COLLEGE OF ENGINEERING PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(CE-09001) Design of Steel Structures

Course: B. Tech Branch: Civil Engineering

Semester: V

Year: 2014-2015 Max.Marks:60

Duration: 3 Hours Time:- 2.00pm to 5.00 pm **Date:1st December 2014**

Instructions: **MIS No.** | | | | | | | | | | |

1. Figures to the right indicate full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data wherever required and state it clearly.
6. Write your MIS Number on Question Paper
7. Use of IS 800: 2007; IS 808 and Steel table is permitted.
8. For all problems, use steel with fy = 250 MPa and fu= 410 MPa

Q.1 A built up laced column consists of two channels ISMC 300 placed back to back with clear distance of 150 mm. The height of the column is 5 m. Assuming that both ends of the column as hinged, determine the load carrying capacity of the column. Also:

i) Deign lacing system for the column.

ii) Design the slab base for the above column. Allowable bearing pressure for concrete is 4 MPa. Bearing capacity of soil is 250 kN/m^2.

iii) Draw neat elevation and plan of the column with lacing and slab base showing design details. (20)

Q.2 Design a simply supported welded plate girder of span 25 m subjected to a factored uniformly distributed load of 80 kN / m (excluding self weight), acting over the entire span. The girder also supports four factored point loads, 300 kN each, placed at every 5m interval from the left support. The compression flange is laterally supported

throughout and the ends are restrained against torsion, warping is not restrained in both flanges.

i) Design the plate girder section.

ii) Deign the intermediate stiffeners

iii) Design the Load bearing stiffeners

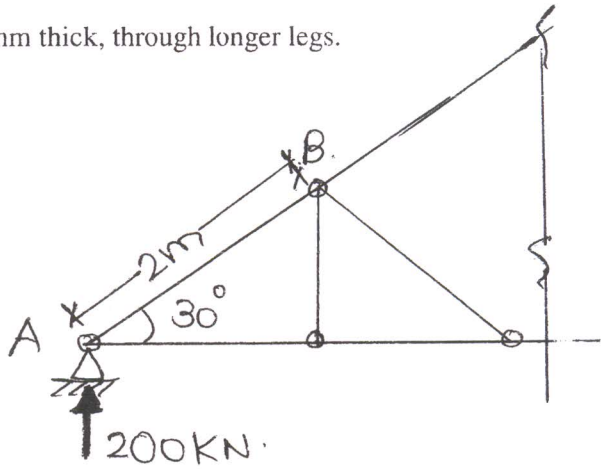
iv) Design curtailment of flange plates.

v) Design the connections.

vi) Draw neat sketches showing the design details. (20)

Q.3 A simply supported beam having 6 m effective span is loaded by a uniformly distributed load of '*w*' over the entire span. The beam section is ISMB 500. Find the safe load '*w*', the beam can carry, when the compression flange of the beam is laterally unsupported. Each end of the beam is restrained against torsion. (10)

Q.4 The figure shows line diagram of part of a roof truss. The factored reaction at end **A** is 200 kN, as shown. The member 'AB' of the truss is 2m long and is to be made of two unequal angles, placed back to back. The angles are to be connected to both sides of a gusset plate 8 mm thick, through longer legs.



i) Design member AB. Find the number of M20 bolts required for the connection

ii) Calculate capacity of member 'AB' in tension, if reversal of stress takes place, to avoid failure due to (i) yielding of gross section and due to (ii) rupture of critical section. (10)