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

Question Paper Code: 46101

B.E. / B.Tech. DEGREE EXAMINATION, NOV 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. A fillet weld may be termed as

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

2. 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*

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. The main assumption of the method of simple design of steel frame work, is

   (a) beams are simply supported
   (b) all connections of beams, girders and trusses are virtually flexible
   (c) members in compression are subjected to forces applied at appropriate eccentricities
   (d) all the above

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 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*

8. 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)

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. Web crippling generally occurs at

(a) flanges of the beam (b) root of the radius
(c) mid span of the beam (d) mid depth of the web

PART - B (5 x 2 = 10 Marks)

11. Define efficiency of a joint.

12. Define net sectional area.

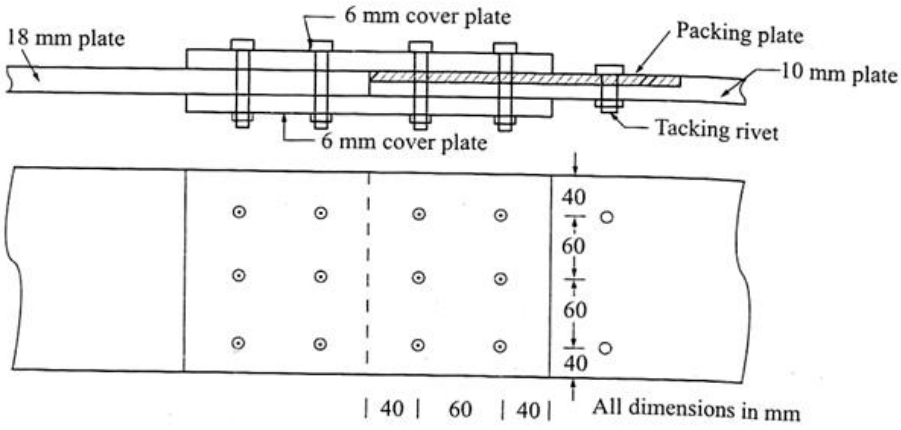
13. List out the failures modes of column sections.

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)

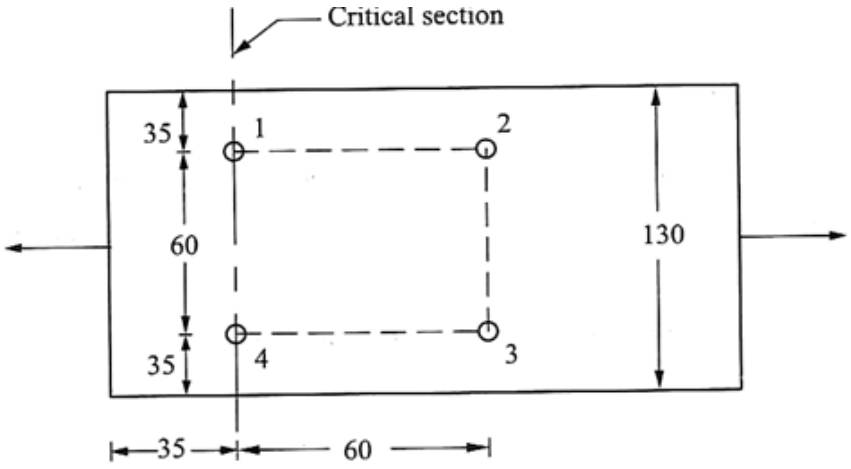
16. (a) Design a lap joint between the two plates each of width 120*mm*, if the thickness of one plate is 16*mm* and the other is 12*mm*. The joint has to transfer a design load of 160*kN*. The plates are of Fe410 grade. Use bearing type bolts. (16)



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) Determine the design tensile strength of the plate 200 *mm* x 12 *mm* with the holes for 16 *mm* diameter bolts as shown in figure. Steel used is of Fe415 grade quality. (16)



Or

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) Calculate the strength of a discontinuous strut of length 3.2*m*. The strut consist of two unequal angles ISA 100x75x8 *mm* (f_y = 250N/mm^2), with long legs connected and placed,

(i) On the opposite sides of Gusset plate

(ii) On the same side of the Gusset plate. (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. (b) Design a welded plate girder using Fe 415 steel for a span of 25 *m* to carry a load of 30 *kN/m*. (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) A column has to carry a load of 600 *kN*. Its effective height is 4.0 *m*. Design a built up solid wood column of deodar. (16)

Or

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