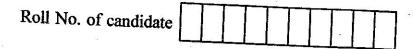
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## 2017

## 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:
- 3×10=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:  $5\times8=40$ 
  - (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 :  $10 \times 3 = 30$ 
  - (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. (fy=250 MPa; fx = 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.

(5)