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Total No. of printed pages = 5

CE 131603

Roll No. of candidate

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2017

B. Tech 6th Semester End-Term Examination

DESIGN OF STRUCTURES - II

Full Marks – 100 Pass Marks – 35 Time – Three hours

The figures in the margin indicate full marks
for the questions.

Use of IS: 800-2007, IS: 875- part III and
Steel table are permitted.

1. Answer any *ten* questions : $3 \times 10 = 30$
- (i) What are the requirements of a good connection in steel design ?
 - (ii) What are the advantages of steel structures ?
 - (iii) Show any two types of hot rolled steel sections with neat sketches. Label them.

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- (iv) What do you understand by friction type of bolts ?
- (v) Differentiate between welded and bolted connections.
- (vi) Define : (a) Splices, (b) Gussets, (c) Lacing.
- (vii) What do you understand by compact, semi compact and slender sections ?
- (viii) Write down the differences between laterally supported and laterally unsupported beams.
- (ix) What are the various types of column bases ? Draw labelled diagram of any.
- (x) What are the different types of stiffeners used in plate girders ?
- (xi) What do you understand by the terms, web buckling and web crippling ?
- (xii) Enlist the factors on which selection of roof truss depends.

2. Answer any *eight* questions : 5×8=40

- (i) Explain the various design philosophies of steel structure.

- (ii) Sketch the stress-strain curve for mild steel and explain it in brief.
- (iii) A single bolted double cover butt joint is used to connect two plates, each 8 mm thick. Assuming 18 mm diameter bolts of grade 4.6 and cover plates of 4 mm thickness, calculate the strength and efficiency of the joints, if 4 bolts are provided in the bolt line at a pitch of 45 mm.
- (iv) A circular plate, 210 mm in diameter, is welded to another plate by means of 5 mm fillet weld. Calculate the ultimate twisting moment that can be resisted by the weld. (Use steel of Fe 410 grade and shop welding)
- (v) What is meant by failure of tension members? Explain various types of failures.
- (vi) Determine the effective net area for the section ISA 100×100×10 for the following cases :
 - (a) If connection is done by using 3 numbers bolts of 18 mm diameter in single line.
 - (b) If connection is done by welding.

(vii) Determine the plastic section modulus about the strong and weak axes for ISMB 300 @ 433.60 N/m neglecting the fillets.

(viii) Calculate the dimensions of a square base plate if load coming from column is 1000 kN and M20 grade of concrete is used for foundation below the base plate.

(ix) Name any five types of roof trusses with neat diagram.

(x) Calculate the design wind pressure for a building which is located in an industrial area of Chennai, for the following data :

Overall length of the building 48m
Overall width of the building 16.5m
Height of the building 12m
(Assume terrain category 4)

3. Answer any *three* questions : 10×3=30

(i) A single unequal angle section ISA 100×75 with thickness 8 mm is connected to a 12 mm thick gusset plate at the ends with 3 numbers of 22 mm diameter bolt to transfer tension. Determine design strength of the angle if gusset plate is connected to the longer leg. (Assume pitch=55 mm and edge distance=36 mm)

(ii) Design a column to support a factored load of 1050 kN. The column has an effective length of 5m. Use steel of grade Fe 250. ($f_y=250$ MPa ; $f_x = 410$ MPa)

(iii) A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable bolted gusset base. The base rests on M20 grade concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections.

(iv) A simply supported steel joist of 4m effective span is laterally supported throughout. It carries a total uniformly distributed load of 40 kN. Design an appropriate section using steel of grade Fe 410.

(v) Write down the steps involved in the design of a roof truss.