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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

JUNE—2019

DCE—SIXTH SEMESTER EXAMINATION

STEEL STRUCTURES

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

Reference books to be allowed :

(1) Steel Code IS 800–2700

(2) Steel Tables

(3) Extracts from IS 875–1987 for wind load calculation

PART—A 3×10=30

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

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

(3) Any missing data can be suitably assumed.

1. Write three merits and three demerits of steel structures over RC structures.

2. What are the different types of welds?

3. What are the different types of failures of tension members?

4. Find design tensile strength due to rupture of a plate 100 mm × 8 mm connected to a gusset plate of 10 mm thickness by welding. Take f_u = 410 N/mm^2.

5. Define 'effective length' and 'slenderness ratio' of the compression member.

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6. What are the lacings and battens?

7. Define shape factor. State the values of shape factor for rectangular and circular sections.

8. Explain 'web buckling' and 'web crippling'.

9. State the formula for calculating weight of the truss.

10. Calculate the live load per sq. m of plan area on a sloping roof of 25.

PART—B 5×10=50

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

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

(3) Any missing data can be suitably assumed.

11. An angle ISA 150 × 115 × 10 mm carrying an axial tensile load of 500 kN is to be connected to a gusset plate of 12 mm thickness through its longer leg using side fillet welds only. Design the welded joint. Take ultimate shear stress in the weld as 330 N/mm^2. Assume connections are made in the workshop.

12. Design a double-angle tension member to carry factored load 450 kN using welded joint. Assume the angles are connected to either side of 12 mm thick gusset plate. f_y = 250 N/mm^2 and f_u = 410 N/mm^2. Assume length of connection as 200 mm. [Check for block shear is not necessary].

13. Find the design compressive strength of a column section ISHB 250 @ 547 N/m, 5 m height with both ends restrained against translation and rotation. Take yield stress of steel (f_y) = 300 N/mm^2.

14. *(a)* Draw the sectional elevation of slab base showing various component parts. 4

(b) Find the thickness of a slab base of size 400 mm × 450 mm is provided below the steel column carrying a factored load of 750 kN. The projection of base plate beyond the column in both directions is 125 mm. 6

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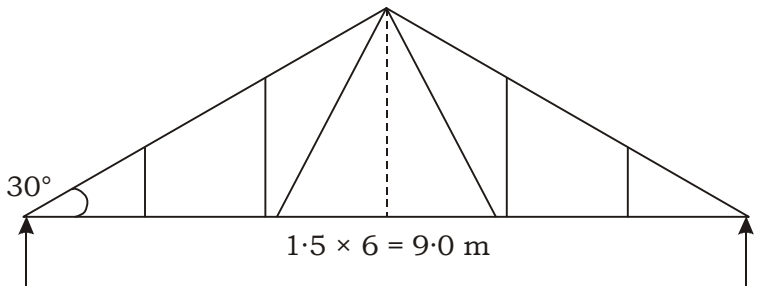
15. Determine the design strength in compression of single angle discontinuous strut ISA 90 × 60 × 8 mm of length 2·50 m is connected to a gusset plate through longer leg by fillet weld. f_y = 250 N/mm^2, E = 2 × 10^5 N/mm^2. Assume gusset fixity as rigid. Assume gusset fixity as rigid.

16. Determine the design bending strength and design shear strength of laterally restrained simple supported beam ISLB 325 @ 431 N/m. Assume yield stress of steel, f_y = 300 N/mm^2.

17. A rolled steel I-section of a cantilever beam of length 2·5 m subjected to factored BM of 150 kN/m and factored SF of 100 kN. Check the adequacy of the beam for bending and shear. Assume compression flange of the beam is laterally restrained. Take f_y = 250 N/mm^2.

18. A Pratt roof truss of span 9·0 m and pitch 30° carries AC sheet roofing. The trusses are 3·0 m apart. The design wind pressure is 1500 N/m^2. Determine 'live load' and 'wind load' at various nodal points of the truss. Assume eaves height 7·0 m and 'normal' permeability.



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