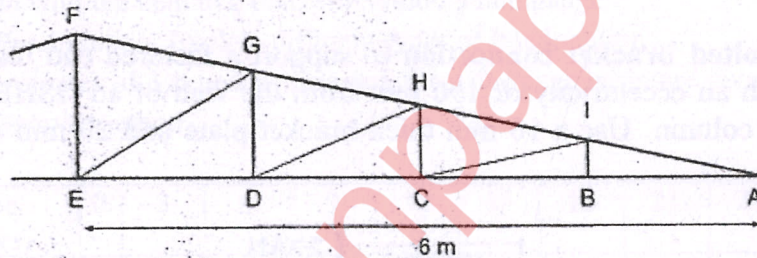


- N.B. 1. Question No. 01 is compulsory.
Attempt any three out of the remaining four questions.
2. Draw neat and proportionate sketches where necessary.
 3. Use of IS 800 and steel tables is permitted.
 4. Assume suitable data if necessary and justify your assumptions.
 5. Use steel of grade Fe410 and bolts of grade 4.6.

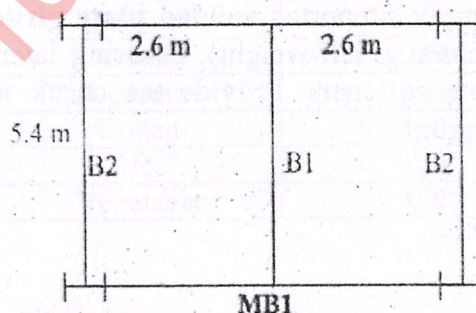


- Q.1 a 1) Find the panel point load for a given roof truss for DL, LL, and WL. 12
Considering the truss to be constructed in the industrial area of Mumbai.
The angle at joint A is 20° . Height of column is $= 13.9$ m
- Assume $K_1 = 1.0$, $K_2 = 0.99$, $K_3 = 1.0$, and $(C_{pe} - C_{pi}) = -0.45$,
- Spacing between trusses - 3.0 m; the span of truss - 12.0 m
- wt of GI sheets - 190 N/m^2
- Self-weight of Purlin - 220 N/m
- 2) design members AB, AI, and BI. 20
- Use ISA sections, Draw structural details of the design.



OR

- Q.1 b Design laterally supported beams B1 and MB1 using suitable I sections and 32
beam-to-beam connections. The floor plan is provided. Assume the top flange of the beam is embedded in the slab.
Design the flooring system with the following data,
- Slab thickness: 140 mm
- Wall thickness: 210 mm
- Wall height over beams: $1:1$ m
- Unit weight: Concrete - 25 kN/m^3 , Brick Wall - 20 kN/m^3
- All beams are laterally restrained
- All columns are ISHB 400 @ 759.3 N/m

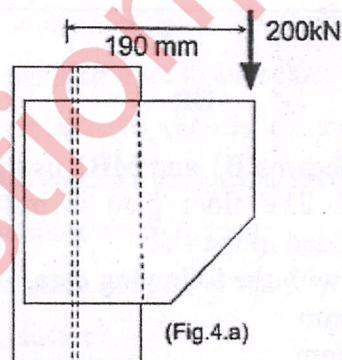


- | | |
|----------------------|---------|
| Load Calculations - | 4 marks |
| Design of Beam B1 - | 8 marks |
| Design of Beam MB1 - | 8 marks |
| Connection Design - | 4 marks |
| Drawing on sheet - | 8 marks |

Q P code
80769

Prog code
1T00636

- Q.2 a) **Design a built-up column** arranged face-to-face using two ISMC channel sections to support a factored axial load of 1435 kN. The effective length of the column is 3.7 meters. Design a bolted laced connection, perform all necessary checks, and draw an appropriate diagram.
(Design of column 08 marks; detailed drawing - 02 marks) 10
- b) **Design a slab base** for a column with ISHB 200 @ 392.4 N/m that carries a factored load of 850 kN. The column is resting on M20 grade concrete. 06
- Q.3 a) **Determine the size and thickness of a gusseted base** for a column with ISHB 200 @ 392.4 N/m that carries a factored load of 1250 kN. Use M20 concrete. also determine the number of bolts required for the connection.
(Design of gusset base 08 marks; detailed drawing - 02 marks) 10
- b) **Determine the capacity** of column section ISHB 200 @ 392.4 N/m, if the column is 7.7 m high and effectively held in position and direction at both the ends. 06
- Q.4 a) **Design a bolted bracket connection** to support a factored end reaction of 200 kN with an eccentricity of 190 mm from the web of an ISHB 200 @ 392.4 N/m column. Use a 10 mm thick bracket plate and 20 mm diameter bolts. 08



- b) **Calculate the design bending strength (M_d) and the safe uniformly distributed load (UDL)** for a laterally unsupported ISLB 300 @ 369.7 N/m beam with a span of 2.8 m, Use IS code table number - 13(a) and 14. 08
- Q.5 **Design the cross-section for a 22 m simply supported welded plate girder** subjected to a UDL of 50 kN/m (excluding self-weight), ensuring lateral support throughout and no intermediate stiffeners. Provide the check for shear buckling, and design bending strength. 16

END...