

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

December, 2016

00452

BAR-044 : THEORY OF STRUCTURES – V

Time : 3 hours

Maximum Marks : 70

Note : Attempt any four questions. Use of scientific calculator and IS : 456 code is permitted. Assume any data, if missing, suitably.

1. (a) What do you understand by 'Composite sections' ? Give any two examples and write the advantages of use of such sections. 5
- (b) A simply supported RC beam, 300 mm wide and 500 mm effective depth, carries a uniformly distributed load of 50 kN/m including its own weight over its effective span of 4 m. Design the shear reinforcement in the form of vertical stirrups. Use M 20 grade concrete and Fe 415 grade steel. Use working stress method of design. Assume that the beam contains 1.0% reinforcement throughout its length.

2. (a) Discuss why over-reinforced RC beam sections are to be avoided. What should be the remedy? 5
- (b) Determine the moment of resistance of a singly reinforced RC beam, 160 mm wide and 300 mm deep to the centre of reinforcement. The reinforcement consists of 4 bars of 16 mm diameter. Use M 20 grade concrete and Fe 415 grade steel. $12\frac{1}{2}$
3. (a) Compare the load transfer mechanism in one-way and two-way slabs. Provide neat sketches showing load transfer in both cases, if a concentrated load is applied at the centre of the slabs. 5
- (b) A reinforced concrete column, 4 m effective length and 400 mm in diameter, is reinforced with 8 bars of 20 mm diameter. Find the safe load for the column. The column is provided with lateral ties. Use M 25 grade concrete and Fe 415 grade steel. $12\frac{1}{2}$
4. (a) Discuss why shear reinforcement is usually not required in slabs of residential buildings unlike in RC beams. 5

- (b) Design an isolated footing of uniform thickness for a reinforced concrete column bearing an axial load of 600 kN. The size of the column is 300 mm × 300 mm. The safe bearing capacity of soil may be taken as 120 kN/m². Use M 20 grade concrete and Fe 415 grade steel. Take the total thickness of footing as 400 mm. Draw a neat sketch showing the detailing of reinforcement. $12\frac{1}{2}$

5. (a) Enlist the various types of foundations and provide a neat sketch of any one type. 5

- (b) Design the cantilever chajja slab, shown in Figure 1. Take live load intensity on the slab as 2 kN/m². Use M 20 grade concrete and Fe 415 grade steel. $12\frac{1}{2}$

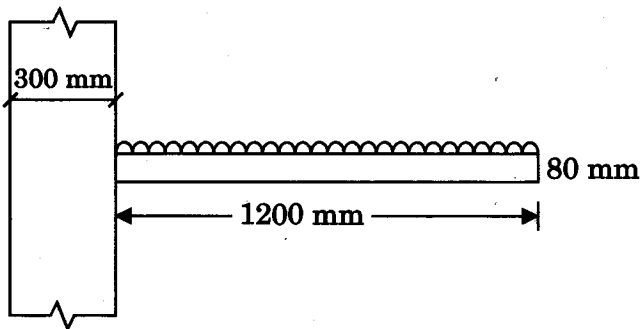


Figure 1

(All dimensions are in mm)

6. (a) Differentiate between earthquake-resistant and earthquake-proof structures. 5
- (b) Discuss various practices which help us make earthquake-resistant structures. Provide neat sketches in your answer. $12\frac{1}{2}$
7. Write short notes on the following :
- (a) Classification of different types of columns $5\frac{1}{2}$
- (b) Precautions to be taken for quality control in concrete construction 6
- (c) Utility of thumb rules in design 6
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