

C 32231

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Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION JUNE 2007**

CE 04 502-STRUCTURAL DESIGN - I

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all questions. Sketch the reinforcement details.

- I. (a) What are the assumptions in the working stress method of design?
 - (b) Show that the limiting depth of neutral axis for a rectangular section reinforced with Fe-415 grade steel is $0.48 d$.
 - (c) Discuss limit state of safety and serviceability.
 - (d) What are the types of failure in singly reinforced rectangular section.
 - (e) List out the steps recommended by code for design of continuous beams.
 - (f) Explain the need of conner reinforcement in two way rectangular slab, whose corners are prevented from lifting up.
 - (g) Explain any *two* types of staircases normally used.
 - (h) Why does the code require all columns to able to resist minimum eccentricity of loading.
(8 × 5 = 40 marks)
2. (a) A reinforced concrete T-section has an effective width of the flange as 1500 mm, thickness of flange 125 mm. Overall depth is 500 mm. It is provided with 4 Nos. 20 mm dia of bars, at an effective cover of 50 mm. Breadth of rib is 250 mm. Find the moment of resistance of the section, if M-15 grade concrete and Fe-415 steel are adopted.
(15 marks)

Or

- (b) Design a singly reinforced concrete section for a simply supported rectangular beam with a span of 6 m to carry a dead load of 20 KN/m and a working live load of 15 KN/m. Use M-20 concrete and mild steel bar.
(15 marks)

Turn over

3. (a) Design a rectangular beam section for an ultimate moment of 150 KN-m. Use M-20 concrete and Fe-415 steel.

(15 marks)

Or

- (b) A five span continuous rectangular beam has to carry an imposed load of 9 KN/m (not fixed) and an imposed load (fixed) of 10 KN/m excluding its own weight, over equal spans of 5m/c. The width of all supports may be assumed as 300 mm. Design the beam for interior span. Adopt concrete grade M-20 and steel grade Fe-415.

(15 marks)

4. (a) A one way continuous reinforced concrete slab for a hall with 8.0 m × 16.0 m clear dimensions is to be cast using concrete grade M-20 and Fe-415 Grade steel. The slab is supported on T-beam Spaced at 4 m centre to centre. The size of the rib is 300 mm × 500 mm. Superimposed load on the floor is 3 KN/m². Load due to floor finish is 0.6 KN/m². Design the slab. Assume wall thickness as 300 mm.

(15 marks)

Or

- (b) Design a two-way slab 4 m × 5 m with continuous over all the edges. The slab is to carry a service live load of 4 KN/m². Use M-20 Grade of concrete and Fe-415 steel.

(15 marks)

5. (a) Design the flight slab for a room 2.5 m × 4.5 m. The live load is 5.0 KN/m². Tread is 250 mm and rise is 160 mm. Steps are of reinforced concrete M-20 and Fe-415 are to be used. Landing slab and flight slab span is perpendicular direction. Height of floor is 3.2 m. Give neat sketch with reinforcement details.

(15 marks)

Or

- (b) An RCC circular column of diameter 600 mm is to carry an axial load of 2000 KN. The effective height of column is 9 m. Design the column with helical ties. Adopt M-25 concrete and Fe-415 steel.

(15 marks)

(4 × 15 = 60 marks)