No. of Printed Pages : 5

**BAR-034**

00474

# B. ARCH.

## Term-End Examination

## December, 2010

## BAR-034 : THEORY OF STRUCTURES - IV

*Time : 3 hours* *Maximum Marks : 70*

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

**1.** Choose the most appropriate answer from the options given for the questions (a) to (g). **7 × 2 = 14**

(a) A rigid jointed plane frame is stable and statically determinate if

(i) $(m + r) = 2j$

(ii) $(m + r) = 3j$

(iii) $(3m + r) = 3j$

(iv) $(m + 3r) = 3j$

where m is number of members, r is number of reaction components and j is number of joints

(b) In moment distribution method the sum of distribution factors of all the members meeting at any joint is always

(i) zero (ii) less than 1

(iii) 1 (iv) greater than 1

(c) Diameter of bolt hole is usually taken as

(i) gross diameter of bolt

(ii) nominal diameter + 1.5mm

(iii) nominal diameter + 2.0mm

(iv) nominal diameter of bolt

(d) A butt weld is specified by

(i) effective throat thickness

(ii) plate thickness

(iii) size of weld

(iv) penetration thickness

(e) A circular column section is generally not used in actual practice because

(i) it is uneconomical

(ii) it can not carry load safely

(iii) it is difficult to connect beams to round sections

(iv) all of the above

(f) Due to rise in temperature in a three hinged arch, induced stress is

(i) direct compressive

(ii) direct tensile

(iii) shear

(iv) none of the above

(g) compared to mild steel, cast iron has

(i) high compressive strength and high tensile strength

(ii) high compressive strength and low tensile strength

(iii) low compressive strength and low tensile strength

(iv) low compressive strength and high tensile strength

2. (a) Define the terms - determinate structures and indeterminate structures. Discuss a method of finding indeterminacy of structures. 7

(b) Find the static indeterminacy of the structures shown in Figure 1 (a) and (b). 7

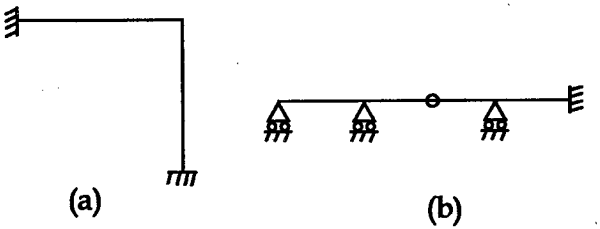


Figure - 1

3. Analyse the rigid frame shown in Figure 2 and draw the bending moment diagram. 14

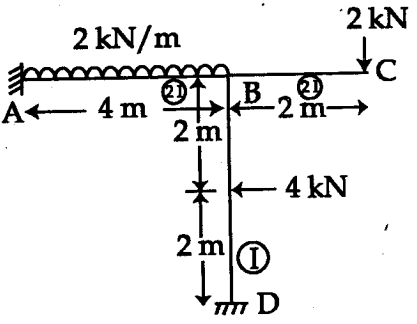


Figure - 2

4. A three hinged parabolic arch of 20m span and 4m central rise carries a point load of 4 kN at 4 m horizontally from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also calculate the maximum positive and negative bending moment. 14

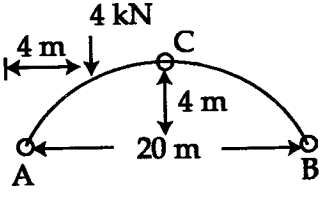


Figure - 3

5. A built up column shown in figure 4 consists of two ISMC 250 @ 30.4 kg/m. Determine the maximum allowable load for the column if the channels are so placed as to give the column equal resistance to bending about either axis. Take effective length of column as 4.5 m. **14**

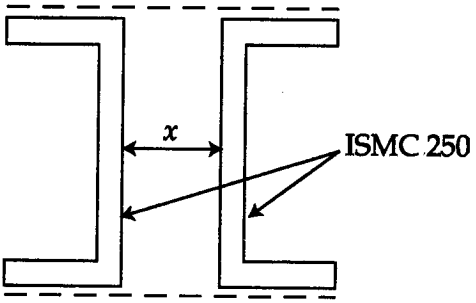


Figure - 4

6. (a) Discuss the advantages and disadvantages of high strength bolts. **7**

(b) Design a doubly bolted lap joint for plates 16mm thick to carry its full load. Take permissible axial tension in plate 0.6 fy where fy=250N/mm$^2$. **7**

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

(i) advantages and disadvantages of indeterminate structures

(ii) Types of arch

(iii) Comparison of post and lintel system and portal frames