C 61447 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION APRIL 2014

(2009 Scheme)

CE/PTCE 09 602—STRUCTURAL DESIGN—II

(Use of IS 800, IS 883, IS 875, SP6 and Steel Table Permitted)

(Assume suitable data, if not given)

[Regular/Supplementary/Improvement]

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Define the theorems of plastic analysis.
2. What are the advantages of welded connection over bolted connection ?
3. Derive the equation for determine area of cover plates in a built up beam.
4. How is wind pressure on roof trusses calculated ?
5. What are the characteristics of good timber ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Calculate the strength of a double cover butt joint, where the main plates to be jointed are 12 mm thick, each cover plate being 8mm thick and using 16 mm diameter bolt of grade 4.6.
7. Design a tension member 3.5 m between c/c of intersections using double angle sections and carrying a factored pull of 200 kN. The member is subjected to reversal of stress.
8. Calculate the strength of a discontinuous strut of length 3.6 m. the strut consists of two unequal angles of 100 mm × 75 mm × 8 mm with long legs connected and placed on same side of gusset plate. The steel is of Fe410 grade. The strut is tack bolted and is connected to a 10 mm gusset plate.

Turn over

9. Given a beam ISMB 400 at subjected to an end reaction of 110kN. Check the adequacy of section against web buckling if stiff bearing is of length 50 mm.

10. Design a built up column 9 m long to carry a factored load of 1200 kN. The column is restrained in position but not in direction at both ends. Design the built-up section only as two channels placed back to back. Use steel of grade Fe 410. Assume batten connections.

11. A timber beam having clear span 6 m carries a uniformly distributed load of 15 kN/m including self weight of beam. Assuming beam to be made of deodar wood, design the beam. Permissible shear stress – 0.7 N/mm^2, Permissible bending stress –10 N/mm^2.

(4 × 5 = 20 marks)

Part C

Answer section (a) **or** *section (b) of each question.*
Each question carries 10 *marks.*

12. (a) Design bracket connection for the factored load of 500 kN shown in Fig. 1. Provide 20 mm diameter bolts of grade 4.6. Given steel of grade Fe 410.

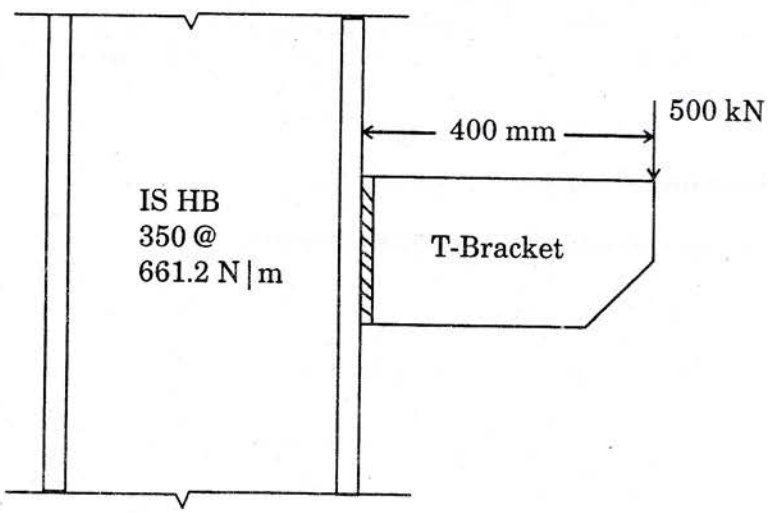

Fig. 1

Or

(b) Design a bridge truss diagonal subjected to a factored tensile load of 200 kN. Length of diagonal is 4 m. The tension member is connected to a gusset plate 16 mm thick with one line of 20mm diameter bolts of grade 4.6, use steel of grade Fe 410.

[redacted]

13. (a) A built up column with four angles ISA 90 mm × 90 mm × 6 mm as in Fig. 2. The column is 12 m long and supports a factored axial compressive load of 700 kN. The ends of the column are held in position and retrained against rotation. Design double lacing system. Use steel of grade Fe 410.

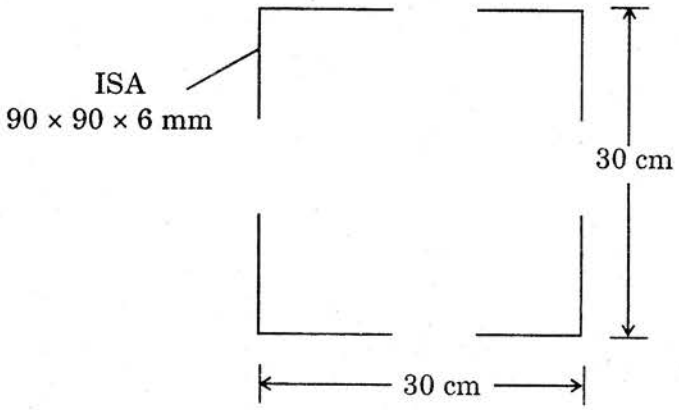

Fig. 2

Or

(b) Design a laterally unsupported beam for a effective span of 4 m , subjected to a udl of 10 kN/m inclusive of self weight. Use steel of grade Fe410.

14. (a) Design a gusstted base for a column ISHB 350@ 710 N/m with two plates 450 mm x 20 mm carrying a factored load of 3600 kN. The column is to be supported on a concrete pedestal to be built with M20 concrete.

Or

(b) Design an I section truss member for the following data: Length of member – 3.5 m, Factored axial tension – 450 kN, Factored moment at two ends of member about the strong axis Mz - 35 kNm and 20 kNm respectively. Steel is of grade Fe410.

15. (a) A timber column 3.5 m long has to support a load of 80 kN. Design the column as a spaced column. Take E = 0.95×10^4 N/mm^2.

Or

(b) A timber beam having clear span of 6 m carries a udl of 20 kN/m including self weight of beam. Design the beam.

(4 × 10 = 40 marks)

[redacted]