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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2017

DCE—SIXTH SEMESTER EXAMINATION

STEEL STRUCTURES

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

(4) Use of IS 800–2007 and steel tables are permitted.

1. List any six loads in the design of steel structures.

2. Define *(a)* size of fillet weld(s) and *(b)* effective length of fillet weld.

3. Define *(a)* gross area and *(b)* net area.

4. Calculate the design strength of a tension member due to yield of gross-section for ISA 90 60 6 mm with its longer leg connected to the gusset plate by fillet welds. Take f_y 250 MPa.

5. Define *(a)* imperfection factor ( ) and *(b)* stess reduction factor ( ).

6. State the expression to calculate the equivalent slenderness ration of a single angle compression member as per IS 800–2007 with usual notations.

7. What is built up beam? Sketch any two forms of bultup beams.

8. Name any three types of web stiffeners in plate girder.

9. Define *(a)* principal rafter and *(b)* ridge line and *(c)* eves.

10. How is design wind speed calculated for a trussed roof for a given height (*z*)?

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. The longer leg of an unequal angle ISA 125 95 10 mm is to be connected to a gusset plate of 12 mm thick by a lap joint using side welds only at site. The member carries an axial design tensile force of 275 kN acting through the center of gravity of the angle. Design the joint taking the ultimate shear stress in the fillet weld as 330 N / mm^2.

12. Determine the design strength of a tensile member ISA 125 75 8 mm when its shorter leg is connected to 10 mm thick gusset plate by 7 mm size fillet welds. The effective length of weld is 180 mm. Take f_y as 250 MPa and f_u as 410 MPa.

13. An ISMB 150 is used as column. It is laterally supported in the plane of the major axis at a height of 2·5 m and in the plane of minor axis at a height of 4·5 m. The ends are hinged. What will be the allowed load on the column?

14. Design a steel column using a single rolled I-section to carry an axial load of 800 kN. Both ends of the column are restrained against translation and rotation. The actual length of column between intersections is 8 m. The yield stress of steel is 280 MPa.

15. A steel column consists of two ISMC-400 at 489 N/m placed back to back at a clear distance of 120 m. It carries an axial load of 1200 kN. Use M_{20} grade concrete and f_c 250 grade steel. Design the slab base and concrete pedestal if the Safe Bearing Capacity of soil is 180 kN/m^2. Take bearing Strength of concrete as 9 N / mm^2.

16. A simply supplorted beam ISMB 400 @ 604 N/m has an effective span of 5 m. Find—

(a) the design bending strength of beam;

(b) the design shear strength of beam;

(c) the intensity of udl that the beam can carry under service conditions;

Assume that the beam is laterally supported and the grade of steel is Fe-250.

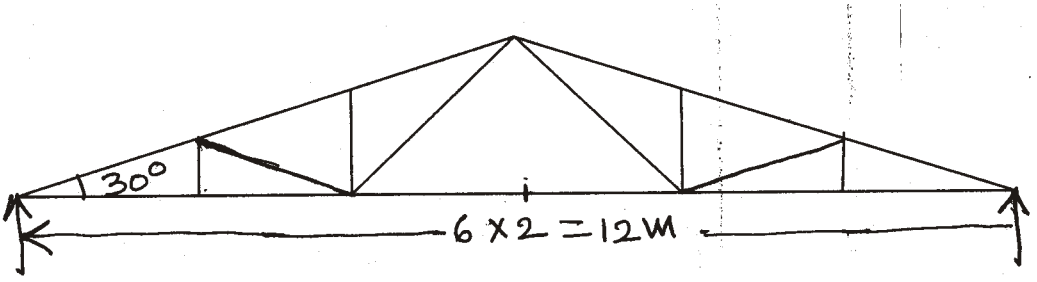
17. Design a rolled steel I-section to act as a simply supported beam with span 5 m carrying a.u.d.l. of 32 kN/m including the self-weight. Check the beam for shear and deflection if the beam is laterally restrained. [Use Fe-410 grade steel]

18. A Pratt roof truss of span 12 m and pitch 30° is shown in the figure below. The trusses are placed at 4 m apart and carry a corrugated AC sheet roofing. The basic wind pressure may be assumed as 1500 N/m^2. If the building is of normal permeability, determine—

(a) dead load;

(b) wind load;

(c) live load at various panel points of the truss



Consider—

(i) Weight of AC sheet as 160 N/m^2

(ii) Weight of purlins as 110 N/m^2

(iii) Height of eves as 7 m

(iv) External pressure coefficient (C_{pe})

Slope	For wind angle 0°		For wind angle 90° on both slopes	
30°	Windward	Leeward	Near gable end	Internal bays
	–0·2	–0·5	–0·8	–0·8

(v) Internal pressure coefficients (C_p) as 0 2

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