

2153

B. E. 4th Semester (Civil Engg.) Examination,

May-2012

DESIGN OF CONCRETE STRUCTURE-I

Paper-CE-204-E

Time allowed : 3 hours]

[Maximum marks : 100

Note : (i) Attempt five questions in all.

(ii) All questions carry equal marks.

(iii) Assume suitable data wherever required or missing.

(iv) Use of calculator and IS. 456 code is permitted.

1. (a) What do you understand by design mix ? What are the various corrections that are applied in field to the design mix ? 10
- (b) Write down various assumptions of limit state method. 10
2. (a) What do you mean by under-reinforced section ? 5
- (b) A singly-reinforced concrete beam 300 mm wide has an effective depth of 500 mm, the effective span being 5m. It is reinforced with 804 mm<sup>2</sup> of steel. If the beam carries a total load

2153-P-4-Q-8 (12)-910

P.T.O.

of 16 KN/m on the whole span, determine the stresses produced in concrete and steel. Take  $m=13.33$ . Solve by working stress method. 15

3. (a) Write a short note on characteristic load. 5
- (b) Find the reinforcement required for a doubly reinforced beam section if width of the beam is 250 mm and depth of the beam to the centre of the tensile reinforcement is 500 mm. Take effective cover to the centre of the compression reinforcement is 50 mm and maximum bending moment under working load conditions is 160 KN/m. Using M20 concrete and Fe 250 steel. Take safety factor = 1.5.  
Solve by limit state method. 15
4. (a) What are the various methods / means by which shear reinforcement are provided ? 4
- (b) A R. C. beam of span 5M is 250 mm wide and 500 mm deep to the centre of tensile reinforcement, which consists of 4 bars of 22 mm diameter. The beam carries a load of 30KN/m inclusive of its weight. Design the shear

reinforcement by stirrups. Use M20 concrete and Fe 415 steel. 16

5. (a) List out the important properties of fresh concrete and explain any one in detail.
- (b) Write a short note on covers provided to reinforcement in different type of sections in R.C.C.
6. (a) Write down the rules about diameter, percentage and spacing of distribution bars in slab.
- (b) Design a slab over a room  $4\text{m} \times 6\text{m}$  as per IS code. The edges of the slab are simply supported and the corners are not held down. The live load on the slab is  $3000 \text{ N/mm}^2$ . The slab has a bearing of 150 mm on the supporting walls. Use M20 concrete and Fe 415 steel.
7. (a) What are the different types of column ? Define slenderness ratio of a column. 5
- (b) A rectangular reinforced concrete section 700 mm deep and 450 mm wide is reinforced with 7 bars of 28 mm diameter placed at an effective cover of 50 mm from the top edge and seven similar bars at the same effective cover

( 4 )

**2153**

from the bottom edge. Determine the maximum thrust on the section, which can be applied at a distance of 100 mm from the centre line if the compressive stress in concrete is not to exceed  $7 \text{ N/mm}^2$  Take  $m = 13.33$ .

8. Design a stem of a reinforced concrete cantilever type retaining wall having a 5 m tall stem. The wall retains soil level with its top. The soil weighs  $18000 \text{ N/m}^2$  and has an angle of repose of  $30^\circ$ . The safe bearing capacity of the soil is  $200 \text{ KN/m}^2$ . Use M20 concrete and Fe 415 steel.

2153-910