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Roll No. :

320651(20)

B. E. (Sixth Semester) Examination, Nov.-Dec. 2021
(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

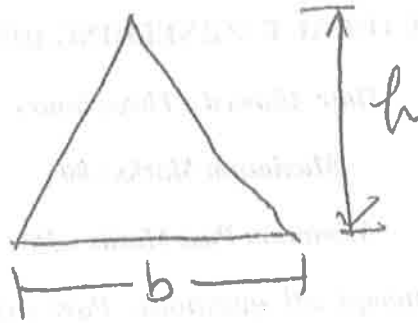
*Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any **one** part from (b) & (c) of each question. Use of IS 800:2007 and Steel Table is permitted. Use Fe410 grade steel unless otherwise mentioned.*

Unit-I

1. (a) Write physical and mechanical properties of structural steel. 2

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- (b) (i) Discuss advantages and disadvantages of steel as a structural member. 7
- (ii) Discuss various methods of design in steel structure. 7
- (c) Calculate the shape factor for a triangle of width b and height h . 14



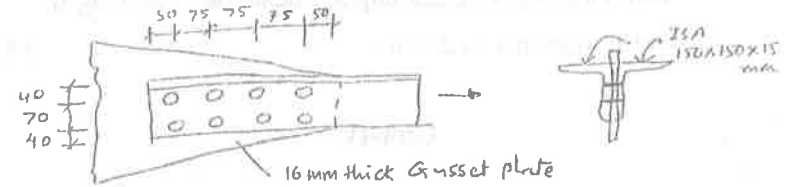
Unit-II

2. (a) Of the drilled and punched holes which one is preferred and why? 2
- (b) A double angle section ISA 150 × 150 × 15 mm is connected to 16 mm thick Gusset plate as shown in figure. Determine the service load the connection

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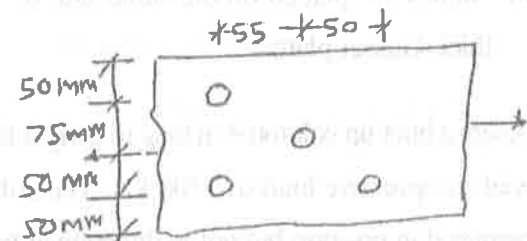
can carry on the basis of shear and bearing strength. The bolts are of grade 4.6 and of 24 mm in diameter. 14



- (c) An 150 mm × 115 mm × 12 mm angle section is to be connected to a 12 mm thick gusset plate at site. Design the fillet weld to carry a load equal to the strength of the member. 14

Unit-III

3. (a) Under what circumstances will block shear failure dominates? 2
- (b) Determine the effective net area of the plate as shown in figure. All holes are of 20 mm diameter. 14



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- (c) Design a tension member to carry a factored tensile load of 400 kN. Two angles placed back to back with long legs outstanding are desirable. The length of the member is 2.9 m. 14

Unit-IV

4. (a) Why are plastic or compact section preferred for compression members. 2
- (b) Design a double angle discontinuous strut to carry a factored load of 140 kN resulting from combination with wind load. The length of strut is 3.0 m between intersection. Two angles are placed back to back (with long legs connected) and are tack bolted. Use steel of grade Fe410.
- (i) Angles are placed on opposite sides of 10 mm thick gusset plates.
- (ii) Angles are placed on the same side of 10 mm thick Gusset plate. 14
- (c) Design a built up column 9 m long to carry a factored axial compressive load of 1200 kN. The column is restrained in position but not in direction at both the

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ends. Design the column with single lacing bolted connection. Use two channel sections back to back. Use steel of grade Fe410. 14

Unit-V

5. (a) Differentiate between the bending and buckling of the beam. 2
- (b) A simply supported steel Joist of 4.0 m effective span is laterally supported throughout. It carries a total uniformly distributed load of 40 kN (inclusive of self weight). Design an appropriate section using steel of grade Fe410. Check for deflection also. 14
- (c) Design a laterally unsupported beam for the following data effective span 4 m.

Effective span	4 m	
Maximum bending moment	550 kNm	
Maximum shear force	200 kN	
Steel of grade	Fe410	14