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

Question Paper Code: 41161

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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

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

6. 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

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. 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

10. 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

PART - B (5 x 2 = 10 Marks)

11. List any two common failure of riveted connection.

12. Define net sectional area.

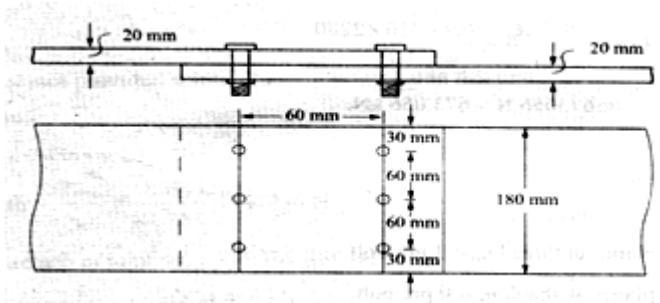
13. List out the failures modes of column sections.

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

15. What are all the permissible defects in structural timber?

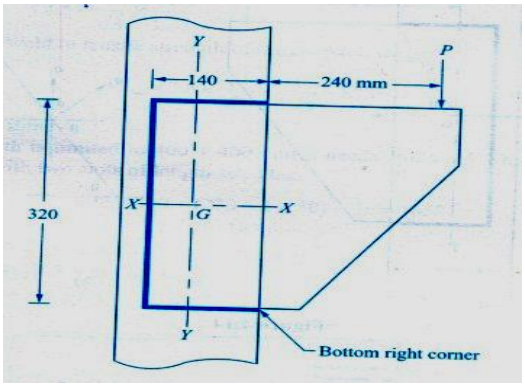
PART - C (5 x 16 = 80 Marks)

16. (a) Find the efficiency of the lap joint shown in below figure, Given: M20 bolts of grade 4.6 and Fe 410 (E 20) plates are used. (16)



Or

(b) Determine the maximum load that can be resisted by the brackets shown in below figure, by fillet weld of size 6*mm*, if it is shop welding. (16)



17. (a) Design a channel section to carry an axial tension of 300*kN*. 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) 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) A column section ISHB 350@661.2*N/m* carries an axial load of 1100*kN*. Design a suitable Gusset basing by using riveted connection. (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 = 3.015*m*, Axial load = 350*kN*. (16)

Or

(b) Calculate the safe central point load which can be supported by the Sal wood beam. Beam size 150x400*mm*, Timber = Sal, Bearing at each end = 300*mm*, Self weight of beam = 0.51*kN/m*, Location = inside, Effective span = 4.5*m*, Let central point load= W *kN*. (16)