* 3721 *

C09–C–602

3721

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

(4) Use of IS 800 : 2007, IS 875 and steel tables are permitted.

(5) Assume data suitably, if necessary.

1. State three merits and three demerits of steel structures.

2. Sketch the cross-section of fillet weld and show its component parts.

3. Define *(a)* shear lag and *(b)* effective slenderness ratio.

4. Calculate the design strength of a tension member due to yielding of gross section for a plate of 200 mm width and 10 mm thickness. Take, f_y as 250 N/mm^2 for the material.

5. State the codal expression to calculate the design strength of a compression member.

6. Define effective length of a column. Also write the values of effective length for any two cases of end connections.

7. Define shape factor. Mention the shape factors to a rectangular and circular sections.

8. What do you understand by tension field method for the shear buckling in plate girders?

9. How do you estimate the weight of a truss when span is given?

10. Determine the live load per square meter on a sloping roof having a slope of 38°.

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. An angle ISA 200 × 150 ×15 mm carrying an axial tension of 600 kN is to be connected to a gusset plate through its longer leg using side fillet welds only. Design the joint if the ultimate shear stress in the weld is 330 MPa. Assume connections are made in the workshop.

12. Design a double-angle section to carry a tension of 300 kN. The end connection is made of fillet welds. Assume the angles are provided on both sides of the gusset plate. The yield and ultimate strength of the steel used are 250 MPa and 410 MPa respectively. Assume gusset plate thickness as 12 mm.

13. Determine the design compressive strength of single ISHB 400 @ 806 N/m when it is used as a column of 5 m height with both of its ends restrained against translation and rotation. The yield stress of steel used is 340 MPa.

14. A steel column of 6·5 m height, to carry an axial load of 1000 kN including its self-weight is restrained against translation but free to rotate at its ends. Design a column using two channel sections placed face-to-face. The yield stress of steel used is 250 MPa.

15. Design a slab base with rectangular base plate having equal projections for a column section consisting of ISHB 350 @ 661 N/m carrying an axial load of 1200 kN including self-weight. Use M-20 grade concrete and Fe-250 grade steel. Also design the concrete pedestal if safe bearing capacity of soil is 180 kN/m^2.

16. A 3 m cantilever beam has to carry a udl of 16 kN/m excluding the self-weight. Design the beam and check its safety against shear and deflection. Take, f_y = 300 MPa.

17. Write a note on the effect of holes in the tension zone of a laterally supported beam.

18. The line sketch of a Howe truss of 9 m span is shown in the figure. The trusses are placed at 4 m apart and carry a corrugated AC sheet roofing on angle purlins. The slope of the roof is 20°. The basic wind pressure for the place is 2000 N/m^2. There will be no snowfall in the region. 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 the following :

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

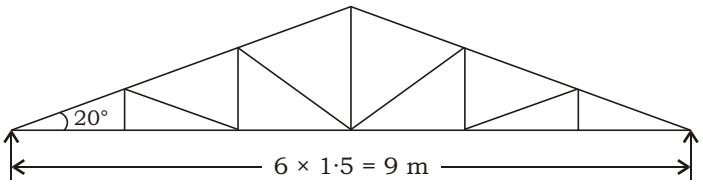
(ii) Weight of purlins as 100 N/m^2

(iii) Height of eves as 7 m

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

Slope	For wind angle 0°		For wind angle 90° on both slopes	
20°	Windward	Leeward	Near gable end	Internal bays
	– 0·7	– 0·5	– 0·8	– 0·6

(v) Internal pressure coefficient (C_{pi}) as 0 2



★ ★ ★