Total No. of printed pages = 7

CT-602/DOSS/6th Sem/2017/N

DESIGN OF STEEL STRUCTURE

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

Marks – 25

Question numbers 1 to 15 carries 1 mark each.

1. The effective length of a compression member of length L held in position and restrained in direction at one end and effectively restrained in direction but not held in position at the other end, is

   (a) L

   (b) 0.67 L

   (c) 0.85 L

   (d) 1.5 L

   (e) 2

2. If the pitch is 6 cm and rivet value is 4 tonnes, the number of rivets required for a riveted connection carrying an eccentric load of 15 tonnes at a distance of 30 cm from the centre line, is

(a) 6 (b) 8

(c) 10 (d) 12

3. A beam is defined as a structural member subjected to

(a) axial loading

(b) transverse loading

(c) both axial and transverse loading

(d) None of these.

4. A fillet weld may be termed as

(a) metre weld (b) concave weld

(c) convex weld (d) All of the above.

5. Web crippling generally occurs at the point where

(a) bending moment is maximum

(b) shearing force is minimum

(c) concentrated loads act

(d) deflection is maximum

6. Pick up the incorrect statement from the following :

(a) The nominal diameter of a rivet is its diameter before driving.

(b) The gross diameter of a rivet is the diameter of rivet hole.

(c) The gross area of a rivet is the cross-sectional area of the rivet hole.

(d) The diameter of a rivet hole is equal to the nominal diameter of the rivet plus 1.5 mm.

7. Pick up the correct statement from the following:

(a) Dead load includes self-weight of the structure and super-imposed loads permanently attached to the structure.

(b) Dead loads change their positions and vary in magnitude.

(c) Dead loads are known in the beginning of the design.

(d). None of these.

8. If the unsupported length of a stanchion is 4 metres and least radius of gyration of its cross-section is 5, the slenderness ratio of the stanchion, is

(a) 60 (b) 70

(c) 80 (d) 90

9. The cross-section of a standard fillet is a triangle whose base angles are

(a) 45° and 45° (b) 30° and 60°

(c) 40° and 50° (d) 20° and 70°

10. The effective length of a weld, is taken as the actual length

(a) minus the size of weld

(b) minus twice the size of weld

(c) plus the size of weld

(d) plus twice the size of weld

(e) None of these.

11. Diameter of a rivet hole is made larger than the diameter of the rivet by

(a) 1.0 mm for rivet diameter upto 12 mm

(b) 1.5 mm for rivet diameter exceeding 25 mm

(c) 2.0 mm for rivet diameter over 25 mm

(d) None of these.

12. Tacking rivets in tension members, are provided at a pitch in line not exceeding

(a) 25 cm (b) 50 cm

(c) 75 cm (d) 100 cm

13. The main type of butt joints, is a double cover

(a) shear riveted joint

(b) chain riveted joint

(c) zig-zag riveted joint

(d) All of the above.

14. Rolled steel angle sections are classified as

(a) equal angles (b) unequal angles

(c) bulb angles (d) All of the above.

15. Lug angle is

(a) used with single angle member

(b) not used with double angle member

(c) used with channel member

(d) All of the above.

Question numbers 16 to 20 carries 2 marks each.

16. What is the basic difference between elastic and plastic analysis ?

17. What is the difference between design strength and characteristics strength of a material ?

18. What are the different types of failure in a riveted joint ?

19. What is throat thickness and its importance in steel structure ?

20. State the difference between web buckling and web crippling with suitable figures.

PART – B

Marks – 45

Answer any *three* questions.

21. What are the different defects occurs during welding operation ? A splice has become necessary in a long tension member carrying a factored tension of 80 kN. The member is a single angle 60 mm × 40 mm × 8 mm. Design a single V-grooved welded joint. 5+10=15

22. In a truss girder of bridge, a diagonal consist of 16 mm thickness flat and carries a pull of 750 kN and is connected to a gusset plate by a double cover butt joint. The thickness of each cover plate is 8 mm. Determine the number of rivets necessary and the width of the flat require. What is the efficiency of the joint ? Sketch the joint if diamond riveting pattern is to be used. 5+5+5=15

23. Determine the design bending strength of a laterally supported beam ISMB 350 @ 514 N/m. Assume that the factored shear force is less than the design shear strength. Assume Fe 410 grade of steel. 15

24. A double angle discontinuous struts ISA 125×95 @ 0.165 kN/m with long legs back to back is connected to both sides of a gusset plate of 10 mm thick with two rivets. The length of strut between two centre to centre of intersection is 4 m. Determine the safe load carrying capacity of the section. 15