Total No. of printed pages = 4

DESIGN OF STEEL STRUCTURE

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer all questions.

Use of I.S. code and Steel table permitted.

1. Find the efficiencies of the following riveted joints :

    (i) Single riveted lap joint for 8 mm plates with 16 mm diamter rivets at a pitch of 50 mm c/c.

    (ii) Double riveted lap joint for 8 mm plates with 16 mm diameter rivets at a pitch of 75 mm c/c.

[Turn over

Assume,

$$f_s = 100 \text{ N/mm}^2 \; ;$$

$$f_b = 300 \text{ N/mm}^2 ;$$

$$f_t = 150 \text{ N/mm}^2.$$ 10+10=20

2. Design a ecentric riveted bracket connection to the following requirement :

Load transferred to each bracket plate = 120 kN

Number of vertical rows of rivets = 2

Distance between the rivets = 120 mm

Spacing of rivets in each vertical rows = 100 mm
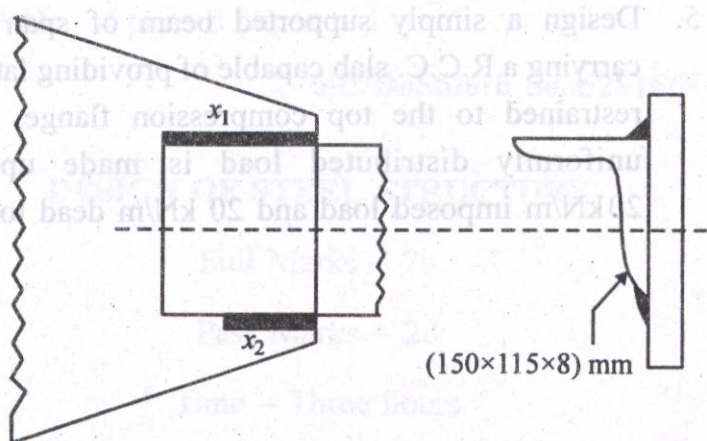
Ecentricity of load = 250 mm

Diameter of rivets = 20 mm

Thickness of the bracket plate = 10 mm.

Assume any missing data.   10

3. A 150 mm × 115 mm × 8 mm angle carrying a tensile load of 200 kN is to be connected to a gusset plate by 6 mm fillet welds at the extremities of longer legs as shown in the figure below.

x_1

x_2

(150×115×8) mm

Design the joint allowing a shear stress of 110 N/mm² in the welds. **10**

4. Find the strength of the 12 mm thick plate as shown in the figure below. All roles are 21.5 mm diameter. Take tensile stress as 150 N/mm². **10**

30 mm

50 mm

50 mm

50 mm

30 mm

→|40→|←40→|
|mm | mm|
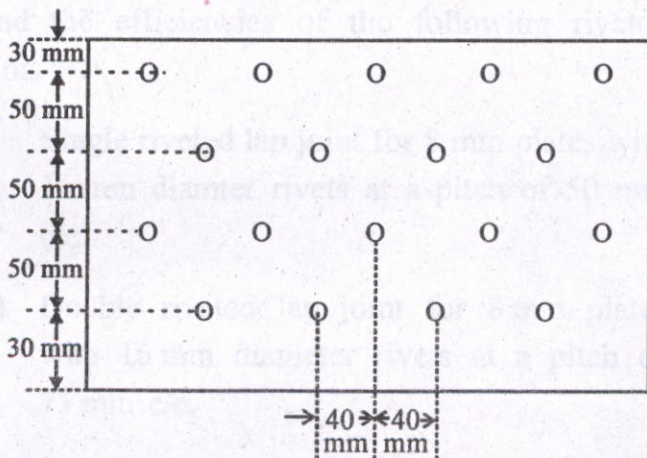
5. Design a simply supported beam of span 4m carrying a R.C.C. slab capable of providing lateral restrained to the top compression flange. The uniformly distributed load is made up of 20 kN/m imposed load and 20 kN/m dead load.

20