No. of Printed Pages : 4 **BAR-024**

BACHELOR OF ARCHITECTURE

00821

Term-End Examination

June, 2011

BAR-024 : THEORY OF STRUCTURE - III

Time : 3 hours *Maximum Marks : 70*

Note : *Question No.1 is* ***compulsory****. Attempt* ***any four*** *questions from the remaining questions. Use of calculator is permitted.*

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1. Choose the most appropriate option from the given options in questions (a) to (g). **7x2=14**

(a) Rate of change of bending moment is equal to :

(i) shear force

(ii) deflection

(iii) slope

(iv) rate of loading

(b) The relationship between radius of curvature R, bending moment M and flexural rigidity E I is given by :

(i) $R = \frac{M}{EI}$ (ii) $M = \frac{EI}{R}$

(iii) $EI = \frac{R}{M}$ (iv) $E = \frac{MI}{R}$

(c) A beam of uniform strength has at every cross section same :

(i) bending moment

(ii) bending stress

(iii) deflection

(iv) stiffness

(d) A beam of rectangular cross-section is 100 mm wide and 200 mm deep. If the section is subjected to a shear force of 20 kN, then the maximum shear stress in the section is :

(i) 1.0 N/mm^2

(ii) 1.125 N/mm^2

(iii) 1.33 N/mm^2

(iv) 1.5 N/mm^2

(e) A portion of a beam between two sections is said to be in pure bending when there is :

(i) constant bending moment and zero shear force

(ii) constant shear force and zero bending moment

(iii) constant bending moment and constant shear force

(iv) none of the above

(f) Ultimate compressive load in a column depends upon :

(i) the material of the column

(ii) the effective length of the column

(iii) cross-sectional shape and dimensions of the column

(iv) all of the above

(g) Effective length of a chimney of 20 m height is taken as :

(i) 10 m (ii) 20 m

(iii) 20.28 m (iv) 40 m

2. A truss is loaded as shown in figure - 1. Determine the forces in all the members of the truss. **14**

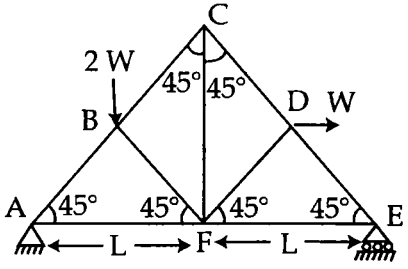

Figure - 1

3. A simply supported beam of 10 m span is loaded as shown in Figure - 2. Draw the bending moment and shear force diagrams, indicating principal values. **14**

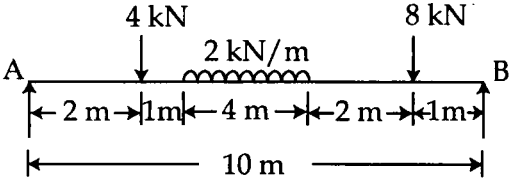

Figure - 2

4. The aluminium and steel pipes shown in Figure - 3 are fastened to rigid supports at one of their ends to a rigid plate c at the other ends. Derive expressions for axial stresses in the two pipes. Hence find the numerical values if $P = 30$ kN, $A_\alpha = 4000$ mm^2, $A_s = 400$ mm^2, $E_a = 0.7 \times 10^5$ N/mm^2 and $E_s = 2 \times 10^5$ N/mm^2. **14**

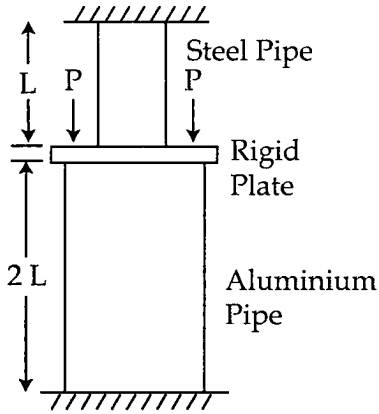

Figure - 3

5. Derive the expression for maximum deflection for a simply supported beam of length 'L' having a point load 'W' at the mid point of the span. **14**

6. What are the assumptions of Euler's theory ? Discuss the limitations of Euler's formula. **14**

7. Write short note on *any two* of the following : **2x7=14**
   (a) Difference between Method of Joints and Method of Sections for analysis of a truss.
   (b) Variation of shear stress across circular and rectangular cross section.
   (c) Uses and advantages of composite sections.