Reg. No.

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B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Civil Engineering

CE 2352/CE 62/CE 1354/10111 CE 603 — DESIGN OF STEEL STRUCTURES

(Regulations 2008/2010)

(Common to PTCE 2352/10111 CE 603 - Design of Steel Structures for B.E. (Part-Time) Fourth Semester - Civil Engineering - Regulations 2009/2010)

Time : Three Hours   **Maximum : 100 Marks**

Instruction :   (1)   Use of IS 800-2007, IS 883-875-1994 and steel tables is permitted.

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1.   Write short notes on limit state of serviceability.

2.   List the advantages of welded connections.

3.   How is shear lag accounted for in IS 800-2007 ?

4.   What do you understand by 'net area' of a section ?

5.   Sketch neatly a typical gusseted base connection.

6.   When are laced columns preferred ?

7.   What are the factors that cause buckling of the compression flange ?

8.   Under what conditions a beam should be checked for shear ?

9.   What are the sections normally used as purlins ?

10. List the criteria to be adopted for arriving at the spacing of truss.

PART – B (5 × 16 = 80 Marks)

(Use structural steel of Fe410 grade unless specified otherwise)

11. (a) Two plates 12mm and 18mm thick are to be joined using double cover butt joint. Assuming 10mm thick cover plates design the joint to carry a factored load 600 kN. Use bolts of grade 4.6.

OR

(b) Design the fillet weld for connecting ISA 80 × 80 × 8mm to a 10mm thick gusset plate, if the weld is to be done on its three sides. The welding is done in the workshop. The factored tensile load in the member is 350 kN.

12. (a) Compute the tensile capacity of a truss member ISA 100 × 100 × 10mm connected to a 12mm thick gusset plate. The member is connected by one line of 5 nos. of 16mm diameter bolts of grade 4.6.

OR

(b) Design a truss diagonal subjected to a factored tensile load of 250 kN. The length of the diagonal is 3m. The tension member is connected to a gusset plate 16mm thick with one line of 16mm diameter bolts of grade 4.6.

13. (a) Design a column using with two channel sections laced together and placed toe-to-toe and spaced apart to support a factored axial load of 2500 kN. The effective length of the column is 5m.

OR

(b) Design a single angle discontinuous strut to carry a factored load of 120 kN. The length of the strut between centre of intersections is 3.3m.

14. (a) Find the moment capacity of the laterally unsupported beam ISMB 600 of effective span 4m.

OR

(b) Design a laterally restrained cantilever beam of effective span 3m carrying a factored point load of intensity 300 kN at the free end. Assume a bearing length of 100mm. Also check for deflection and bearing.

15. (a) Design an I-section purlin, for an Industrial building situated in the outskirts of Chennai to support a GI sheet for the following data.

Spacing of the truss c/c = 5 m

Span of truss = 10m

Spacing of purlins c/c = 1.5 m

Intensity of wind pressure = 2 kN/m^2

Weight of GI sheets = 125 N/m^2

OR

(b) (i) Elaborate the steps involved in the design of a gantry girder. **(10)**

(ii) Write the steps involved in the design of the principal rafter of a truss. **(6)**