

[Time: 4 Hours]

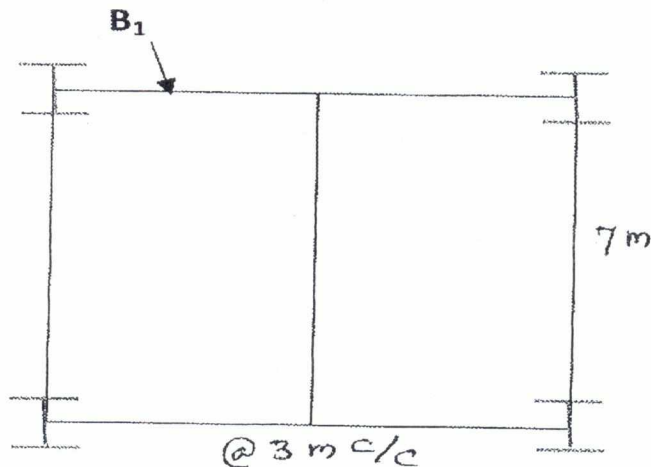
[Marks:100]

Please check whether you have got the right question paper.

- N.B:
1. Question No 1 is compulsory.
 2. Solve any four questions from remaining six questions.
 3. Assume suitable data if required but justify same.
 4. Use of IS 800 and steel table is permitted in the Examination hall.
 5. Figures to the right indicate full marks.

Q.1 Figure shows the typical framing plan of a steel building. Design beam B1 as laterally supported. **20**
Use following data for the design.

- a) All beams support a brick wall of 200mm thick and 3.6 m high having unit weight 20 kN/m²
- b) Thickness of RCC slab is 200mm and top flange is embedded in concrete. Unit weight of Concrete is 25 kN/m³
- c) Live load on slab is 4 kN/m² and floor finish 1 kN/m²



Q.2 Design a column with two channels placed back to back to carry an axial factored load of 1800kN. **20**
If the effective length of the column is 6 meter, design also battens system with 20 mm Ø 4.6 class bolt. Draw neat sketches.

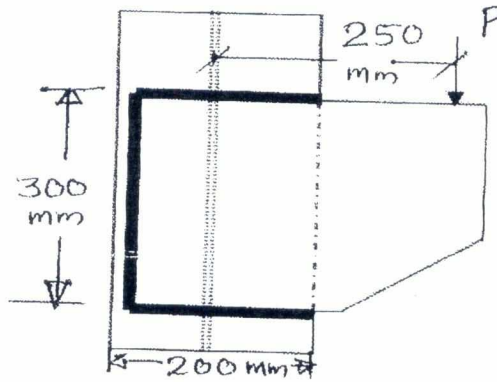
Q.3

- a) Determine the size of solid base plate for a column consisting of an ISHB 400 with cover plate 400mm x 20mm at each plate. The column carries an axial load of 1200 kN. **08**
- b) Referring to the data given in Q.3(a) above, design a gusseted base for the column. Also design the bolted connection using 20mm Ø 4.6 class bolt. Assuming safe bearing pressure on concrete as $0.6f_{ck}$ grade of concrete is M15. Also design a concrete pedestal, if safe bearing capacity of soil is 200 kN/m². **12**

Q.4

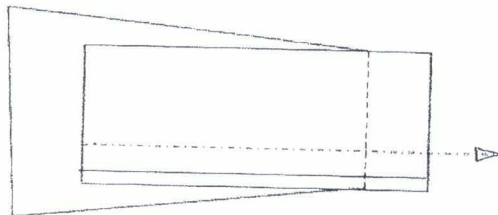
- a) Determine the moment of resistance of laterally unsupported beam ISMB350 of effective span 3.8 m. **10**
- b) Determine compressive strength of member of roof truss consisting of ISA 75x75x8 **10** connected at each end with 10mm thick gusset plate by means of 2- 16 mm dia 4.6 grade bolts at each end. The centre to centre length of member is 2.0 meter.

- Q.5 a) A bracket Plate 10mm thick is welded to flange of column by 8mm filled weld as shown in fig below Find the safe load on the bracket 10



- b) A ISLB350 beam has a factored end reaction of 100 kN . It is connected to the flange of a column ISHB300. Design an unstiffened seat connection. Use 4.6 grade bolts and steel grade Fe410. 10

- Q.6 a) State the step by step procedure to design a purlin in a roof truss. 07
 b) A single unequal angle ISA100x75x8 is connected to a 10mm thick gusset plate at the ends with 4 No. of 16mm dia. bolts to transfer tension as shown in fig. Determine the design tensile strength of the angle assuming that the yield and the ultimate stress of steel used are 250Mpa and 410Mpa if the gusset is connected to the 100mm leg .Use P=60 mm and e= 40 13



- Q.7 a) Discuss the concept of block shear failure in tension member. 05
 b) Explain the terms: web buckling & web crippling in beams. Give neat sketches. 05
 c) Derive the expression for BM developed in a battened column due to transverse shear. 05
 d) What is a fillet weld? How do you decide its size? Sketch the cross section a fillet weld indicating all the important parameters. 05
 e) Discuss the concept of block shear failure in tension member. 05