

QP Code : 1852

(4 Hours)

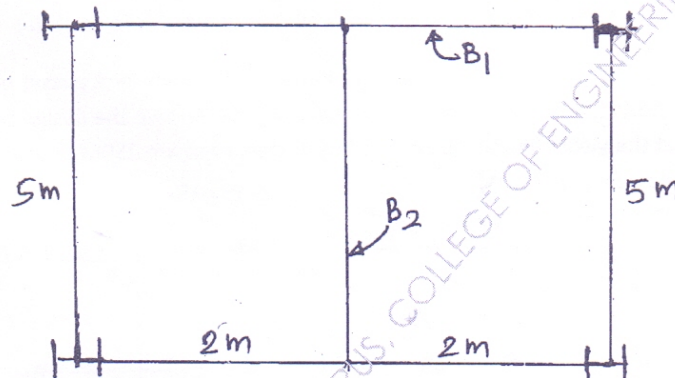
[Total Marks : 100]

- 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. No. 1 Figure shows the typical framing plan of steel building. Design beam B1 as laterally supported. Use following data for the design.

- a) All beams support a brick wall of 200mm thick and 3.5 m high having unit weight 19 kN/m^2
 b) Thickness of RCC slab is 200mm and top flange is embedded in concrete. Unit weight of Concrete is 25 kN/m^3
 c) Live load on slab is 3 kN/m^2 and floor finish 1 kN/m^2

(20)



Q. No.2 a) Determine the size of solid base plate for a column consisting of an ISHB 400 with cover plate $400\text{mm} \times 20\text{mm}$ at each plate. The column carries an axial load of 1300 kN. (08)

b) Referring to the data given in Q.2(a) above, design a gusseted base for the column. Also design the bolted connection using $20\text{mm } \phi 4.6$ 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 kNm^2 . (12)

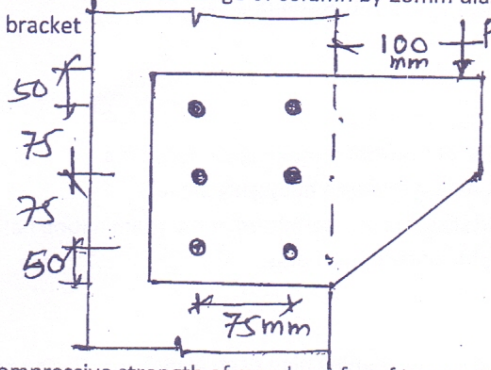
Q.No.3 Design a column with two channels placed back to back to carry an axial factored load of 1650 kN. If effective length of the column is 6.1 meter, design also single lacing system with $20 \text{ mm } \phi 4.6$ class bolt. Draw neat sketches to show details of the connections. (20)

Q. No. 4 a) Determine the moment of resistance of laterally unsupported beam ISMB350 of effective span 4.5m. (10)

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QP-Con. 7444-15.

- a) A bracket Plate 10mm thick is bolted to flange of column by 20mm dia. bolts as shown in fig below. Find the safe load on the bracket (10)

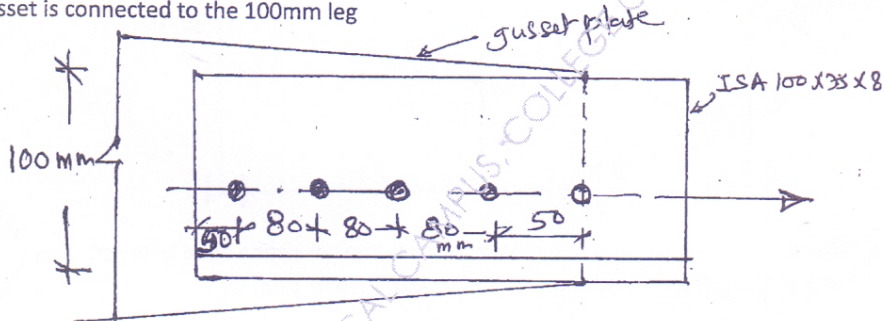


- Q. No. 5 (a) Determine compressive strength of member of roof truss consisting of ISA 65x65x8 connected at each end with 10mm thick gusset plate by means of 2- 16 mm dia 4.6 grade bolts at each end. The centre to centre length of member is 2.5 meter. (10)

- b) A ISLB350 beam has a factored end reaction of 120 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.No. 6 a) Write step by step procedure to design wind load as per IS 875 (part III) (07)

- b) A single unequal angle ISA100x75x8 is connected to a 10mm thick gusset plate at the ends with 5No. of 20mm 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 (13)



- Q.No. 7 (a) What do you mean by laterally restrained beam? What is its advantage? (5)

- (b) Design an channel section purlin for the following data (10)

Wind pressure $- 1.2 \text{ kN/m}^2$ on each slope
 GI sheet of self weight 0.13 kN/m^2 for the roof covering
 Spacing of truss is 3.5 m c/c , spacing of purlins is 1.3 m c/c
 Self wt. of purlin is 100 N/m^2 , $\theta = 30^\circ$, Live load is 400 N/m^2

- c) State the step by step procedure to design a purlin in a roof truss. (05)