No. of Printed Pages : 4

BAR-024

BACHELOR OF ARCHITECTURE (B.ARCH)

Term-End Examination

June, 2014

00014

BAR-024 : THEORY OF STRUCTURES - III

Time : 3 hours *Maximum Marks : 70*

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

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

(a) The point of contraflexure will occur in the deflected curve of the beam where :
   (i) Bending moment changes sign
   (ii) Shear force changes sign
   (iii) Curvature does not change sign
   (iv) Curvature is not zero

(b) Bending stresses developing at the extreme fibres of the section which is unsymmetrical about Neutral axis is :
   (i) same in tension and compression
   (ii) always more in tension
   (iii) maximum at Neutral axis
   (iv) different in tension and compression

(c) A pin jointed plane truss having 'm' members and 'j' joints is said to be Imperfect if :
   (i) $m = 2j - 3$
   (ii) $m > 2j - 3$
   (iii) $m < 2j - 3$
   (iv) $m \leq 2j - 3$

(d) Limitations of Euler's formula for crippling load depends upon :

(i) Modulus of Elasticity of column material

(ii) Crushing strength of material

(iii) Modulus of Elasticity and crushing strength

(iv) Length of column and end conditions

(e) In a circular section minimum shear stress will occur at :

(i) Extreme fibres

(ii) Neutral axis

(iii) Bottom fibre

(iv) Either at top or at bottom of extreme fibre

(f) Final deflection due to all loads including the effect of temperature, creep and shrinkage and measured from the as cast level of the support of floors, roofs and all other horizontal members, should not normally exceed in R.C.C. and pre-stressed concrete beam/slab :

(i) span/250

(ii) span/350

(iii) span/150

(iv) span/360

(g) Members of a pin jointed truss will be subjected to :

(i) Axial tension

(ii) Axial compression

(iii) Direct force

(iv) Shear force and axial force

2. Determine the force in each member of the pin jointed roof truss shown in Figure - 1. **14**

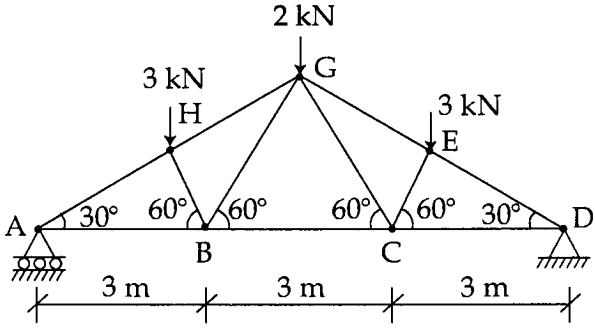

Figure - 1

3. A simply supported overhang beam is loaded as shown in Figure - 2. Draw SFD and BMD for the beam. **14**

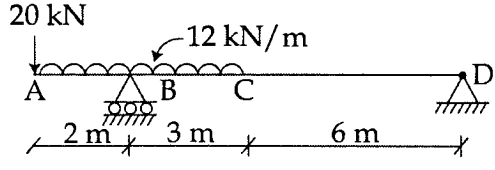

Figure - 2

4. (a) What is slenderness ratio ? How is it important for a column. **6**

(b) A pinned-end strut of aluminium ($E = 1 \times 10^5 N/mm^2$) with a length 2.5 m is constructed of a circular tubing with an outside diameter of 50 mm and a thickness of 5 mm. Find safe axial load carrying capacity of strut if factor of safety is 2. **8**

5. Compute maximum deflection for the beam shown in figure - 3. Assume E as 2.5×10^4 N/mm^2 and cross-section of beam as 300 mm × 450 mm. **14**

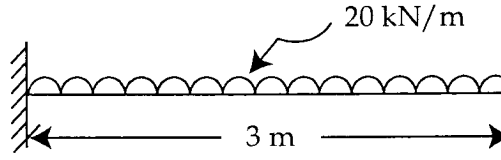

Figure - 3

6. (a) What is a Funicular polygon ? What is its use in structural analysis ? 7

(b) What do you understand by a composite section ? What are advantages of such sections ? 7

7. Write short notes on **any two** of the following topics. **2x7=14**

(a) Effects of deflections in beams

(b) Centroid of a section

(c) Analysis of pin jointed truss by method of sections