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E73

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE305B

REINFORCED CONCRETE DESIGN-I

Time : 2½ *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Any data if missing can be suitably assumed. Use of scientific calculator is allowed. Use of Indian Standard is allowed.

1. (a) Explain different concrete structural systems you know with the help of figure.

(b) What do you understand with limit state of serviceability ? Explain any *three*.

2. A reinforced concreate beam of size 300 × 600 mm with 25 mm effective cover has been cast using M 25 grade of concrete and Fe 415 grade of steel. It is reinforced with 3-20 mm diameter bar at bottom. Using working stress method determine the moment of resistance of the beam.

3. A reinforced concrete beam was cast over a span of 5 m using M 20 grade of concrete. It carried 50 kN/m uniformly distributed load throughout the span. The beam with the cross-section 300 × 600 mm was reinforced with 5-20 diameter Fe 415 grade of steel. Design the shear reinforcement for this beam using working stress method.

4. Design a reinforced concrete column 3.5 m high using M 25 grade of concrete, Fe 415 grade of steel and working stress method. The column carries 1500 kN service load and one side has been restricted to 300 mm from architectural consideration.

5. A reinforced concrete T beam having a flange width 1100 mm and thickness of 100 mm is reinforced with 4-25 mm diameter tension bars provided at a depth of 500 mm below the top of the flange in a 300 mm wide rib. Determine uniformly distributed load inclusive of self weight that the beam can safely support over a span of 7.5 m if the materials used are M 25 grade of concrete and Fe 550 grade of steel. Limit state method is to be used.

6. A slab of a hall is supported over a grid of beams measuring span 4 × 6 m. It has to carry a service live load 3kN/m^2 and dead load including finishes 2kN/m^2. Using limit state method, M 20 grade of concrete and Fe 500 grade of steel, design an interior mid span of the slab.

7. A reinforced concrete beam of size 300 × 600 mm with 25 mm effective cover has been cast using M 25 grade of concrete and Fe 415 grade of steel. It is reinforced with 5-20 mm diameter bar at bottom. The beam carries uniformly distributed service load 15 kN/m over a span of 7.5 m. Using limit state method determine the distance where (i) 2-bars and (ii) 3-bars can be bent from the consideration of flexure, anchorage and bond. Show the details with the help of figure.

8. A reinforce concrete column 450 mm diameter has been reinforced with 6-20 mm diameter Fe 415 grade of steel and 8 mm diameter helix with pitch 75 mm. If the column was cast using M 25 grade of concrete determine the ultimate load the column can carry.