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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

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 and steel tables permitted.

(4) Assume data suitably, if necessary.

1. Write short notes on the following :

(a) Limit state of strength

(b) Limit state of serviceability

2. Sketch a fillet weld and a butt weld.

3. Sketch the figures of angles *(a)* connected to the same side of a gusset plate and *(b)* both sides of a gusset plate showing welds in appropriate places.

4. Calculate the gross cross-sectional area of a tie member ISA 90 mm 60 mm 8 mm if the longer leg is connected to gusset plate.

5. Define the following :
   (a) Slenderness ratio
   (b) Effective length of column

6. Define lacing and battening.

7. Distinguish between laterally restrained beam and unrestrained beam.

8. List the component parts of a plate girder.

9. Draw a neat sketch of a roof truss and name the component parts.

10. What is a purlin? List various loads used in the design of a purlin.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.

11. A double-angle tension member 2-ISA 100 mm 65 mm 10 mm carries an axial load of 500 kN. The angles are connected to either side of gusset plate 10 mm thick by field fillet welds along both sides of longer legs using side welds. Design the weld if the ultimate stress in the weld is 410 MPa.

12. Design a single-angle tension member for a roof truss to carry a factored tensile force of 225 kN. Check for block failure is not necessary. [f_y 250 N/mm^2, f_u 410 N/mm^2]

13. Compare the compressive strength of ISLB 450 @ 653 N/m and ISHB 300 @ 630 N/m, when they are used as column of effective length 3·2 m. [f_y 300 N/mm^2]

14. *(a)* Describe briefly stress reduction factor and column buckling curves.
   (b) Design a single-angle strut for a roof truss to carry a compressive load 110 kN. The length of the angle between centre to centre of intersection is 2·4 m. Assume the end condition to be fixed and f_y 250 N/mm^2.

15 *(a)* What are the types of a column bases? Explain any one of them.

(b) Find the thickness of a base plate of size 400 mm 500 mm which is provided below a steel column carrying a total load of 800 kN. The projection of the base plate from column in both the directions is 100 mm and the permissible bending stress in base plate is 180 N/mm^2.

16. A simply supported beam ISMB 350 @ 524 N/m is subjected to a BM of 100 kN-m and SF of 80 kN. Check the safety of the beam in bending and shear if the beam is laterally restrained.

17. A hall of clear dimensions 16 m 6m is to be covered by RCC slab flooring 12 cm thick resting over RS joists spaced at an interval of 4 m centre to centre. Terrazo finishing of 1·5 kN/m^2 is to be provided over the RCC slab. The live load on the slab is 4 kN/m^2 and the joists are resting over 30 cm thick walls. Design the floor joists. The unit weight of RCC is 24 kN/m^3. Check the safety of the beam in shear and deflection only.

18. A Pratt truss of span 15 m and pitch 25° is used for an AC sheet roofing. The trusses are 3 m apart and the wind pressure may be assumed as 1500 N/mm^2. Determine *(a)* dead load, *(b)* wind load and *(c)* live load at—

(i) intermediate panel points;

(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

Permeability : medium

Height at caves level : 8 m

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