Register Number……

M.E. DEGREE EXAMINATIONS: APRIL / MAY 2010

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. What are the design components in industrial building?
2. What is meant by gable frame? Under what conditions it is provided?
3. What is meant by stiffened seated connection? Where is it required?
4. An LB 350@495KN/m transmits an end reaction of 290KN to the web of an MB 500@0.869 KN/m. Design a framed connection.
5. How do the light gauge compression members fail?
6. What is form factor in light gauge compression member?
7. What do you know about slenderness ratio of towers?
8. Write a note on loads on towers.
9. Explain about plastic collapse in steel structure?
10. What is LRFD?

PART B (5 x 16 = 80 Marks)

11. a) i) Write an essay about the bracings of industrial building in longitudinal and transverse direction. (10)

ii) Write a note on methods of bracing. (6)

(OR)

b) Design the gable rafter, side rails, gable column and gable wind girder for the industrial building with the following data..

The span of knee roof trusses used over the industrial building 28m long is 18m, the spacing of roof trusses is 4m.The pitch of roof truss is 1 in 4. The Galvanized corrugated iron sheets are used for roof covering. The basic wind pressure is 1.50KN/m^2 and there is no snow fall. The height of eaves above ground level is 8m. Propose a suitable type of roof truss.

12. a) i) An MB 500 @0.869 KN/m transmits an end reaction of 130KN to the Flange stanchion HB 250@0.150KN/m. Design a unstiffened seated connection. Use 22mm diameter rivets. (8)

ii) A single bay single storey portal frame carries uniform distributed load of 40KN/m over its beam 6m long. The rigidity of semi-rigid connection at either and of the beam with the column is 80%. Determine the design moments. The columns and beam have uniform cross section. (8)

(OR)

b) An LB 400@0.569KN/m transmits an end reaction of 250KN to the flange of an HB 300@0.588KN/m column. Design stiffened seated connection. Provide (i) a single stiffener angle (ii) two stiffener angle.

13. a) A light gauge steel rectangular box section 200mm x 100mm x 2.0mm is used for a column. The effective length of column is 3.60m.Determine the safe load carrying capacity of the section. Take basic design stress σ_b = 125N/mm^2.

(OR)

b) Two channel sections without bent lips 200mm x 50mm are connected with webs to act as a beam. The thickness of channel is 2.5mm. The effective span of simply supported beam is 4.00m. Determine the maximum uniformly distributed load inclusive of self-weight which can be supported by the beam. The beam is laterally supported throughout its length.

14. a) A steel tower is to be erected for transmission for a single circuit three-phase,

50 cycles per second to transmit 50MW at 0.75 power factor

259km as per the following data design.

Voltage of transmission-132kV

Unit weight of conductor-16.76N/m

Permissible axial tension-35.60 kN

Youngs modulus of elasticity-0.842x10^5 N/mm^2

Coefficient of expansion-0.00001992/ ˚C

Shape factor for conductor-0.67

10 mm diameter galvanized steel wire with permissible axial tension as 25.49kN

Vertical height of conductor above the ground-6.7m

Vertical spacing between the power conductor-3.5m

Horizontal spacing -6.25m

Variation of temperature-5 ˚to 60˚C

Uniform intensity of wind-1.50kN/m^2

Snowfall is not expected.

Wind span of tower-240m

(OR)

b. Derive the expression for shape, sag and tension in uniformly loaded conductors.

15. a. i Write a note on fundamental condition for plastic analysis**.**

ii. Discuss about plastic collapse of steel structure.

(OR)

b. Write short notes on design of axially loaded compression members and serviceability limit state.

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