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Question Paper Code: 46101

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. Ultimate tensile strength (f_{ub}) of grade 4.6 bolts is
 - (a) 200 MPa
 - (b) 410 MPa
 - (c) 400 MPa
 - (d) 415 MPa
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. 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 steel member which is upright is called
(a) Column (b) Strut (c) Column or strut (d) Beam column
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. 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)

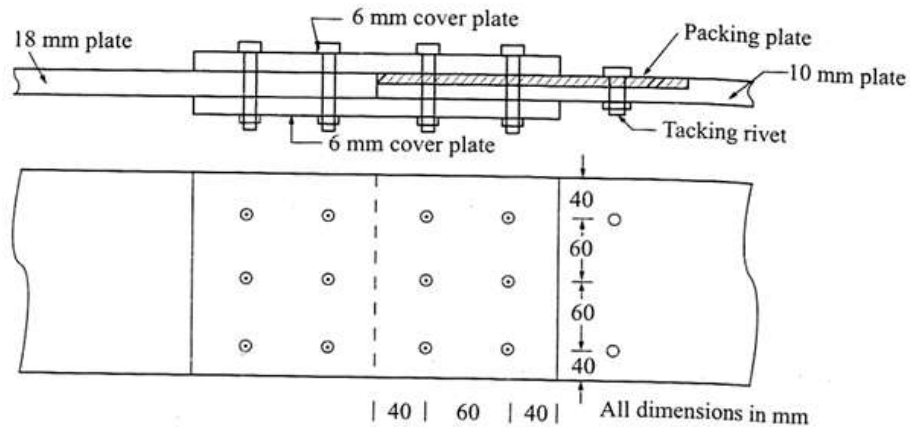
11. Distinguish between gauge distance and pitch distance?
12. Where do you use lug angles?
13. List out the failures modes of column sections.
14. Write short note on web buckling and web crippling.
15. List out the types of joints used in timber members.

PART - C (5 x 16 = 80 Marks)

16. (a) Design a double bolted double cover butt joint to transmit a pull of 250 kN connecting 2 plates of 12mm thickness. Take $f_y = 250\text{MPa}$. Find also the efficiency of the joint. (16)

Or

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



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

Or

- (b) Design a splice to connect a 300 x 20 mm plate with a 300 x 10 mm plate. The design load is 500 kN. Use 20 mm black bolts, fabricated in the shop. (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 5m effective span, carrying a uniform load of 20kN/m if the compression flange is laterally unsupported $f_y = 250\text{N/mm}^2$. (16)

Or

- (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)

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 spaced column of 3.5 m length, carries an axial load of 240 kN. Design completely the column using class A timber. Take $f_{cp} = 12$ N/mm² and $E = 12600$ N/mm². (16)