

Government College Of Engineering, Aurangabad

(An Autonomous Institute Of Government Of Maharashtra)

T.E.(Civil) EXAMINATION

End Semester Examination 2016, Semester-I
AM 342/302 : DESIGN OF STEEL STRUCTURES

Time:- Three Hours

17 NOV 2016

Maximum Marks :-60

“Verify the course code and check whether you have got the correct question paper ”

N. B. :-

1. All Questions are compulsory
2. Figures to the right indicates full marks
3. Assume suitable data if necessary and state it clearly
4. Use of non-programmable calculator is allowed.
5. Use of IS 800, IS 875 (parts 1-5) is allowed.
6. Old students may use IS 800-1984

Q.1 a) Calculate the strength of 20 mm diameter bolt of grade 4.6/rivets for the following cases. The main plates to be jointed are 12 mm thick. (08)

- (1) Lap joint
- (2) Single cover butt joint; the cover plate being 10 mm thick
- (3) Double cover butt joint; each of the cover plate being 8 mm thick

b) Design the fillet weld for the angle section of ISA 65×65×6mm is welded in field to gusset plate 10 mm thick. Design the joint to the full strength of angle and the weld is to be done on its three sides.

Use Fe 410 grade steel $f_u=410$ MPa (07)

OR

b) The tension member of a truss consists of two angles 80mm x 80mm x 8 mm. If the two angles are welded on either side of a gusset plate at the joint. Design the joint. Axial tension in the member is 220 kN. Permissible shear stress in the welds = 110 N/mm^2 . Use 6mm fillet welds. (07)

Q.2 a) Solve any four of the following : (08)

- 1 State partial safety factors for resistance to buckling and ultimate stress
2. Draw sketch of plate girder showing details
3. What are Ultimate Stress and Yield Stress for bolt class 4.6
- 4 Define Web Buckling with sketch
5. Explain lug angle with sketch
- 6 Define column splice, with sketch
- 7 State the purpose of providing lacing and battens.

- b) A tension member of a truss consists of a single angle ISA 125 x 75 x 10mm carrying a load of 240 kN. If 20mm diameter bolts/Rivets are used, design the connection to gusset plate using a lug angle. (07)

OR

b) A double angle discontinuous strut is to carry a factored axial compression of 180 kN. The length of intersection is 3.08 m. Design the member for the following cases.

1. on the opposite side of a gusset plate.
2. on the same side of the gusset plate.

The strut is tack bolted and connected to a 10 mm gusset plate. (07)

- Q.3 a) Design a simply supported beam to carry a uniformly distributed load of 63 kN/m. The effective span of beam is 8.3 m. The compression flange of the beam would be prevented from lateral deflection. (09)

OR

- Q.3 a) Design the main section of a plate girder of effective span 20 meters to carry a superimposed load of 135 kN/m. Permissible bending and shear stress are 165 N/mm^2 and 100 N/mm^2 respectively. (09)

- b)) Design the base plate of an ISHB 350 column to carry a factored load of 1360 kN. Assume Fe410 grade steel and M25 concrete? (06)

- Q.4 a) Design a built-up column of effective length of 5m to carry an axial load of 1180 kN using battens. Use ISMC 250 Draw suitable sketch (08)

- b)) Find the panel points load of roof truss due to wind load for the following particulars. Span of the truss = 16m, Rise of truss = 4m, Height of eaves = 8m, Spacing of trusses = 4m, Roofing G. I. sheets, truss supported on 400mm thick brick walls. The basic wind speed is 50m/sec. Take $k_1 = 1$, $k_2 = 0.82$, $k_3 = 1$ (07)