T.E. Civil VI CBGS

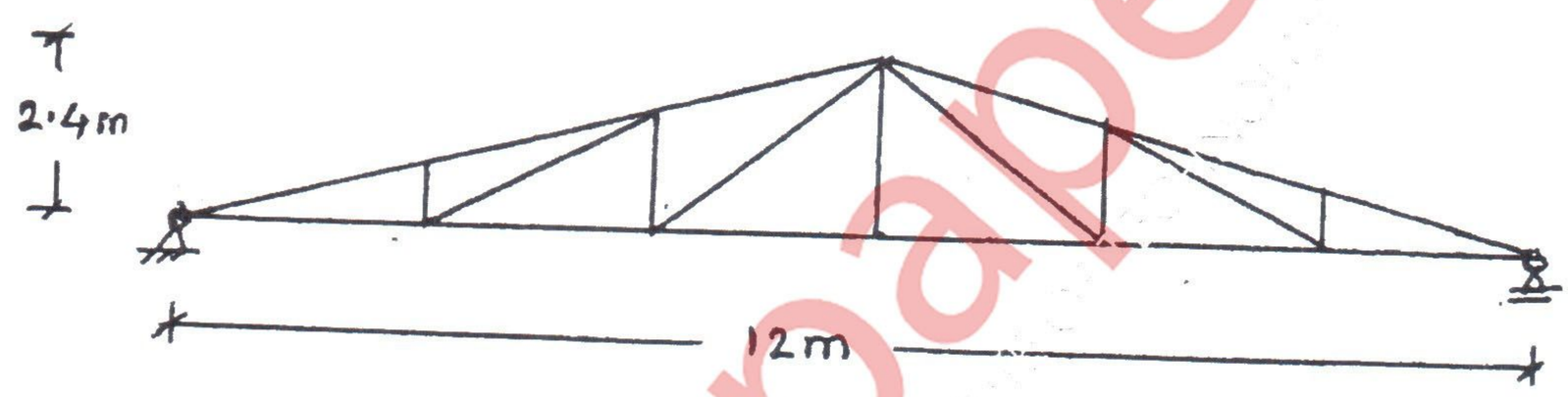
16.5.16

Q.P. Code : 577401

(4 Hours) (Total Mark- 80

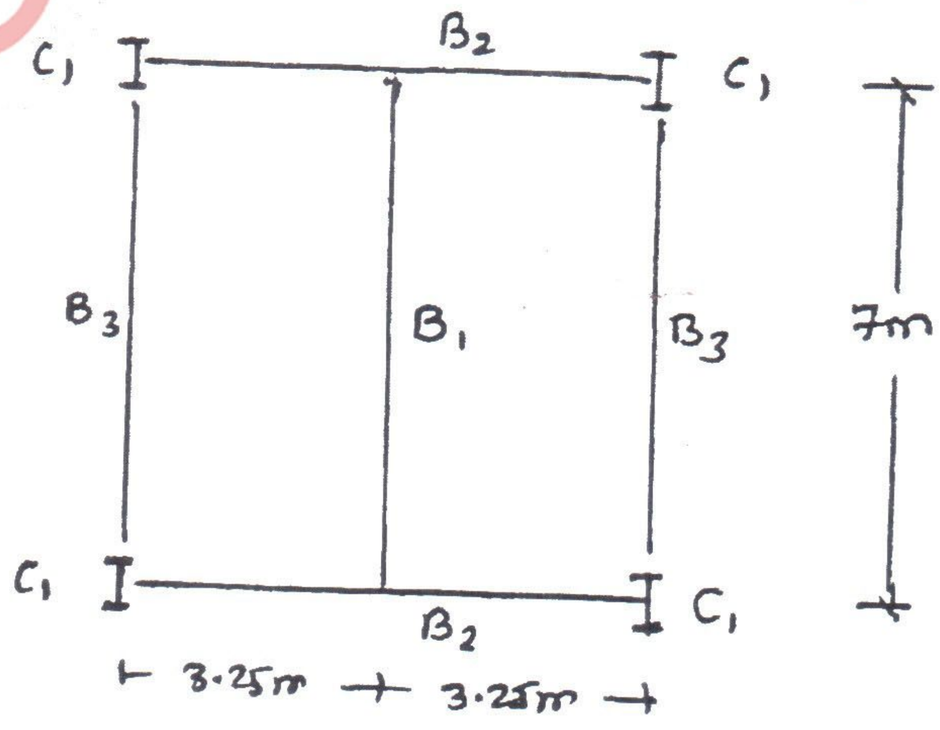
N.B.- (1) Question No.1 **is compulsory.**
(2) Attempt **any three** out of remaining **four** questions.
(3) Assume **suitable data** wherever necessary. Use steel grade Fe 410.
(4) Use of IS-800, IS-875 and steel table **is permitted** during examination.

1 Design the typical principal rafter, main tie and an intermediate strut for the steel roof truss shown in figure. Use following data- (32)
Centre to centre spacing of trusses= 4 m.
Total dead load on a truss 400 N per m^2 of plan area. Live load as per IS 875
Wind load = 1100 N/m^2 (Suction & normal to both slopes)



OR

1 Figure shows the typical floor plan of a steel building. Design the beams 'B_1' and 'B_2'. Top flanges of all the beams are at the same level and embedded in concrete of 150 mm RCC slab. Also design the connection between these two beams using bolts of grade 4.6. Use following data- (32)
Imposed load = 3 KN/m^2. Floor finish load = 1.5 KN/m^2.
All beams support 150 mm thick brick wall, 3.5 m in height. (Unit wt. 20 N/m^3)



Turn Over

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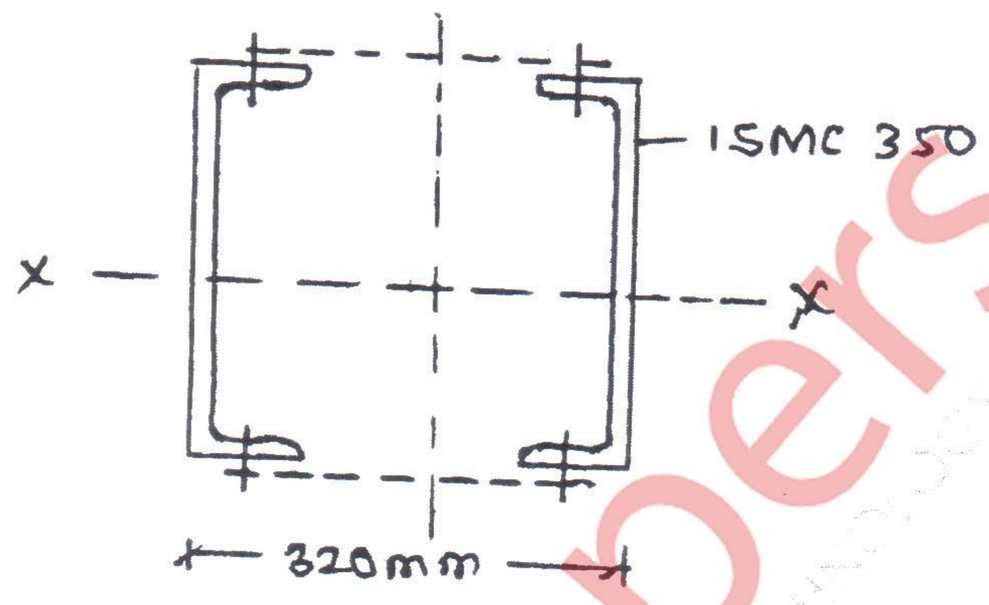
2 Figure shows the plan of a built up battened column consists of 2 ISMC 350 spaced 320 mm apart as shown. The length of column is 8 m. it is effectively held in position at both ends but restrained against rotation at one end only. Find the limiting load capacity (axial) of the column. Also design the end batten & intermediate batten including their connections using black bolts of suitable size. Draw neat sketches i.e. plan & elevation. (16)



3 A built up column consists of an ISHB 450 @ 87.2 Kg/m along with a cover plate of 400 mm x 20 mm, attached to each flange using black bolts of suitable size. The length of column is 5 m having both ends effectively held in position and also restrained against rotation. Calculate the limiting load capacity (axial) of this column. Also design the suitable column base and its connection. The column is made to rest on a pedestal of concrete (grade M20. Draw neat sketches to show maximum structural details. Design of concrete pedestal is not required. (16)

4(a) A beam ISMB 350 is laterally unsupported over an effective span of 3.6 m. Carry out section classification and hence find the design moment capacity of the beam Use tables of IS 800 to find required stresses. (8)

4 (b) A beam ISMB 450 transmits an end reaction of 250 KN (factored) to the flange of a column ISHB 250@ 51 Kg/m. Design welded stiffened seat connection between these components. Use shop weld. (8)

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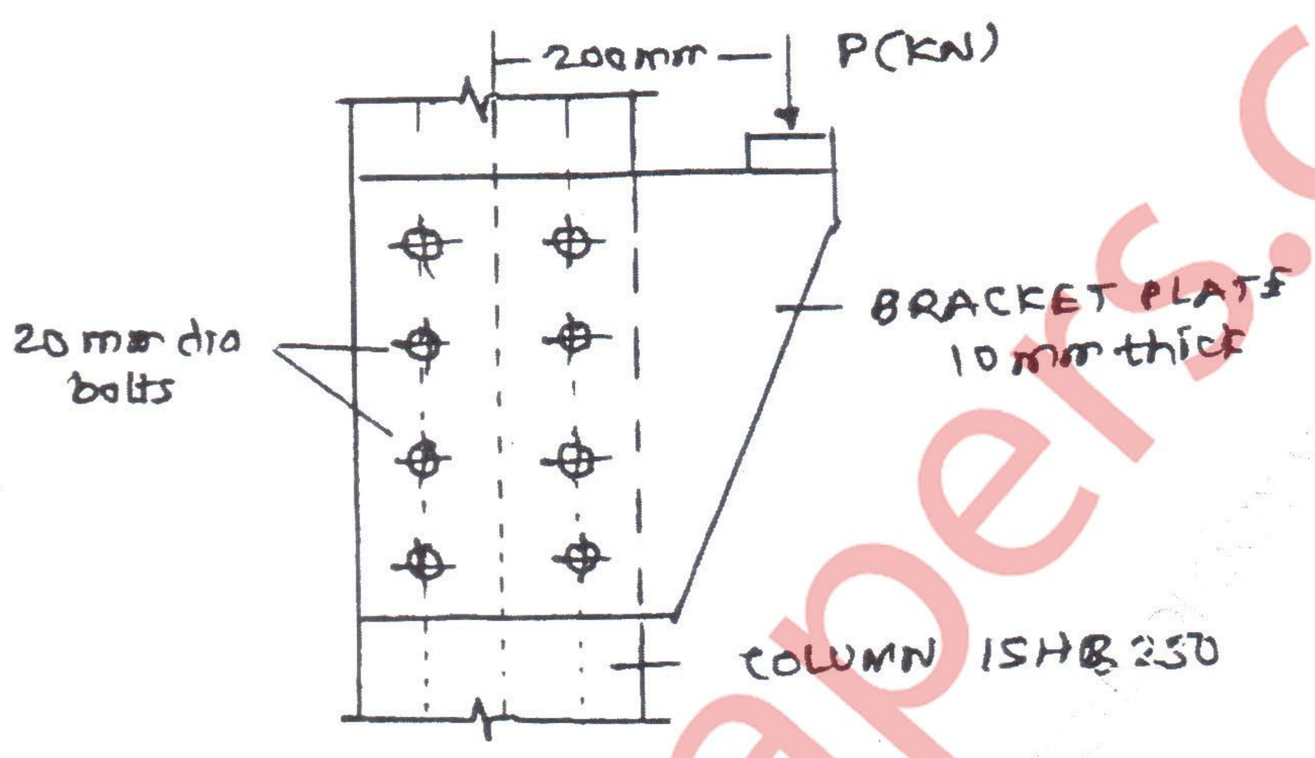
4 (b) A 10 mm thick bracket plate is connected to the flange of a column ISHB 250 @ 54.7 Kg/m using 8 bolts of 20 mm diameter of grade 4.6 as shown in figure. Assume pitch of bolt = 60 mm & end distance = 35 mm. Find the safe load 'P' at an eccentricity = 200 mm, the bracket can transfer. (8)



5 A welded plate girder of span 25 m is laterally supported throughout and required to carry superimposed udl 100 KN/m over the entire span. The girder will not have intermediate transverse stiffeners. Design the most economical section. Provide suitable curtailment of flange plates if necessary. Also design the weld connection between web & flange plate. (16)