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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2016

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) Use of IS 800 : 2007, IS 875 : 1987 for wind load calculations, steel tables are permitted.

(4) Assume data suitably, if necessary.

1. List out three advantages and three disadvantages of steel structures.

2. Define *(a)* size of fillet weld and *(b)* throat thickness of fillet weld.

3. Define a tie and mention the different shapes of sections used as ties.

4. Calculate the design strength of a tension member due to yielding of gross section for ISA 100 mm 60 mm 10 mm.

5. Differentiate between a column and a strut.

6. Define lacing and battening.

7. Briefly explain *(a)* web buckling and *(b)* web crippling.

8. State the situations where the plate girders are necessary.

9. Define slope and pitch of a roof truss.

10. Determine the live load per square meter of plan area of the pitched roof of slope 24°.

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 90 mm 60 mm 8 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 250 kN acting through the CG of the angle. Design the joint taking the ultimate shear stress in the fillet weld as 400 N/mm^2.

12. Design a single-angle tension member for a roof truss to carry a factored tensile force of 250 kN. Check for block failure is not necessary. [Given : f_y 250 N/mm^2, f_u 410 N/mm^2]

13. Determine the design compressive strength of single ISHB 400 @ 806 N/m when it is used as a column of 4 m height with both of its ends restrained against translation and rotation. The yield stress of steel used is 300 MPa.

14. Design a single-angle discontinuous strut of 1·4 m, connected to rigidly fixed gusset plates at its ends by fillet welds, to carry a design load of 200 kN. The yield stress of steel is 250 MPa.

15. Design a slab base for a column ISHB 350 @ 674 N/m to carry an axial factored load of 1000 kN. Assume Fe–410 grade of steel and M–20 grade of concrete is used. Provide welded connection between column and base plate. Also design pedestal, if SBC of the soil is 180 kN/m^2. 6+4=10

16. Determine the design bending strength of a laterally restrained beam ISLB 450 @ 653 N/m. The yield stress of steel is 300 MPa.

17. Rolled steel I-section to be provided at 3 m intervals to support RCC slab of 120 mm thick. The imposed load on the slab is 3 kN/m^2, weight of floor finishing is 1·2 kN/m^2, and the effective span of the beam is 6·2 m. Design suitable beam. Take : f_y 250 MPa.

18. A Pratt truss of span 12 m and pitch 25° is used for AC sheet roofing. The trusses are 3 m apart and the wind pressure may be assumed as 1500 N/mm^2.

Determine the *(a)* dead load, *(b)* wind load and *(c)* live load at *(i)* intermediate panel points and *(ii)* end panel points of truss assuming the following data :

Unit weight of AC sheet roofing : 200 N/m^2 of plan area

Unit weight of purlin : 100 N/m^2 of plan area

Unit weight of bracing : 20 N/m^2 of plan area

Topography : Slope less than 30°

Permeability : Medium

Height at eves level : 9 m

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