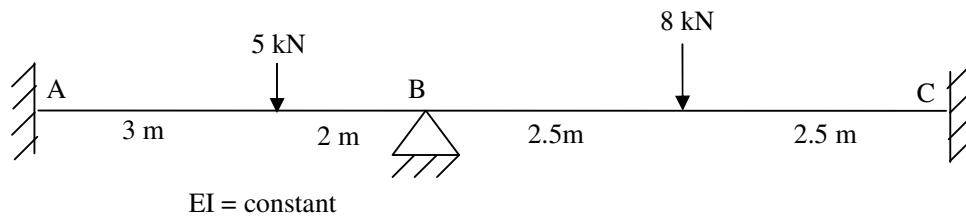


Figure -1

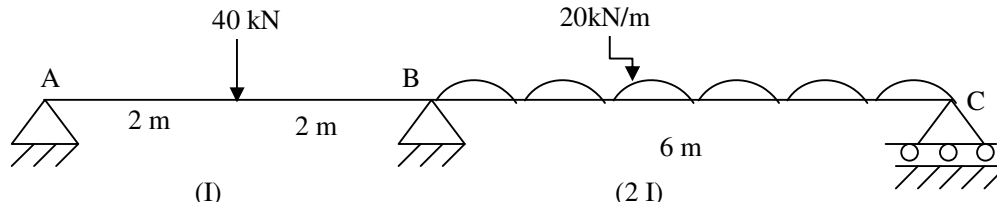


Figure (2)

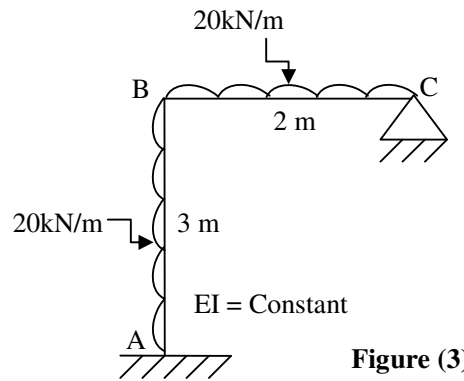


Figure (3)

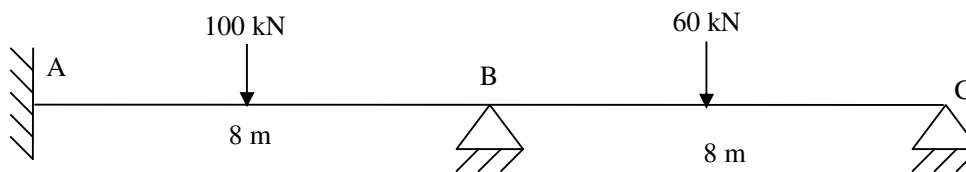


Figure (4)

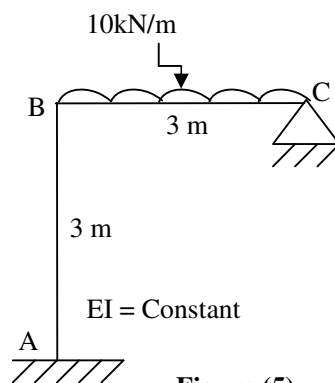


Figure (5)