206M163

Candidate No. ....

GUJARAT UNIVERSITY
B.E. Sem. VI (Civil) Examination
Design of Structures-I

Friday, 20th June, 2008]

[Time : 4 Hours

Max. Marks : 100

Instructions : (1) Use of IS-456, IS-875 and Steel Tables, is permitted.
(2) Detailed sketches should be drawn to support design calculations.
(3) Figures to the right indicate **full** marks.
(4) Assume additional data where necessary.

SECTION I

1   (a)   Derive Limiting values of xulim/d for Fe415 and Fe500   **(6)**

(b)   Find Reinforcement for flexure and shear in a singly reinforced beam to resist an ultimate load of 30kN/m over a span of 5 m. Assume width of 230 mm. Use M20 concrete and Fe415 grade steel.   **(12)**

2   (a)   Design a T- Section beam for following data: Span = 6m; centre to centre of beams = 3m; Mu = 190 kNm; Slab thickness = 120 mm; width of web = 200 mm; Use M20 and Fe415.   **(8)**

(b)   Design a doubly reinforced beam with section 230 mm x 400 mm over a span of 6 m and Imposed load of 50kN/m   **(8)**

OR

2   (a)   Design an end span Flanged beam for data in Q.2(a) above.   **(8)**

(b)   Design a 3 span continuous slab for a room size of 6.5 m x 3 m to carry an imposed load of 1.2 kN/m   **(8)**

3   (a)   Design a slab for a room size of 6m x 5m with torsion reinforcement, to carry a live load of 1.5 kN/m . Use M20 and Fe500   **(8)**

(b)   Design an axially loaded column for an Ultimate Load of 2000kN. Effective length Ix = 3m, Iy = 2.7m. Use Fe415 and M25.   **(8)**

OR

3   (a)   Enumerate in detail design steps for design of isolated footing and draw typical reinforcement details.   **(8)**

(b)   Design a circular column to carry an axial load of 2500 kN. Effective length Ix = 3.5m, Iy = 2.7m. Use Fe415 and M20.   **(8)**

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SECTION - II

4 **(a)** Design a tension member to carry load of 350kN. Design also the connection using lug angles. **(8)**

(b) Design tension splice to connect 270mm x 20mm plate with 220mm x 20mm plate end to end. Design load is 250 kN. Use 16 mm PDS rivets. **(8)**

5 **(a)** Design a strut to carry 80 kN load using single discontinuous angle connected by two rivets at ends. Centre to centre between end connections is 3.2m. **(9)**

(b) Design a battened column for a load of 2000 kN. Effective length of column is 6.4 m. **(9)**

OR

5 **(a)** Draw neat sketches of : Framed connection; Gusset base ; and Stiffened connection. **(9)**

(b) Design a slab base for a column carrying load of 200 kN. The column section consists of ISHB 300 with two cover plates 20 mm thick. SBC of soil is 220 kN/m^2 and permissible bearing pressure is 4000 kN/m^2 **(9)**

6 **Attempt any 4 using IS:800** **(16)**

(a) Give Net effective area of two angles in Tension, back to back connected on same side of gusset plate. What is permissible stress in axial tension for Fe250?

(b) Give effective length, allowable stress & slenderness ratio for double angle connected by one rivet.

(c) What is minimum width of lacing bar in riveted connection? What is the maximum limit of slenderness ration for lacing bar in compression?

(d) What is maximum permissible axial tension stress in power driven rivets? What is maximum and minimum pitch of rivets?

(e) Give minimum thickness for uniformly loaded slab base.

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