

GANPAT UNIVERSITY**B. Tech. Semester: V (Civil Engineering)****Regular Examination November – December 2013****2CI504 Elements of Structural Design****Time: 3 Hours****Total Marks: 70**

- Instruction:**
1. Answer to the two sections must be written in separate answer books.
 2. All Questions are Compulsory.
 3. Figure to the Right indicates full marks.
 4. Assume Suitable Data if necessary.
 5. Use of code IS800-2007, IS456-2000, Steel Table is allowed.

Section - I**Que. – 1 Answer the Following Question**

A three span continuous one way slab is to be used for a marriage hall. (12)
The centre to centre distance of supporting beams is 3.4 m. Design the slab using M 25 and Fe 415.

OR**Que. – 1 Answer the Following Question**

(A) Design a cantilever beam for 2.2 m overhang. The beam is carrying a (08)
load of 10 kN/m including of its self weight. Use M 25 concrete and Fe 415 steel.

(B) Whether the following statement is True or False. And give suitable (04)
reason for it. (any four)

- i. The working stress method assumes that stress is directly proportional to strain.
- ii. Bending stress are maximum at neutral axis.
- iii. IS code recommends the use of nominal shear stress.
- iv. The economical depth of a T beam equal to the balanced depth.
- v. The economical depth of a T beam depends upon the cost of steel and concrete

Que. – 2 Answer the Following Question

(A) An R.C.C beam is carrying a bending moment of 90 kNm. Find the (07)
dimension of the beam and area of steel required. Take $5d=9b$. Use M25 and Fe 415.

(B) Explain in brief “loading pattern in slab”. (04)

OR**Que. – 2 Answer the Following Question**

(A) Determine the ultimate moment of resistance of a rectangular beam 330 (07)
mm x 650 mm effective reinforced with 5-25 mm diameter bars in tension zone and 2-25 mm diameter bars in compressive zone. Use M 25 and Fe 415. Take $d' = 60$ mm.

(B) Differentiate following: (any two) (04)

- i. Neutral Axis and Critical Neutral axis
- ii. WSM and LSM
- iii. Shear Crack and Flexure Crack

Que. – 3 Answer the following Question

- (A) Design a circular column 4.0 m high and effectively held in position but restrained against rotation at one end only. It is carrying an axial load of 1800 kN. Design the column if its diameter is restricted to 600 mm. Use M 20 and Fe 500. (08)
- (B) Explain Column and its types. (04)

Section – II

Que. – 4 Answer the following Question

- (A) An ISA 125 x 75 x 8 mm is carrying an axial tensile force of 150 kN with longer leg connected to gusset plate 10 mm thickness. Design joint using M 20 bolts of 4.6 grade and Fe 410 plate. (08)
- (B) Explain Failure of bolted joints. (04)

OR

- Que. – 4 (A) Determine bolt value of 16 mm diameter 8.8 grades HSEFG bolts connecting two plates 10 mm thick and 160 mm wide. Grade of plate is 410Mpa. Also design the lap joint if it is subjected to tension load of 200kN. (08)
- (B) Write down possible remedies for failure of bolted joints. (04)

Que. – 5 Answer the following Question

A Single unequal angle 100 x 75 x 10 mm is connected to 10 mm thick gusset plate at the ends with six no. of 16mm diameter bolts to transfer tension. Assume 4.6 grade bolts and Fe 410 steel with $f_y=250\text{MPa}$, $p=50\text{mm}$ and $e=30\text{mm}$. Determine the design tensile strength of the angle, if Shorter leg is connected to the gusset plate. (11)

OR

- Que. – 5 A tie plate of 80x8mm is connected to the gusset plate to transmit a factored load of 150KN. Determine the size and length of the fillet weld, assuming field fabrication, Fe 410 steel and E 41 electrode, for following cases: (11)
- (a) Longitudinal weld only
- (b) With End weld and side weld

Que. – 6 Answer the following Question.

Determine the Compressive strength of a single ISA 200 x 200 x 16 mm with the length of member 3m. The ends of the members is hinged. Assume that the load is applied concentrically to the angle. (12)

Take $f_y=250\text{MPa}$.

END OF PAPER