

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

December, 2016

BAR-034 : THEORY OF STRUCTURES – IV

Time : 3 hours

Maximum Marks : 70

Note : *Question no. 1 is compulsory. Answer any four questions from the remaining questions. Use of IS 800 and steel tables is permitted. Assume any missing data suitably.*

1. Choose the most appropriate answer from the options given in questions (a) to (g) below : $7 \times 2 = 14$
- (a) Which of the following supports may produce six reactions in a space structure ?
- (i) Roller support
 - (ii) Pinned support
 - (iii) Hinged support
 - (iv) Fixed support
- (b) Indeterminacy of a cantilever beam, propped at free end with a roller support, is
- (i) 1
 - (ii) 2
 - (iii) 3
 - (iv) 4

- (c) Which of the following may be a unit of stiffness ?
- (i) N mm^2
 - (ii) N mm
 - (iii) N/mm
 - (iv) N/mm^2
- (d) The flexural stiffness of a beam is
- (i) EI
 - (ii) EI^2
 - (iii) E^2I
 - (iv) $1/EI$

where E and I have their usual meanings.

- (e) Which of the following is the most ductile material ?
- (i) Mild steel
 - (ii) Concrete
 - (iii) Medium tensile steel
 - (iv) Brick
- (f) Choose the correct statement.
- (i) Plain concrete should be used to construct beams.
 - (ii) Columns can never be subjected to shear forces
 - (iii) Indeterminacy of a simply supported beam is 3.
 - (iv) Structures should be stable.

- (g) The shape of BMD for a cantilever for a point load at free end is
- Triangular
 - Parabolic
 - Rectangular
 - None of the above

2. (a) What is meant by a determinate structure ? Discuss briefly with an example. 7
- (b) Describe the characteristics of a post and lintel system in brief. 7

3. Analyse the structure shown in Figure 1 by Moment Distribution method and draw the BMD.

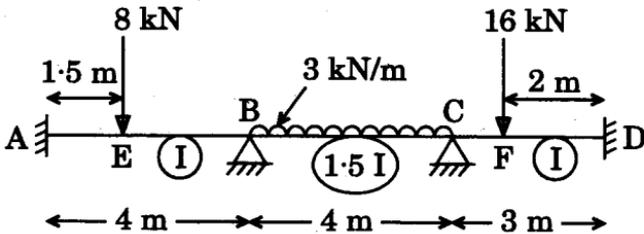


Figure 1

Moment of inertia values for spans are shown encircled in the figure. Young's modulus of elasticity for the beam material may be taken as E uniformly. 14

4. (a) What are portal frames ? How do they resist horizontal forces ? Discuss in short. 7
- (b) Compare the working of an arch and a beam briefly. 7

5. (a) Compare bolted and welded steel connections. 7
- (b) Draw stress-strain curves of mild steel and high strength steel and briefly compare them. 7
6. (a) Provide a classification of welds. Draw neat sketches for various types of welds. 7
- (b) Explain the meaning of 'size of weld' and 'throat thickness of weld' with the help of a neat sketch. 7
7. Write short notes on any *two* of the following : $2 \times 7 = 14$
- (a) Three-hinged arch
- (b) Characteristics of a fixed support
- (c) Shear force diagram
- (d) Design of steel girders
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