Total No. of Questions : 5] [Total No. of Printed Pages : 4

Roll No. .....

CE–605

B. E. (Sixth Semester) EXAMINATION, June, 2009

(Civil Engg. Branch)

STRUCTURAL DESIGN AND DRAWING – II

(Steel)

(CE – 605)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Solve all the *five* questions. Assume suitable value for missing data, if any. Use of IS : 800, other relevant codes and steel table is permitted.

1. (a) Describe the advantages and disadvantages of bolted connections. 6

   (b) The diagonal of a bridge truss is made of 16 mm thick flat and has to transmit a pull of 600 kN. The diagonal is to be connected to 16 mm thick gusset plate by a double cover butt joint with 20 mm rivets. 14

   Calculate the number of rivets and width of flat required. Take permissible stresses as follows :

   σ_{at} = 150 MPa; τ_{rf} = 100 MPa and σ_{pf} = 300 MPa.

   Sketch the joint and calculate the efficiency of the joint. Also determine :

   (i) the actual stresses induced in the flat and the rivets.

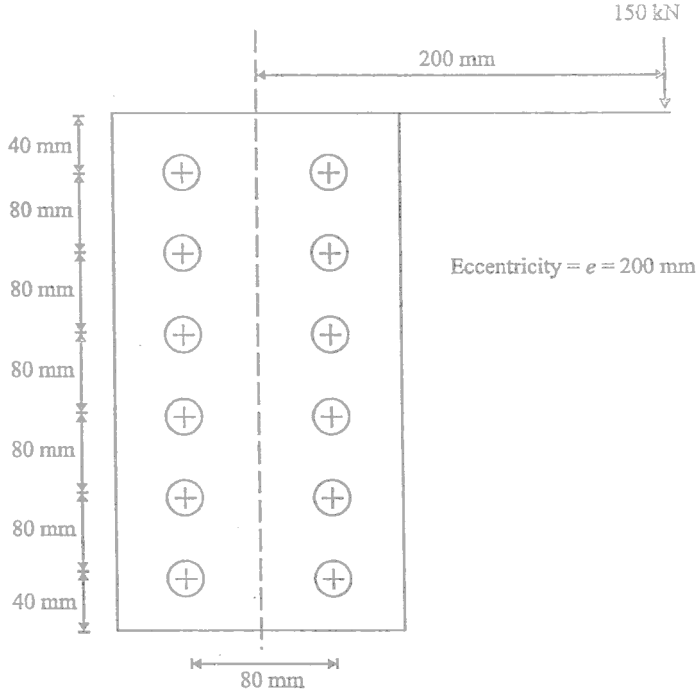
   (ii) thickness of cover plates.

P. T. O.

Or

(a) A tie bar consisting of a single angle 60 mm × 60 mm × 10 mm is to be welded to a gusset plate. The tie bar carries a load of 160 kN along its centroidal axis. Design the joint if both the side fillets and end fillets are to be provided. 10

(b) A load of 150 kN is carried by a bracket riveted to the flange plate of a stanchion, as shown in fig. Each rivet is of 24 mm diameter. Calculate the maximum shear stress in the rivet. 10



2. (a) A tie member in a roof tress is 1·75 m long and carries an axial load of 170 kN. Design suitable single angle section if (i) power driven shop rivets are used, (ii) fillet weld is used at the joint. 10

(b) Design a main slings using double angle section from the following data : 10

Maximum compressive force
(due to wind) = 47·18 kN

Maximum tensile stress = 30·28 kN

Length of member = 2·9 m

Or

(a) Explain the difference between gross area, wet area and net effective area. 4

(b) Design a double angle discontinuous strut of a truss to carry load of 200 kN. The length of strut between centre to centre of intersection is 3·0 m. Thickness of gusset plate is 16 mm. 16

3. A steel column is made up of two Indian standard channels placed back to back to carry an axial load of 1100 kN on an effective length of 12·0 m. Design the most efficient section of the column and the batten system between the channels. 20

Or

A column section I. S. H. B. 350 @ 674 N/m carries an axial laod of 1200 kN. Design a suitable gusset base. 20

Allowable bearing pressure on cencrete is 4000 kN/m^2.

4. A hall, measuring 9 m × 20 m from inside is provided with reinforced concrete slab resting on secondary beams spaced at 3 m centre to centre. The secondary beams are connceted to the web of main beams spaced at 5 m centre to centre. Design the secondary beams, taking a live load of 3 kN/m^2. The thickness of roofing inclusive of the slab is 200 mm. 20

Or

A riveted plate girder is simply supported over an effective span 20 m. It carries a U.D.L. of 70 kN/m in addition to its self weight and two concentrated loads of 500 kN each 5 m from the either support. Design the mid section of the plate girder, assuming that it is effectively supported in lateral direction. 20

5. A steel tower is to be erected for transmission line for a single circuit three-phase, 50 cycles per second to transmit 50 mW at 0·75 power factor for 259 km. The various concering data are as under :

(i) Voltage of transmission = 132 kV.

(ii) Power conductor 30 mm dia. A. C. S. R. conductors consisting of 54 strands of 3 mm diameter of aluminium and 7 strands of 3 mm dia. of steel shall be used :
Unit weight of conductor = 16·76 N/m
Permissible axial tension = 35·60 kN,
$E = 0{\cdot}842 \times 10^5$ MPa
$\alpha = 1{\cdot}992 \times 10^{-5}$/°C, shape factor = 0·67.

(iii) Ground wire – 10 mm diameter galvanised steel wire shall be used, permissible axial tension = 25·40 kN.

(iv) Clearance requirements. Vertical height of conductor above ground = 6·7 m (min.). Vertical spacing between power conductors = 3·5 m (min).
Horizontal spacing between power conductors = 6·25 m (min.). Height of ground wire above top most power, conductor shall be half of the horizontal spacing of power conductors.

(v) Variation of temperature range = 5°C to 60°C.

(vi) Wind : Uniform intensity of wind = 1·50 kN/m^2.

(vii) Tower : Tangent type of tower with net more than 2° line deviation shall be erected. Weight span of tower = wind span = 240 m.
Suggest the geometry of the tower and determine the length of every member of the tower. 20

Or

Explain in detail the following :

(a) Bracings for transmission towers. 10

(b) Stability analysis of foundation for transmission towers. 10