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B.E/ B.Tech (Full-Time) DEGREE ARREAR END SEMESTER EXAMINATIONS, APR/MAY 2013

CIVIL ENGINEERING BRANCH

FIFTH SEMESTER

**CE 9302 – DESIGN OF STEEL STRUCTURES**

(REGULATIONS 2008)

Time : 3 hours Max Marks : 100

Instructions: 1 . Use of IS 800-2007, IS 883-1994 and steel tables is permitted.

2. Relevant data may be suitably assumed if found necessary.

Answer ALL Questions

PART A – (10 x 2 = 20 marks)

1. With a neat sketch show the stress-strain relationship of a typical light gauged steel section.
2. What are the different failure modes in bolted connections?
3. List the factors that influence the strength of tension members.
4. What is shear lag?
5. State the significance of column buckling curves.
6. What are the different types of bases provided for connecting steel columns to the foundation?
7. What is web crippling?
8. Draw the moment-curvature behavior of a typical plastic section.
9. What are the advantages of laminated timber?
10. State the width and depth criteria for the selection of timber beams.

PART B – (5 x 16 = 80 marks)

11. Design a double cover butt joint to connect two plates 200mm x 16mm thick. The factored load to be transferred by the joint is 300 kN. Use 20mm diameter grade 4.6 bolts. The plates are of Fe 410 steel with $f_y$ = 250 MPa.

12. a) Design a suitable angle section of length 4m to carry a factored tensile load of 200 kN assuming a single row of M20 grade 4.6 bolts. Take $f_y$ = 250 MPa and $f_u$ =410 MPa.

Or

b) Determine the tensile strength of a roof truss diagonal ISA 150 x 75 x 8mm, the longer leg connected to a 10mm thick gusset plate using 4mm field welds. Take $f_y$ = 250 MPa and $f_u$ =410 MPa.

13.(a) Determine the load carrying capacity of the column section ISMB 350. The effective length of the column in Z-Z direction is 8m and in the Y-Y direction is 5m. Take $f_y$ = 250 MPa and E= 200 GPa.

Or

(b) Design a column using a rolled steel I-section with cover plates to carry a factored axial load of 2000kN. The effective length in both the planes is 5m. Take $f_y$ = 250 MPa and E= 200 GPa.

14. (a) A built-up I-section has the following dimensions : Flanges : 250 x 6mm ; Web : 300 x 3mm. Calculate the plastic section modulus and plastic moment capacity of the section. Also find the shape factor.

Or

(b) Design a laterally restrained cantilever beam of effective span 4m carrying a live load udl of 10kN/m and a dead load udl of 20 kN/m. Assume stiff bearing length of 75mm. Take $f_y$ = 250 MPa and E= 200 GPa.

15. (a) With neat sketches give a detailed account of the different types of connectors used in timber construction.

Or

(b) Design a spaced column of effective length 5m made of teak wood to carry an axial load of 200 kN.