Total number of printed pages:02 **DEGREE/7TH/UCE 702**

2023

DESIGN OF STRUCTURES-II

Full Marks: 100

Time: Three hours

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

Assume suitably for any missing data

*Answer **any five** questions.*

1. a) What are the advantages of steel as structural material? 08

   b) Explain the different types of failure of bolt joints 06

   c) Define the following: (a) Slenderness ratio (b) Ductility (c) Web crippling 06

2. a) Define the following: (i) Pitch and (ii) Gauge 04

   b) Design a bolted connection for a lap joint between plates of size 120 x 16 mm and 120 x 10 mm to transmit a factored load of 120 kN using single row of bolts of grade 4.6 and grade 410 plate. 16

3. a) Determine the strength of weld as shown in figure-1 to connect two plates with cross-section 100x8 mm and 100x10 mm. The ultimate strength of plates, f_u = 410 MPa. 07

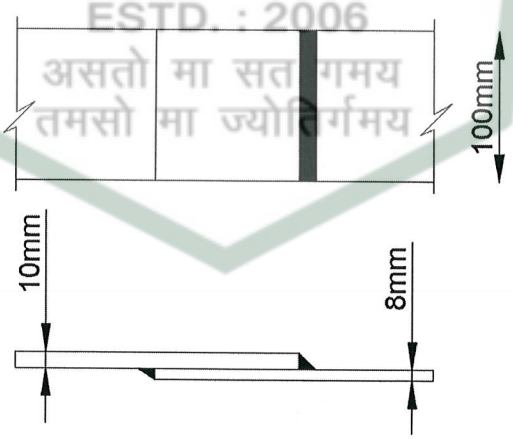

Figure-1`

   b) Two plates of 70 x 12 mm and 130 x 12 mm connected with lap joint as shown in figure-2 to mobilize the tensile strength of the plate using fillet welding in workshop. Design the longitudinal fillet weld. 13

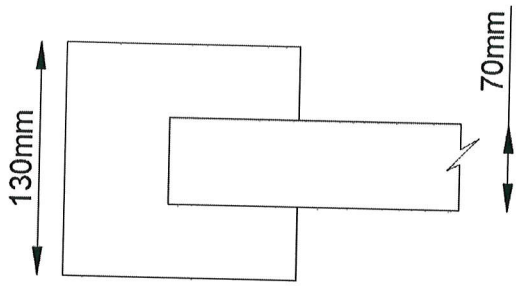

Figure-2

4. a) What are the various modes of failure of tension member? 06

b) Design a tie member of roof truss subjected to working loads 75 kN (Dead Load) and 100 kN (Live Load). Use double angle section connected back-to-back on either side of gussets of 10mm thick. Take 14

5. a) Explain, the failure modes of an axially loaded column. 08

b) Design a column 3.5 m long in a building subjected to a factored load of 600 kN. Both the ends of the column are effectively restrained in direction and position. Use steel of grade 410. 12

6. A room measuring 5m x 8m consists of 15 cm thick RCC slab supported on steel beams as shown in figure-3 below at 2m c/c. The floor finishing load may be considered as 0.75 kN/m^2 and live load as 2.0 kN/m^2. Design the intermediate steel beam. Assume f_y=250 MPa and bearing as 230mm. 20

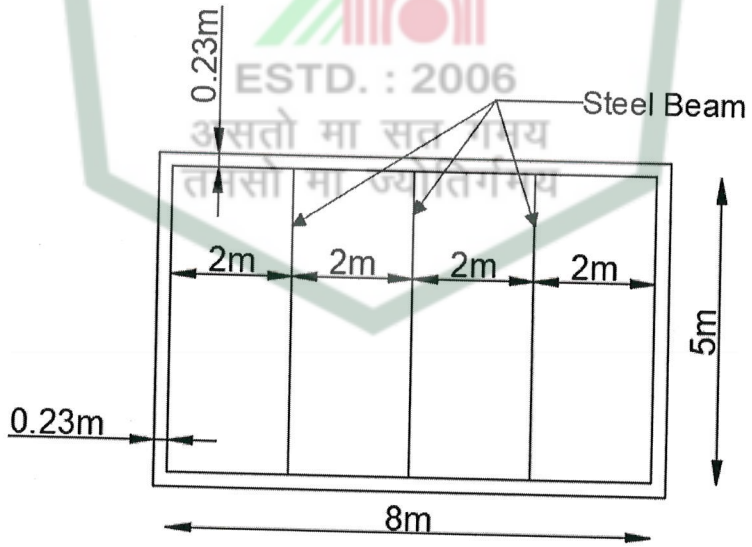

Figure - 3