

**END-SEM EXAM 2024**

**DOS-II**

Full Marks: 100

Time: Three hours

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

*Answer any five questions.*

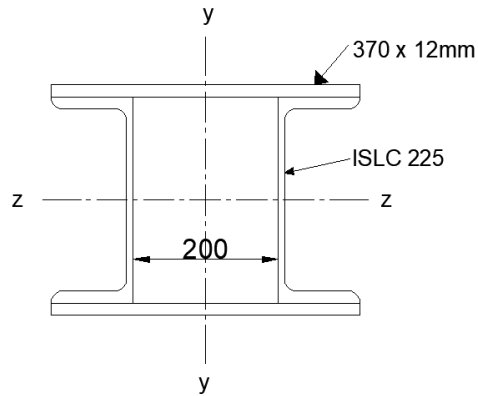
*Use of IS 800-2007 and Steel tables are allowed.*

1. (a) What is the difference between working stress method of design and limit state method of design? **06**
- (b) Design a bolted connection for a lap joint between two plates of 20mm and 12mm thicknesses so as to transmit a factored load of 75 kN using M16 bolts of grade 4.6 and grade 410 plates. **14**
2. (a) Explain the various types of weld joints. **10**
- (b) A tie member of a truss consisting of an angle section ISA 65 x 65 x 6 mm of Fe 410 grade is welded to a 10mm thick gusset plate. Design a weld to transmit a factored load of 200kN. **10**
3. An ISLB 200 is used as a diagonal in a foot bridge truss. Factored axial tensile load 450kN. Both flanges are connected to two gusset plates by 16 numbers of bolts of 16mm diameter symmetrically arranged as shown in figure 1. Determine the maximum tension it can carry. Take  $f_y = 250 \text{ N/mm}^2$ ,  $f_u = 410 \text{ N/mm}^2$ ,  $p = 60\text{mm}$  and  $e = 40\text{mm}$ . **20**



**Figure – 1**

4. (a) Explain the different modes of failure of columns. **08**
- (b) The built-up column shown in figure-2 has an effective length of 5 m. Find the design compressive load for the column. Take  $f_y = 250 \text{ N/mm}^2$  and  $E = 2 \times 10^5 \text{ N/mm}^2$ . **12**



**Figure-2**

5. (a) What are continuous and discontinuous struts? **04**
- (b) A single angle discontinuous member ISA 110 x 110 x 10 mm with single bolted connection in 3.0 m long. Calculate the safe load carrying capacity of the section. If it is connected by one bolt at each end and **16**
  - (a) if both ends fixed
  - (b) if both ends hinged.
6. (a) Explain the failure modes in beam due to: **06**
  - (i) Excessive bending,
  - (ii) Load buckling and
  - (iii) Lateral torsional buckling.
- (b) Calculate the load carrying capacity of laterally restrained simply supported beam with ISMB 450 @ 72.4 kg/m section for an effective span of 4m. **14**

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 ESTD. : 2006  
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