

SUBJECT CODE NO: E-185
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(CIVIL) Examination Nov/Dec 2017
Design of Structure - I (Steel)
(REVISED)

[Time: 3:00 Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- i) Solve any two questions from question no. 2 to 5 and any two from question no. 7 to 10.
 - ii) Questions no. 1 and question no. 6 are compulsory
 - iii) Assume suitable data if necessary and mention it clearly.
 - iv) Use IS 800: 2007; steel Table and Non – programmable Calculator is allowed.
 - v) Figures to right indicate the the maximum marks.

SECTION - A

- Q.1 Answer the following questions (Any five) 10
- a) Explain common shapes of compression member?
 - b) Explain tacking rivets?
 - c) What are the advantages of welded connection?
 - d) Draw the sketches of block shear failure?
 - e) What are the different methods of design?
 - f) Explain tracking bolts?
 - g) Explain with sketches the pitch, gauge distance & edge distance?
- Q.2
- a) Design connections for members of roof truss, with gusset plate 12 mm thk, as shown in the fig.1 using 16 mm dia. Bolt of grade 4.6. 08
 - b) Design connection for members of roof truss, with gusset plate 12 mm thk, as shown in fig. 1.07 Use welded connections. Assume ultimate of steel 400 MPa and shop welded.

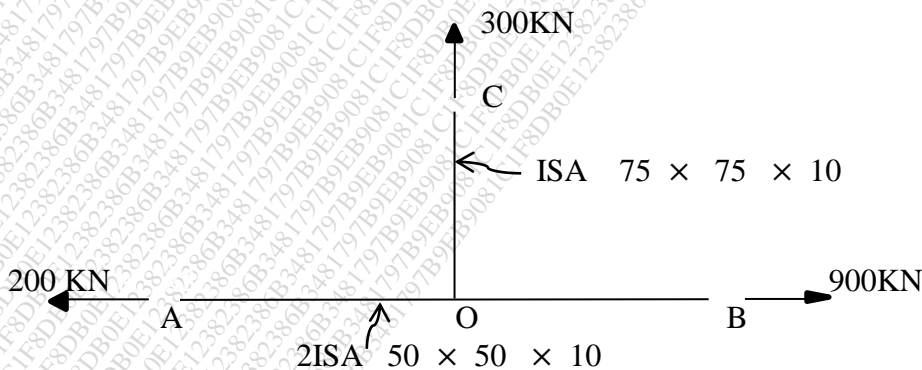


Fig No.1

- Q.3 A single unequal angle 150x 115x 12 mm is connected to a 14 mm thick gusset plate at the ends with 5 nos. of 20 mm dia. Bolts to transfer tension. Determine the tensile strength of the angle if gusset is connected to the 150 mm leg. Use the ultimate & yield strength of steel are 450 & 250 MPa. [Take, e = 40 mm, & p = 60 mm.]

- Q.4 a) Explain laced column & battened columns? 08
- b) A compression member is made up of ISHB 300 @ 577 N/m, if length of column is 5m long and has pinned at both ends. Determine the maximum load carrying capacity? 07
[Use, $f_y = 250 \text{ MPa}$ & $f_u = 400 \text{ MPa}$]

- Q.5 Write short notes on (Any Three) 15
- a) Advantages of steel structures.
- b) Differentiate working stress method and limit state method.
- c) Classification of cross sections of steel structures.
- d) Gusset plate.

SECTION – B

- Q.6 Answer the following questions (any five) 10
- a) Explain failure modes of beams?
- b) What are the various sections of plate girder?
- c) State the different types of loads acting on roof truss?
- d) Draw a sketch of grillage foundation
- e) Explain bracing system?
- f) Explain local buckling of flanges?
- g) What is the gantry girder?

- Q.7 a) Explain the design procedure of laterally unsupported beam. 05
- b) A simply supported beam has of 6m laterally supported and it carries a udl of 50 kN/m and point load 40kN at its center. Design the cross section and check for shear & deflection. 10

- Q.8 A plate girder is simply supported over an effective span of 30m. It carries a udl of 30KN/m in addition to its self-weight and two point load of 200KN each at 10m from their supports. It is fully restrained at both ends against lateral bulking throughout the span. Take $f_y = 250 \text{ MPa}$. Design welded plate girder. 15

- Q.9 A 50 kN hand- operated crane is provided and has following data: 15
- 1) Center to center distance of the gantry beam = 20m
 - 2) Span of gantry = 7.0m
 - 3) Weight of the crane = 50 KN
 - 4) Spacing of wheel = 3m
 - 5) Weight of the crab = 12KN
 - 6) Minimum hook approach = 1m
- Design a simply supported gantry girder assuming lateral supported to it.

- Q.10 Write short note on (Any Three) 15
- a) Explain combined bending and shear in beam.
- b) Explain in detail dead load and live load on trusses.
- c) Differentiate between slab base and gusseted base.
- d) Draw the sketches of various trusses and state suitability for spans.