5E3152

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B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Civil Engg.
5CE2 Concrete Structures - I

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. IS : 456 : 2000 2. NIL

UNIT - I

1 (a) Describe the balanced, under reinforced and over-reinforced sections in limit state design showing the stress and strain variation along the depth of section and indicate the typical values of stress and strain for all these cases. **6**

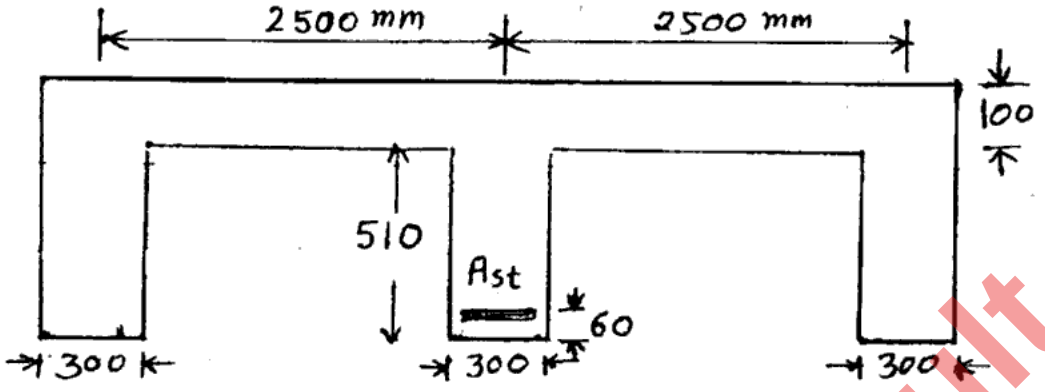
(b) Determine and provide the reinforcement for a beam section of width = 300 mm and overall depth = 550 mm. The section is subjected to an ultimate moment of 350 kN. m. Take effective cover to reinforcements as 50 mm. Use M-20 and Fe-415. **10**

OR

1 (a) Describe the salient features of working stress design philosophy. **4**

(b) For the intermediate T-beam (shown in Fig.1) determine the following, if each beam is simply supported over an effective span of 4.2 m :
(i) Effective flange width
(ii) Depth of neutral axis
(iii) Ultimate moment of resistance.

Also draw the neat stress-block parameters for this T-section. Use M-20 and Fe-415.



Ast contains 3-22Φ and 3-25Φ
(All dimensions are in mm)
Fig 1 (not to the scale)

3+3+4+2

UNIT - II

2 (a) How do the following parameters affect the bond strength of a R.C. section :
(i) Diameter of main-reinforcing bars
(ii) Nature of force in main reinforcement
(iii) Type of reinforcement
(iv) Amount of reinforcement.

6

(b) Design a simply supported R.C.C. slab for a hall having clear dimensions of 4 m × 10 m with 230 mm thick walls all-round. Use M-20 and Fe-415. Take live load = 4 kN/m^2 and floor finish = 0.6 kN/m^2. Give the neat plan and section showing reinforcement details.

8+2

OR

2 (a) Differentiate between short-term deflection and long term deflection.

4

(b) A reinforced concrete beam of rectangular section of 300 mm width and 550 mm overall depth is reinforced with 6 bars of 20 mm Φ placed at an effective cover of 50 mm. Out of 6 bars, 3 bars are bent up at 45° near the support.
Design the shear reinforcement at the support for an ultimate shear of 300 kN. Use M20 and Fe-415.
Give the neat longitudinal section and cross section (at support) showing details of reinforcement.

10+2

UNIT - III

3 Determine and provide +ve and –ve reinforcement along short and long span for the following two way slab :
Effective span : 4m × 6m
Edge Condition : Two adjacent edges continuous
Materials : M-20 and Fe-415
Thickness of Slab : 170 mm
Effective depth along shorter span = 145 mm
Design ultimate load on the slab (including self weight) = 15 kN/m^2.
Show the reinforcement detail in plan.
Also design the torsion reinforcement at corner.

12+4

OR

3 (a) Discuss the advantage and disadvantage of using flat slab.

5

(b) Discuss the limitations of direct design method of flat slabs.

5

(c) Describe the provision of torsion reinforcement in a two way slab. Give the neat schematic diagram showing the placement of torsion reinforcement.

6

UNIT - IV

4 Design a helically reinforced circular column of 300 mm diameter to support an axial factored load of 1500 kN. The column has unsupported length = 3 m and is effectively held in position at both ends but no restrained against rotation. First ensure the applicability of Codel formula for this case by ensuring the minimum eccentricity and slenderness ratio.

16

OR

4 (a) Differentiate between short column and long column and their structural behaviour.

(b) Discuss the salient features of P_u-M_u interaction curve and its use.

(c) Describe the assumptions made for limit state design of columns failing under pure compression.

(d) "Load carrying capacity of helically reinforced column is more than that of column with lateral ties" why, explain clearly.

4×4

UNIT - V

5 (a) Differentiate between "isolated footing" and "combined footing".

(b) Design a suitable footing for a 400 × 400 mm column which is subjected to a service load of 1000 kN. Use M-20 and Fe415 and assume safe bearing capacity of the soil = 200 kN/m^2. Sketch the details of reinforcement.

OR

5 (a) Write short note on the following :

(i) One way shear and punching shear

(ii) Circular raft foundation. 8

(b) Determine the plan area of the combined footing supporting two columns of sizes 400 × 400 mm and 600 × 600 mm carrying the service loads of 1200 kN and 1800 kN respectively. The projection of the footing parallel to the length of the footing beyond the axis of the column of size 400 × 400 mm is restricted to 0.75 m. Ensure the condition that the resultant column load should act at the centroid of the foundation plan. 8