

AR-214 (CBGS)

B.Arch., III Semester

Examination, November 2019

Choice Based Grading System (CBGS)

Analysis of Structures - Steel Structures

Time : Three Hours

Maximum Marks : 50

Note: i) Attempt any five questions.

ii) Choose missing data suitably, (if any).

iii) All parts of the questions shall be attempted in continuation.

iv) Steel table IS code 800 is permitted in examination.

1. a) With the help of sketches describe about various patterns of riveted joints. 2
- b) Discuss about various factors on which the value of pitch depends in bolted and riveted connections. 3
- c) Two plates 10mm and 18mm thick are to be jointed by double cover butt joint. Design the joint for the following data : 5
 Factored design load = 700kN.
 Bolt diameter = 20mm
 Grade of steel = Fe 410
 Grade of bolt = 4.6
 Cover plate 2 (one on each side) = 8mm thick.

2. a) What are the reasons the riveted joints have lost their importance? 2

- b) Why concave shape fillet welds are avoided? Also describe when concave fillet welds are recommended? 3
 - c) An ISLC 300 @ 224.7 N/m (Fe410) is to carry a factored tensile force of 900 kN. The channel section is to be welded at site to a gusset plate 12 mm thick. Design a fillet weld, if the overlap is limited to 350 mm. 5
3. a) Describe about various modes of failures of tension members. http://www.rgpvonline.com 2
 - b) What do you mean by slenderness ratio? Also discuss its significance in design of tension members. 3
 - c) Compute tensile strength of an angle section ISA 150 × 115 × 8 mm. of Fe410 steel connected with the gusset plate as shown in figure 1 for net section rupture. (Dimensions are in mm). 5

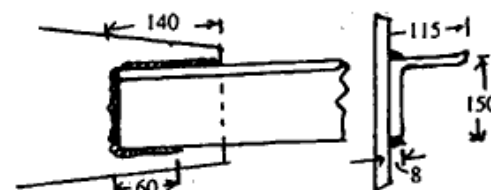


Figure 1

4. a) What do you mean by shear lag? Explain in brief. 2
 - b) Explain the reasons why tubular sections are most commonly used for small loads and length as compression member. 3
 - c) Write step by step procedure for design of laced columns. 5
5. a) Compression members are more critical than tension members comment. 2

- b) What is the difference in behaviour of long and intermediate columns? Explain. 3
- c) Design a double angle discontinuous strut to carry a factored load of 135kN, resulting from combination with wind load. The length of the strut is 3.0m between intersections. Two angles are placed back-to-back. (with long legs connected) and are tack bolted. Use steel of grade Fe 410. Angles are placed on opposite sides of 12mm gusset plate. 5

6. a) Differentiate between bending and buckling of a beam. 2

b) How designer can provide restraint against lateral buckling (compression flange) to improve performance of beam section? Explain about at least 03 methods. 3

c) Write step to step design procedure of laterally supported beams of single rolled beam section. Mention the various formula used in different design steps. 5

7. a) How does a plate girder derive post buckling strength? 2

b) Why end posts required in plate girder? 3

c) Write short notes on any two : (Max. 125 words) 5

i) Elements of plate girder and their functions.

ii) Criterion for deciding thickness of the web of a plate girder section.

iii) Stiffeners :- necessity, types and salient design features.

8. a) With the help of neat sketches, show various structural members and functional members of the steel trussed roof. 2

- b) What are secondary stresses in roof trusses? Explain. 3
- c) Design members AB, AC and joint A of a roof truss. Post of which is shown in fig 2. 5

| Member | length | compressive force | Tensile force |
|--------|--------|-------------------|---------------|
| AB | 2.3m | 75kN | 55 kN |
| AC | 1.8m | 60kN | 80kN |

Also design joint A (welded). Use tubes of Y_{st} 210.

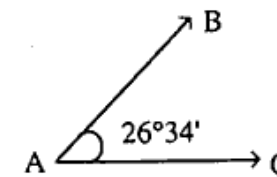


Figure 2
