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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

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) Answers 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. Define *(a)* characteristic actions and *(b)* design actions.

2. State any three advantages of welded connections.

3. Sketch any three types of sections used for the tie members.

4. Calculate the design strength of a tension member due to yielding of gross section for a plate of 160 mm 8 mm thickness. Take f_y as 410 N/mm^2 for the material.

5. State the buckling classes of compression members as divided by IS 800–2007.

6. What are *(a)* lacing and *(b)* battening?

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7. Explain the terms *(a)* web crippling and *(b)* web buckling.

8. A beam ISLB 400 @ 569 N/m has to carry a superimposed load of 30 kN/m over a span of 6 m. Check the beam section for shear stress.

9. Define *(a)* plane truss and *(b)* space truss.

10. How much live load do you consider in the design of a steel truss having an angle of slope of truss 30°?

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. A double-angle tension member of 2, ISA 110 mm 110 mm 12 mm carrying an axial tension of 600 kN is to be connected to a 12 mm thick gusset plate by side fillet welds only. Design the joint if the ultimate shear stress in the weld is 270 N/mm^2. Assume connections are made at site.

12. Design a single angle tension member of a roof truss to carry a factored tensile force of 225 kN. The angle is to be connected to a gusset plate through its longer leg by fillet welds. Take f_y 250 MPa and f_u 410 MPa. Take the length of member as 3 m.

13. Determine the design compressive strength of single ISLB 450 @ 641 N/m when it is used as column of effective length 4 m. The yield stress of steel is 300 MPa.

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

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against translation and rotation. The actual length of column between intersections is 8 m. The yield stress of steel is 280 MPa.

15. Design a slab base for a column ISHB 300 at 577 N/m carrying an axial load of 1000 kN. M20 grade concrete is used for the foundation. The yield stress of steel is 250 MPa. Also design the concrete pedestal if the safe bearing capacity of soil is 190 kN/m^2. Take the bearing strength of concrete as 9 N/mm^2.

16. A simply supported beam ISMB 300 at 402 N/m has an effective span of 6 m. Find—

(a) design bending strength of beam;

(b) design shear strength of beam.

Assume Fe 410 grade steel and assume that the beam is laterally supported.

17. Design a simply supported beam of an effective span 6 m carries a udl of 20 kN/m including self-weight. The compression flange of the beam is laterally restrained. Check the beam for shear and deflection. The grade of steel is Fe 250.

18. A Pratt roof truss of span 12 m and pitch 30° is shown in the fig(i). 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 and;

(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 100 N/m^2

(iii) Height of eves as 7 m

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(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_{pi}) as 0 2 :

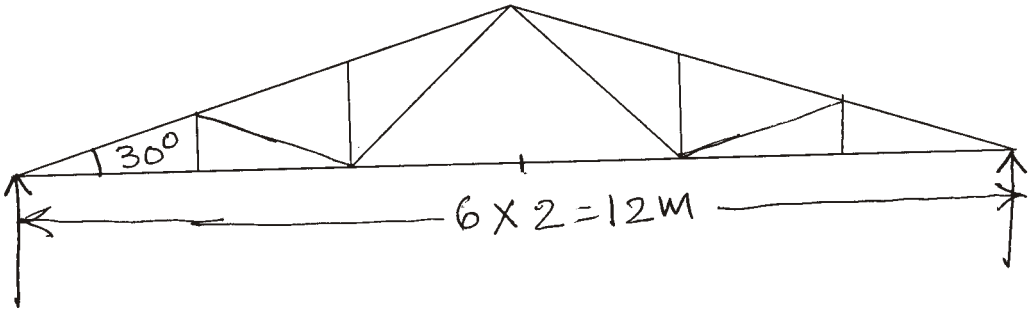

Fig (i)

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