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CE-7002 (CBGS)

B.E. VII Semester

Examination, November 2018

Choice Based Grading System (CBGS)

Structural Design -II (Steel)

Time : Three Hours

Maximum Marks : 70

Note:
i)   Attempt any five questions. All questions carry equal marks.
ii) Assume suitable data if required and mention it clearly.
iii) Use of IS 800, IS 875 (Part 3) and steel table is permitted.
iv) Draw neat and clean diagram as and when required.

1. a) Define characteristic load. What is the use of partial safety factors? How they are different from the factor of safety used in the working stress method? 7

   b) Design a welded end plate connection for a ISMB 400 in grade Fe 410 steel to carry a reaction of 120 kN due to factored loads. The connections has to be made to the flanges of ISHB 300. https://www.rgpvonline.com 7

2. a) Write the various steps involved in the design of unstiffened seat angle connections with formula to be used. 7

   b) The plates of a 6-mm thick tank are connected by a single bolted lap joint with 20-mm diameter bolts at 60-mm pitch. Calculate the efficiency of the joint. Take f_u of plate as 410 MPa and assume 4.6 grade bolts. 7

3. Write short notes on. 14
   a) Web buckling and Web crippling
   b) Latticed Beams   c)   Castellated Beams
   d) Purlins

4. a) What are the steps involved in the design of plate girders? 7

   b) Determine the moments and forces due to the vertical and horizontal loads acting on a simply-supported gantry girder given the following data. 7
      i)   Simply supported span   = 6 m

   ii)   Crane's wheel centres   = 3.6 m
   iii) Self-weight of the girder   = 1.6 k N/m
   iv)   Maximum crane wheel load   = 220 k N
   v)   Weight of crab/trolley   = 60 k N
   vi)   Maximum hook load   = 200 k N

5. a) Define effective length of column. Write the function of providing lacing and battens in columns. Describe the various types of column footings to support a steel column. 7

   b) An ISHB 300 is to be used as a short column carrying axial load. Is its compressive strength likely to be affected by local buckling assuming 7
      i)   Fe 410 steel with f_y = 250 MPa.
      ii) Fe 540 steel with a design strength of f_y = 410 MPa

6. a) What is the function of a bracing? What are the different types of bracings used in a braced building? State the advantages of using a knee brace. 7

   b) Calculate design wind pressure for an industrial building located at Guwahati with a span of 20 m and a length of 50 m. The roofing is galvanized iron sheeting. Basic wind speed is 50 m/s and the terrain is an open industrial area. Building is class B building with a clear height of 8 m at the eves. https://www.rgpvonline.com 7

7. a) Determine the tension capacity of 150×90× 8 mm angles in Fe 410 steel assuming 7
      i)   Connection through the longer leg by two rows of M20 bolts
      ii) Connection through shorter leg by a single row of M24 bolts.

   b) What are the types of transmission line towers? What is meant by tower configuration and explain in detail the various loads to be considered in design of transmission tower? 7

8. a) Write design steps for the design of base plate for column base. 7

   b) Write in brief with diagrams. 7
      i)   Tubular connections
      ii) Lattice girders

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