Ganpat University

B.Tech. Semester V CIVIL ENGINEERING

Regular Examination – November / December: 2012

2CI 504: Elements of Structural Design

Max.Time: 3 Hours   Max. Marks: 70

Exam No. of the candidate: _____   Supervisor's dated initial: _____

Instructions: -   (1) Answer to the two sections must be written in separate answer books.

(2) Figures to the right indicate full marks.

(3) Assume suitable data if required.

(4) IS 800, IS 456 and Steel Table is Permitted.

Section – 1

1	Answer The Following Question.	12
(A)	Design a rectangular isolated sloped footing for a column of size 300 mm X 800 mm carrying an axial characteristics load of 2500 kN and reinforced with 10 nos. of 25 mm diameter bars in M 35 grade concrete. The allowable bearing pressure on soil is 220 kN/m². The materials for footing are grade M 25 concrete and HYSD reinforcement of steel.	

OR

1 (A)	Design a cantilever beam for 3 m overhang. The beam is carrying a load of 14 kN/m including of its self weight. Use M20 concrete and Fe 415 steel.	08
(B)	What is a cantilever chajja? Give the points to be considered while designing a cantilever chajja.	04
2	Answer The Following Question.	11
(A)	Fill the following blanks.	06

1. _____ forms the compression flange of T Beam.

2. In a doubly reinforced beam, compression is taken by _____ and _____.

3. The effective width of a flange of T beam depends upon _____, _____ and _____.

4. Shear reinforcement is _____ provided in the slab.

5. Long column fails by _____.

6. Distribution steel is provided to protect against _____ and _____ stresses.

(B)   Explain in detail Bond and Curtailment of Bars.   05

OR

2   (A)   Classify the grade of OFC.

      (B)   Design a circular column 5.0 m high and effectively held in position but restrained against rotation at one end only. It is carrying an axial load of 1500 kN. Design the column if its diameter is restricted to 550 mm. Use M 25 and Fe 415.

3   Answer the following Question.   12

         Design a dog legged stair case for an office building in a room measuring 3.0 m X 6.0 m (clear dimensions). Floor to floor height is 3.5 m. The building is a public building liable to overcrowding. Stairs are supported on brick walls 230 mm thick at the end of landings. Use M 20 and Fe 415 steel.

Section – II

4   Answer the following Question.   12

      (A)   Determine the tensile strength of a roof truss diagonal 100 X 75 X 6 mm having f_y 250 MPa connected to gusset plate by 4 mm welds of 140 mm long at top and 310 mm long at bottom. The longer edge of 100 mm was connected to plate of 8 mm thickness.   06

      (B)   Why are the connections using HSFG bolts called slip critical connection? What is a main purpose of a washer in HSFG bolts ?   06

OR

4   (A)   Design a simply supported steel beam of 7 m span carrying a RC floor capable of providing lateral resultant to the top compression flange. The total factored uniformly distributed load subjected was 53.6 kN/m throughout and factored point load act at centre as 150 kN. Use ISMB section. Perform the check for web buckling only.   12

5   Answer the Following Question.   11

      (A)   Calculate the compressive resistance of a compound column consisting of ISHB 300 with one cover plate 350 X 20 mm on each flange and having a length of 5 m. Assume that bottom of the column is fixed and top is pinned. f_y = 250 MPa.   06

      (B)   Compare the properties of cast iron, wrought iron and steel.   05

OR

5   Design a single lacing system for a column compound of 2 ISMC 300 @ 35.8 kg/m placed back to back at clear spacing of 200 mm. Axial factored load on column is 1500 kN. Effective length of column is 5.0 m.   11

6   Answer the following Question.   12

         A beam ISMB 500 transmit an end reaction of 250 kN to the flange of column ISHB 250 @ 51.0 kg/m. Design a stiffened seat angle section using 20 mm bolts of grade 4.6.

------END OF PAPER------