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BAR-044

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

00249 **June, 2017**

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 missing data, suitably.*

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1. (a) Discuss why bond between concrete and reinforcement is necessary in a reinforced concrete structural element. 5

(b) A rectangular singly reinforced beam, 300 mm wide and having 500 mm effective depth, is used as a simply supported beam over an effective span of 6 m. The reinforcement consists of 4 bars of 20 mm diameter. Find the moment resistance capacity of the section and safe load carrying capacity. Use M 20 grade concrete and Fe 415 grade steel. $12\frac{1}{2}$

2. (a) Discuss how under-reinforced concrete beam sections can give a better performance than an over-reinforced section. 5

(b) For the RC beam section shown in Figure 1, determine the moment of resistance if grade of concrete is M 25 and grade of steel is Fe 415. $12\frac{1}{2}$

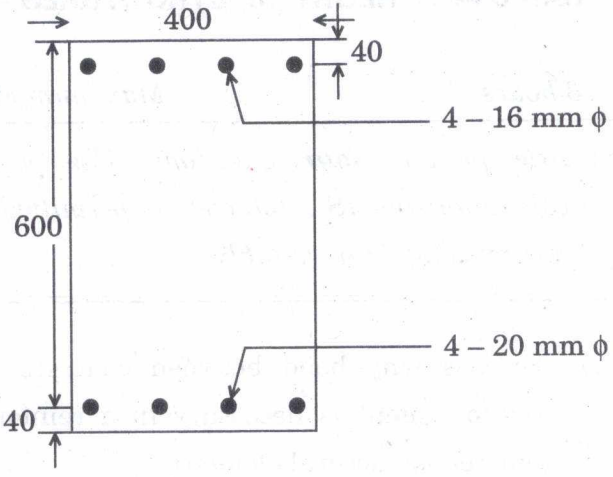

Figure 1

(All dimensions are in mm)

3. (a) Explain one-way slab and two-way slab in detail. 5

(b) Design a slab for a passage of 2·0 m × 6·8 m size. The slab is supported on all sides on walls 230 mm thick. Take the total superimposed load as 2·5 kN/m^2. Take M 25 grade concrete and HYSD bars for use in the slab. $12\frac{1}{2}$

4. (a) What is the effect of compression steel on deflection of a beam? Discuss briefly by comparing this case with that of a singly reinforced beam. 5

(b) A reinforced concrete wall is 250 mm thick and it carries a load of 500 kN/m inclusive of its own weight. Design an RC footing on soil having a safe bearing capacity of 160 kN/m^2. Use M 20 grade concrete and Fe 415 grade steel. Take total depth of footing slab as 525 mm. $12\frac{1}{2}$

5. (a) Discuss why shear failure of a beam is considered worse than a flexural failure. 5

(b) A reinforced concrete beam, 200 mm wide and 400 mm effective depth, is used over an effective simply supported span of 5 m. It is subjected to a uniformly distributed load of 12 kN/m inclusive of its own weight. Find the necessary steel reinforcement at the centre of the span. Use M 25 grade concrete and Fe 415 grade steel. $12\frac{1}{2}$

6. (a) What do you understand by a seismic zone? How does it affect the design of a building structure? Discuss briefly. 5

(b) Discuss good practices which may make a building structure safer in an earthquake. $12\frac{1}{2}$

7. Write short notes on the following :

(a) Cause of an Earthquake $5\frac{1}{2}$

(b) Quality Control in Concrete Construction 6

(c) Types of Foundations 6