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Question Paper Code: 46101

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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)

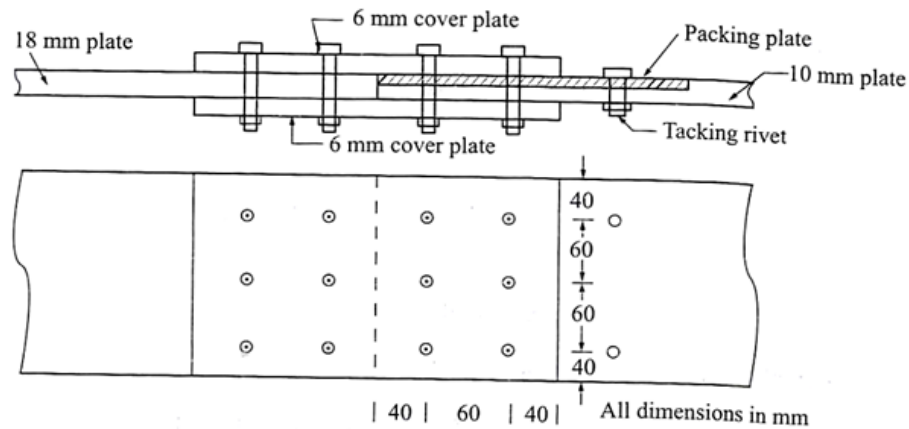
Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

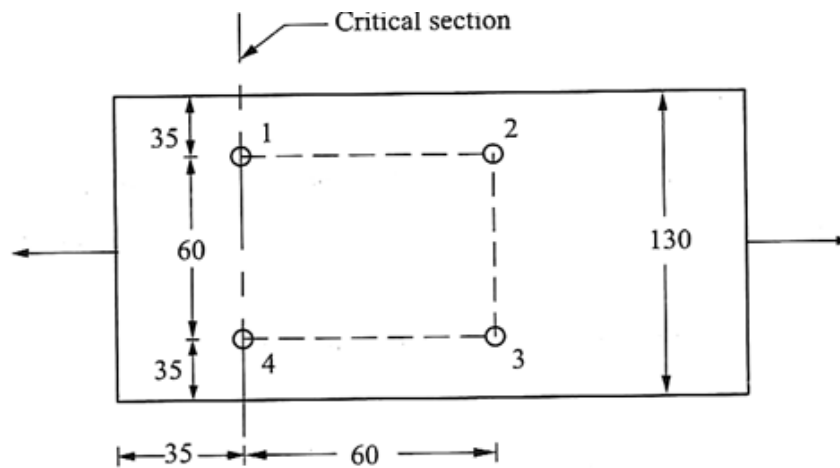
1. A fillet weld may be termed as
 - (a) miter weld
 - (b) concave weld
 - (c) convex weld
 - (d) none of these
2. If d is the distance between the flange angles, the vertical stiffeners in plate girders are spaced not greater than
 - (a) d
 - (b) $1.25 d$
 - (c) $1.5 d$
 - (d) $1.75 d$
3. If the unsupported 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



Or

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

17. (a) Determine the design tensile strength of the plate $200\text{ mm} \times 12\text{ mm}$ 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 200kN . 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 $100 \times 75 \times 8\text{ mm}$ ($f_y = 250\text{ N/mm}^2$), 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 $450\text{ mm} \times 20\text{ mm}$ 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 $150\text{ mm} \times 60\text{ mm}$ 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)