

GANPAT UNIVERSITY**B.Tech. Semester V (CIVIL)****Regular Examination – November / December: 2011****C 504: Elements of Structural Design****Max. Time: 3 Hours****Max. Marks: 70**

- 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:456-2000, IS:800-2007 and Steel table is permitted.

Section – I

- 1 (A) Write assumptions required for design of flexure. 06
- 1 (B) Write short note on classification of beam. 06

OR

- 1 A rectangular beam of size 230mm wide and 500mm effective depth is subjected to a factored moment of 200KN-m. Find the reinforcement for flexure. The materials are M20 grade concrete and HYSD reinforcement of grade Fe415. 12
- 2 (A) A Tee beam(Flange beam) of effective flange width 1200mm, thickness of flange 100mm, width of rib 300mm and effective depth of 560mm is reinforced with 5-25mm diameter bars. Calculate the factored moment of resistance. The materials are M20 grade of concrete and HYSD reinforcement of grade Fe415. 11

OR

- 2 (A) Design a circular short R.C.C. Column is to carry an axial working load of 1250KN. Assume $e_{min} < 0.05D$. Use helical reinforcement. The materials are M20 grade of concrete and mild steel Fe415. For lateral reinforcement mild steel may be used. 11
- 3 (A) A simply supported One way slab of clear span 3.5m is supported on masonry walls of thickness 350mm. Slab is used for residential loads. Consider live load is equal to 2KN/m². Design the slab. The materials are M20 grade of concrete and HYSD reinforcement of grade Fe415. 12

Section – II

- 4 (A) A Tee beam section having 230mm width of web and 460mm effective depth 12
is reinforced with 5-16mm diameter bars as tension reinforcement. The section
is subjected to a factored shear of 100KN. Check shear stress and design the
shear reinforcement. The materials are M20 grade of concrete and HYSD
reinforcement of grade Fe415. For stirrups mild steel may be used.

OR

- 4 (A) A R.C.C. column of size 350mm × 350mm reinforced with 8-16mm diameter 12
bars carries a characteristic load of 1000KN. The allowable bearing pressure on
soil is 200KN/m². Design an isolated pad footing. The materials are M20 grade
of concrete and HYSD reinforcement of grade Fe415.
- 5 (A) A tension member consists of two angles 90 × 90 × 8mm bolted to 10mm 11
gusset, on either side of gusset plate using single row of bolts and tack bolted.
Determine the tensile capacity of the member and number of bolts required to
develop full capacity of member.
What will be the capacity if the angles are connected on the same side of the
gusset plate and tack bolt?

OR

- 5 (A) Calculate compressive strength of 2 ISA 75 × 75 × 6mm placed on either side 11
of gusset plate 8mm thick with effectively held in position at both ends but
restrained against rotation at one end. The length of member is 3.2m and
 $f_y = 250\text{MPa}$.
- 6 (A) Write in brief about "failure of bolted joints" 06
- 6 (B) A tie plates of size 200 × 10mm are connected by lap joint using shop 06
welding. Design fillet weld for full strength of the plate. Use grade Fe 410
plates.

END OF PAPER