M.E. DEGREE EXAMINATIONS: JUNE 2011

Second Semester

STRUCTURAL ENGINEERING

SEE507: Advanced Steel Structures

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

(All Relevant Codes permitted)

Answer All Questions:

PART A (10 x 2 = 20 Marks)

1. Define Industrial buildings, classify it?

2. What is meant by Purlin?

3. What is meant by Unstiffened Seat Connection?

4. What is the principle of semi rigid connection? Under what circumstances it is provided?

5. What is meant by effective width concept?

6. Explain the failure pattern of open column sections and closed column sections?

7. Sketch few types of bracings in steel towers?

8. Write a note on load on towers?

9. Explain the plastic hinge concept?

10. What is meant by serviceability limit state?

PART B (5 x 16= 80 Marks)

11. a) (i) An industrial shed is being built at Visakhapatinam near a hillock. Height of the hill is 150 m and the slope is 1 in 3. The building is proposed at a height of 100 m from the base of the hill. Find the design wind pressure. Height of the building is 15m.   (10)

   (ii) Explain braced and unbraced frames in industrial building?   (6)

(OR)

   b) The truss of an industrial building is of span 20 m and height 5m are spaced at 4.5 m centre to centre. Design a channel section purlin to be placed at suitable intervals to resist the following loads

   Weight of sheeting including bolts= $171 N/m^2$

   Live load = $0.4 KN/m^2$

   Wind load = $1.2 KN/m^2$

   Spacing of purlins = 1.4m

12. a) Design a stiffened seat angle connection for a reaction of 300 kN from a beam of ISMB 450 using M20 bolts of grade 4.6. The beam has to be connected to ISSC 200 column. Assume Fe 410 grade steel.

(OR)

b) Design a welded seat angle connection between a beam ISMB 300 and column ISHB 200 for a reaction of beam 100 kN assuming Fe 410 grade steel and site welding.

13. a) Two channel sections without bent lips 180 mm x 50 mm are connected with the webs to act as a beam. The thickness of the channel section is 2mm. The effective span of simply supported beam is 4.5 m. Determine the maximum uniformly distributed load including self weight which may be supported by the beam. The beam is laterally supported throughout its length. Adopt the properties of the channel section from the code IS 811-1961. Take allowable design stress as 1450 Kg/cm^2.

(OR)

b) A light gauge steel rectangular box section 300 x 150 x 3 mm is used for a column. The effective length of column is 3.5 m. Determine the safe load carrying capacity of the section. Take yield strength as 3000 Kg/cm^2.

14. a) (i) Write a detailed note about the classification of towers? (10)

(ii) Explain the expression for sag tension calculation using parabolic formula? (6)

(OR)

b) Calculate the tower loading for a typical 132 kV double circuit line for the data given below

Type of tower: Tangent tower with 2 degrees line deviation

Nonnal span: 335 m

. Wind pressure

a. Tower (on 11/2 times the exposed area of one face): 200 kg/m^2

b. Conductors and ground wire (on fully projected area): 45 kg/m^2

15. a) Determine the design axial load on column ISMB 350, given that height of column is 3m and that is pin ended. Use Fe410 grade steel

(OR)

b) Three span continuous beam subjected to a total design load is shown in fig.1 Design a suitable section for the beam using plastic analysis . It may be assumed that the beam is adequately braced against lateral deflection and twist over its full length
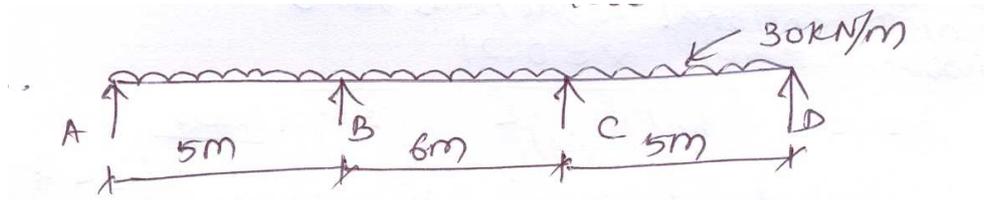

Fig: 1

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