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Question Paper Code : X86915

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Second Semester
Structural Engineering
ST5201 – ADVANCED STEEL STRUCTURES
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Give the significance of using purlin in industrial building.
2. Discuss about the gable wind girder.
3. Enlist the different types of connections.
4. Define clip angle connection.
5. List out the different types of trusses.
6. Write about aseismic design of steel buildings.
7. Define plastic hinge.
8. What are the effects of shear force on plastic moment ?
9. Discuss about the behaviour of compression elements.
10. Define shear lag.

PART – B

(5×13=65 Marks)

11. a) Explain in detail about design of simple bases and gusseted bases with sketches.

(OR)

- b) Design a single angle strut connected to gusset plate to carry 210 kN factored load. The length of the strut between centre to centre intersections is 4m.

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12. a) An ISMB 550@1019.3 N/m transfer an end reaction of 150 kN and an end moment of 125 kNm to the flange of a column ISHB 250@500.3 N/m. Design a site welded connection. Show the details with a neat sketch.

(OR)

- b) An ISMB 300 transmits an end reaction of 185 kN to the web of an ISMB 450. Design (i) framed bolted and (ii) welded connections. Show the details with a neat sketch. **(7+6)**

13. a) Explain the various types of analysis and design of different types of industrial trusses with neat sketches.

(OR)

- b) An ISLB 300 carrying UDL of 50 kN/m has effective span of 8 m. This is to be connected to the web of the girder ISMB 450. Design the frame connection using 20 mm diameter shop bolts.

14. a) A beam of span 6m is fixed at both ends and carries an UDL of 150 kN/m run over left half of the span. Design the section using plastic theory. Allow a load factor of 1.75 and yield stress of steel $f_y = 250 \text{ N/mm}^2$.

(OR)

- b) Explain the following :
- i) Haunched connections. **(7)**
 - ii) Design of straight corner connections. **(6)**

15. a) Explain the following :

- i) Design of webs of beams. **(7)**
- ii) Lateral buckling of beams. **(6)**

(OR)

- b) Explain in detail about the behaviour of unstiffened and stiffened design elements.

PART – C

(1×15=15 Marks)

16. a) Design a stiffened seat angle : (i) Bolted and (ii) welded type of connection for a reaction of 160 kN from beam of ISMB 300 using M16 bolts of grade 4.6. The beam is connected to a column section ISHC 200. Show the details with a neat sketch. **(7+8)**

(OR)

- b) Symmetric trusses of span 25 m and height 5.5 m are spaced 4.5 m c/c. Design the channel section purlins to be placed at suitable distances to resist the following loads.

Weight of sheeting including bolts = 183 kN/m^2

Live load = 0.6 kN/m^2

Wind load = 1.3 kN/m^2 (Suction)

Spacing of purlins = 1.4 m

Design the purlin as per IS 800-2007