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**Question Paper Code: 52622**

M.E. DEGREE EXAMINATION, MAY 2017

Second Semester

Structural Engineering

15PSE202 - STEEL STRUCTURES

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Relevant IS codes are permitted)

PART A - (5 x 1 = 5 Marks)

1. The building purlins are spaced at

- (a) 1.35 – 1.40 m                      (b) 1.30 – 1.40 m  
(c) 1.25 – 1.45 m                      (d) 1.20 – 1.35 m

2. Junction between flange and web of a section is

- (a) Flange angle              (b) Fillet              (c) Web angle              (d) Beam section

3. Which type of member is directly support purlins?

- (a) Bottom chord              (b) Struts              (c) Top chord              (d) Slings

4. The moment capacity of a section at plastic hinge equals to

- (a) Yield moment                      (b) Zero  
(c) Fully plastic moment              (d) Twice the yield moment

5. The density of steel is  $\gamma$

- (a) 7850 kg/m<sup>3</sup>              (b) 7859 kg/m<sup>3</sup>              (c) 7845 kg/m<sup>3</sup>              (d) 7869 kg/m<sup>3</sup>

PART B - (5 x 3 = 15 Marks)

6. What do you mean by gusset base?
7. Distinguish stiffened seat connections and un-stiffened seat connections.
8. Draw a neat sketch of Pratt truss and mention its application.
9. Define plastic section modulus.
10. What is meant by flange curling?

PART C - (5 x 16 = 80 Marks)

11. (a) Explain the design procedure for purlins used in industrial building. (16)

Or

- (b) Explain the procedure for design of slab base and gusset base plates. (16)

12. (a) An ISLB300 carrying udl of 50kN/m has effective span 8m. This is to be connected to the web of girder ISMB450. Design the framed connection using 20mm black bolts. (16)

Or

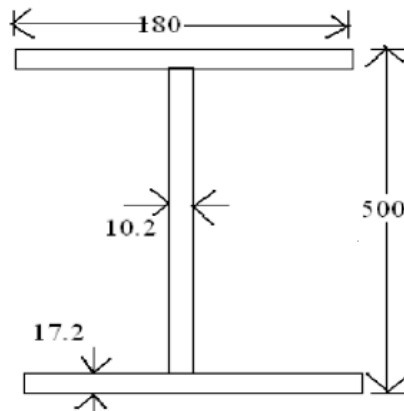
- (b) A ISHB300@0.442 kN/m transmits a factored end reaction of 110 kN and a factored end moment of 30kNm to the flange of a column ISHB300@0.630 kN/m. Design the end connections. (16)

13. (a) An industrial building is proposed to be built in Bangalore city where the basic wind pressure is 33m/s. Particulars of the building are: Length: 120m; Width: 24m; Roof truss: Fink; Eaves height: 8m above GL; Truss span: 24m Rise: 5m; Truss spacing: 5m; Purlin Spacing: 1.3m; Ground: Plain Land; Roof sheeting: ACC sheets. Design the purlin using channel section. (16)

Or

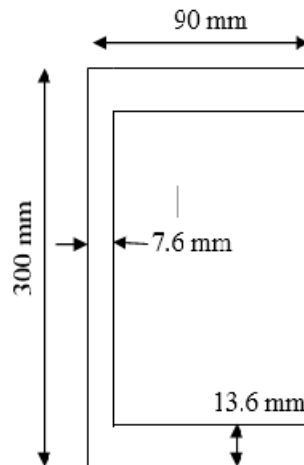
- (b) Design a simply supported gantry girder to carry one electrical overhead travelling crane for the following data: Span of gantry girder: 6.5m; Span of crane girder: 16m; Crane capacity: 250 kN; Self weight of crane girder excluding trolley: 200 kN; Self weight of trolley: 50 kN; Minimum hook approach: 1m; Distance between wheels: 3.5m; Self weight of rails: 0.3 kN/m. (16)

14. (a) Determine the plastic modulus for the section shown in figure below. (16)

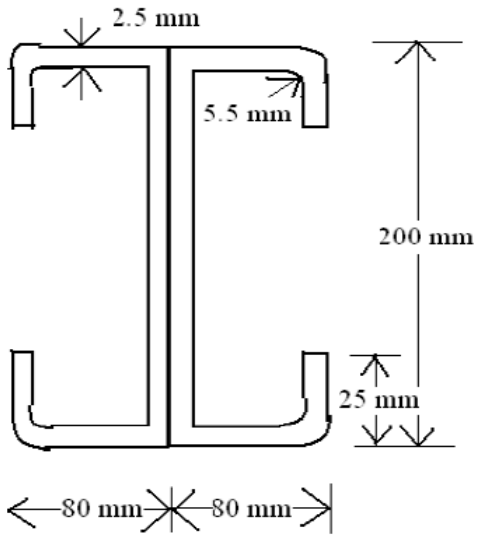


Or

- (b) Determine the plastic section moduli about z-z and y-y axes and plastic moment capacity of the channel section shown in below figure. Assume  $f_y = 250\text{MPa}$ . (16)



15. (a) Two channel  $200\text{ mm} \times 80\text{ mm}$  with bent lips are connected with webs to act as beam as shown in Fig. The thickness of plate is  $2.5\text{ mm}$  and the depth of lip is  $25\text{ mm}$ . The beam has an effective span of  $4\text{ m}$ . Determine the allowable load per meter on the beam. Also, determine the deflection at the allowable load. The steel has a yield point of  $235\text{ MPa}$ . Take  $E = 2 \times 10^5\text{ N/mm}^2$ .



(16)

Or

- (b) A light gauge steel square 250mm x 250mm x 2mm is to be used as a column of effective length 4m. Find the maximum load it can carry. If it is stiffened on all four sides, find the additional load it can carry. (16)

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