Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 12063

M.E. DEGREE EXAMINATION, MAY 2014.

First Semester

Structural Engineering

01PSE102 – STEEL STRUCTURES

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

(Use of IS 800-2007, Steel Tables & IS 6533-1971 are permitted.)

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State the advantages of knee brace.

2. List the advantages and the disadvantages of an unbraced frame over a braced frame.

3. Draw the sketch of the clip angle connection.

4. What are the two main types of moment resisting connections?

5. When gust factor method is preferred for the structures subjected to wind force?

6. Why weight of lining is not considered during the calculation of maximum tensile stress.

7. State the kinematic theorem.

8. What is meant by mechanism?

9. What is meant by distortional buckling of column?

10. What is lateral buckling of beams?

11. (a) Design the following for an elevated rectangular steel water tank to store one lakh litres of water. 1) Bottom plates 2) Side plates 3) Tee-covers Assume $f_y = 250$ N/mm^2. (14)

Or

(b) Write short notes on:

  (i) Stiffened seat angle connections (7)
  (ii) Split beam T-Connection. (7)

12. (a) Design a stiffened seat angle for a reaction of 250 kN from a beam of ISMB 400 using M20 bolts of 4.6 grade. The beam has to be connected to ISLC 200 column. Assume $f_y = 250$ MPa. (14)

Or

(b) Design a welded seat angle connection between a beam ISMB 400 and column ISHB 200 for a reaction of beam 120 kN, assuming Fe410 grade steel ($f_y = 250$ MPa) and site welding. (14)

13. (a) Design the shell of a self-supporting steel stack of height 60 m above the foundation and the diameter of cylindrical part is 4.25 m. Assume that 100 mm thick lining is supported by the stack throughout the height. The chimney is located in Zone-II. The topography of the site is practically plain and the terrain category 2. Thickess of lining is 100 mm. (14)

Or

(b) Design the shell of guyed single level steel chimney for a height of 60 m. Assume that the number of guys used are 4 at 1/3 of height from the base. (14)

14. (a) Compute the permissible axial load on the cold-formed steel column which is made up of two lipped channels placed back to back. The depth of web, flange width, lip length and thickness of one section is 250, 100, 15 and 2 mm respectively. Take the internal radius at junction as 5 mm. The steel has an yield stress of 350 N/mm^2 and modulus of elasticity 2.1×10^5 N/mm^2. (14)

Or

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(b) The light gauge steel beam made of two channels placed back to back, is laterally supported at 1 m interval. The depth of web, flange width and thickness of one section is 150, 40 and 2 mm respectively. Take the internal radius at junction as 5 mm. Compute the moment of resistance of the section. Take $M_1 = -0.75\ M_2$, $f_y = 240\ N/mm^2$. (14)

15. (a) A two span continuous beam ABC has span lengths AB = 6 m and BC = 6 m and carries an u.d.l of 30 kN/m completely covering the spans AB and BC. A and C are simple supports. If the load factor is 1.8 and the shape factor is 1.15 for I - section, find the section modulus needed. Assume the yield stress for the material as 250 N/mm² steel. (14)

Or

(b) Determine the plastic moment capacity of the portal frame of uniform cross-section as shown in figure. (14)
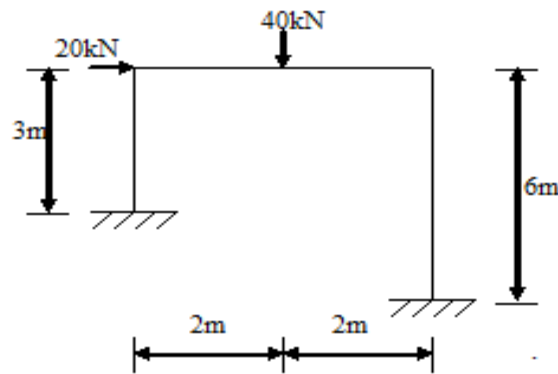
PART - C (1 x 10 = 10 Marks)

16. (a) What are the types of towers? Explain the design principle of towers. (10)

Or

(b) Draw the layout of industrial structures and explain the function of each part? (10)

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