Reg. No. : | | | | | | | | | | |

Question Paper Code: 46101

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Sixth Semester

Civil Engineering

14UCE601 - DESIGN OF STEEL AND TIMBER STRUCTURES

(Regulation 2014)

(Use of IS 800:2007, IS 875 (part I, II & III) : 1987, SP 6-1964 and IS 883:1994 are permitted)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If *d* is the distance between the flange angles, the vertical stiffeners in plate girders are spaced not greater than

   (a) *d* (b) 1.25 *d* (c) 1.5 *d* (d) 1.75 *d*

2. A fillet weld may be termed as

   (a) miter weld (b) concave weld
   (c) convex weld (d) none of these

3. If the unsupported length of a stanchion is 4 meter 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

4. _____ used to connect long length of members to reduce the effective length of If the unsupported length of a stanchion is 4 meter 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

5. A compression member consisting of angle sections may be a

   (a) continuous member (b) discontinuous single angle strut
   (c) discontinuous double angle strut (d) none of these

6. The Indian standard code which deals with steel structures, is

(a) IS : 875 (b) IS : 800 (c) IS : 456 (d) IS : 1893

7. The strength of a riveted lap joint is equal to its

(a) shearing strength (b) bearing strength
(c) tearing strength (d) least of (a), (b) and (c)

8. The minimum pitch of rivet holes of diameter *d* should not be less than

(a) *d* (b) 2.5 *d* (c) 1.5 *d* (d) 2 *d*

9. The timber to be used in structure must conform to the standards specified in

(a) BIS 3626-1969 (b) IS 883-1994
(c) IS 3629-1986 (d) BIS 3620-1980

10. Group A timber comes under the Modulus of elasticity (E) above

(a) $9.8x10^3 N/mm^2$ (b) $12.6 x10^3 N/mm^2$
(c) $5.6 x10^3 N/mm^2$ (d) all the above

PART - B (5 x 2 = 10 Marks)

11. List any two common failure of riveted connection.

12. Define net sectional area.

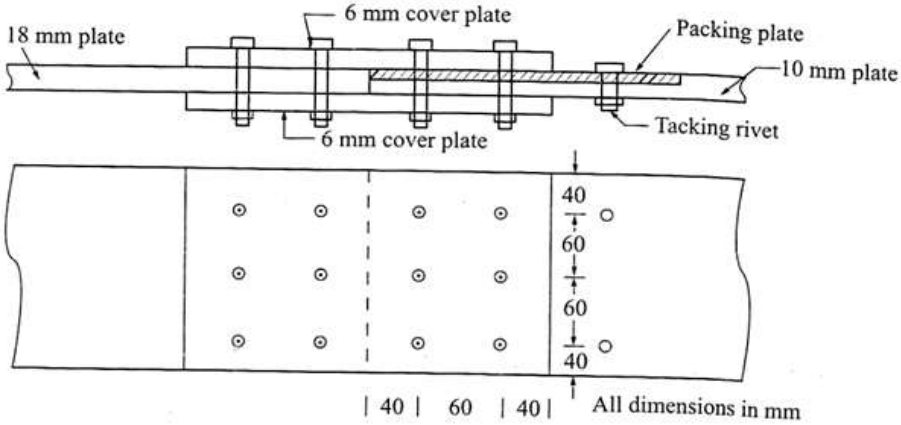
13. List out the failures modes of column sections.

14. Write short note on web buckling and web crippling.

15. List out the types of joints used in timber members.

PART - C (5 x 16 = 80 Marks)

16. (a) Two cover plates, 10 *mm* and 18 *mm* thick are connected by a double cover butt joint using 6 *mm* cover plates as shown in figure. Find the strength of the joint. Given M20 bolts of grade 4.6 and Fe410 plates are used. (16)



Or

(b) Design a lap joint between the two plates each of width 120*mm*, if the thickness of one plate is 16*mm* and the other is 12*mm*. The joint has to transfer a design load of 160*kN*. The plates are of Fe410 grade. Use bearing type bolts. (16)

17. (a) Design a channel section to carry an axial tension of 300kN. Take $f_y = 250N/mm^2$. Also design the riveted joint at the end. (16)

Or

(b) A tension member consists of two angle section and carries a load of 200*kN*. Design the member when both the angles are connected (i) On both sides of Gusset plate (ii) On the same side of Gusset plate. (16)

18. (a) A column section ISHB 350@661.2N/m carries an axial load of 1100kN. Design a suitable gusset basing by using riveted connection. (16)

Or

(b) Design a gusseted base for a column ISHB 350 @ 710 *N/m* with two plates 450 *mm* x 20 *mm* carrying a factored load of 3600 *kN*. The column is to be supported on concrete pedestal to be built with M20 concrete. (16)

19. (a) Design a beam of 5*m* effective span, carrying a uniform load of 20*kN/m* if the compression flange is laterally unsupported $f_y = 250N/mm^2$. (16)

Or

(b) Design the maximum section of a plate girder for a bridge live load of 60*kN/m*, longer than the span and the dead load of 40*kN/m*. The girder is simply supported over an effective span of 12*m*. Take impact factor 20/ (14+L). (16)

20. (a) Design a timber column for inside location for following data:
Type of wood =Kail, Unsupported length = 3.015m, Axial load = 350kN. (16)

Or

(b) A compression member is made of 150mm x 60mm deodar wood and it is 2m long. The member is subjected to a compressive load of 16.5kN and a bending moment of 800Nm. Investigate the safety of the design. Safe compressive stress due to axial load: as per code. Safe bearing stress: 10N/mm^2. (16)