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Roll No. :

320651(20)

B. E. (Sixth Semester) Examination, April-May 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 IS 800-2007 and Steel Table is permitted.

Unit-I

1. (a) Give two advantages of steel as a structural design material. 2

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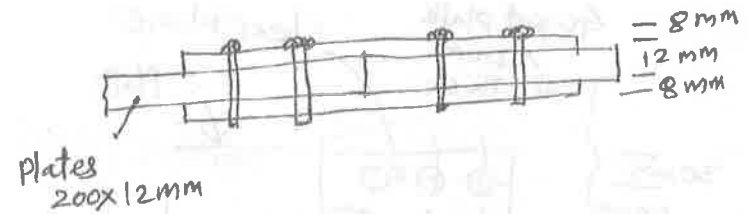
[2]

- (b) (i) State the physical and mechanical properties of steel as a structural material. 7
- (ii) Draw idealized stress-strain curve for mild steel. Discuss the effect of residual stresses. 7
- (c) (i) List out and explain in brief various types of loads to be considered in the design of steel structure. 7
- (ii) Find the shape factor for a diamond section with the unequal diagonals, the shorter being b and longer being h , the shorter diagonal placed parallel to the z -axis. 7

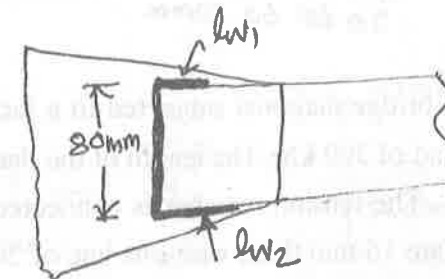
Unit-II

2. (a) Give two disadvantages of welded connection to bolted connection. 2
- (b) Two plates of $200 \text{ m} \times 12 \text{ mm}$ are to be connected by a double cover butt joint with 20 mm diameter bolts as shown in fig. The factored tensile force on the plates is 500 kN. Design the bolted connection. The bolts are arrange to give the maximum efficiency. 14

[3]



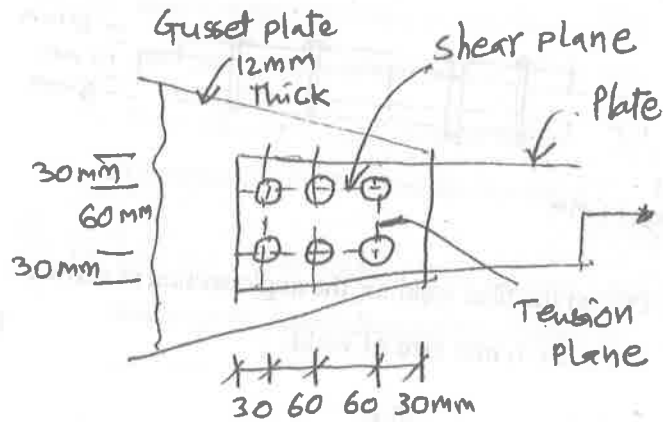
- (c) Design the fillet weld for the angle section as shown in fig use 6 mm size of weld. 14



Unit-III

3. (a) Explain block shear failure. 2
- (b) Determine the design tensile strength of the plate $120 \text{ mm} \times 8 \text{ mm}$ connected to a 12 mm thick Gusset plate with bolt holes as shown in fig. The diameter of bolt is 16 mm and 4.6 grade. Use Fe 410 steel. 14

[4]



- (c) Design a bridge diagonal subjected to a factored tensile load of 300 kN. The length of the diagonal is 3.0 m. The tension member is connected to a gusset plate 16 mm thick with one line of 20 mm diameter bolt of grade 8.8.

14

Unit-IV

4. (a) Why are plastic or compact section preferred for compression member.

2

- (b) For a column section built up of shape as shown in figure determine the axial load capacity in compression for the data indicated against the figure.

14

$$f_y = 250 \text{ MPa}$$

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[5]

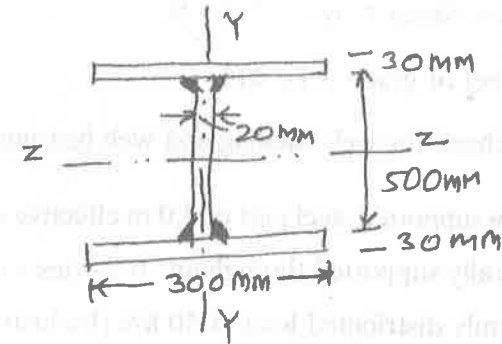
$$L = 6.0 \text{ m}$$

$$t_w = 20 \text{ mm}$$

$$t_f = 30 \text{ mm}$$

$$r_{mf} = 1.50$$

End condition : Both end restrained in direction and position.



- (c) Design a double angle discontinuous strut to carry a factored load of 135 kN, resulting from combination with wind load. The length of the strut is 3.0 m between intersections. The two angles are placed to back (with long legs connected) and are track bolted. Angles are placed on opposite side of 12 mm gusset plate; Use steel of grade Fe-410.

14

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Unit-V

5. (a) Differentiate between bending and buckling. 2
- (b) Design a laterally unsupported beam for the following
datas : 14
- (i) Effective span = 4 m
 - (ii) Max Bending Moment = 550 kN-m
 - (iii) Max Shear Force = 200 kN,
 - (iv) Steel of grade is Fe 410.
- Also check for web bucking and web bearing.
- (c) Simply supported steel joist of 4.0 m effective span
is laterally supported throughout. If carries a total
uniformly distributed load of 40 kN (Inclusive of
self weight). Design an appropriate section using
steel of grade Fe-410. Check for deflection and
web bearing is also required. 14