Code : 011620

B.Tech 6th Semester Exam., 2018

DESIGN OF STEEL STRUCTURE

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer of the following (any *seven*) : 2×7=14

(a) In plastic analysis, the shape factor for circular sections is

(i) 1·5

(ii) 1·6

(iii) 1·697

(iv) None of the above

(b) A beam is defined as a structural member subjected to

(i) axial loading

(ii) transverse loading

(iii) axial and transverse loading

(iv) None of the above

(c) The failure of a web plate takes place by yielding if the ratio of the clear depth to thickness of the web is less than

(i) 45 *(ii)* 55

(iii) 60 *(iv)* 82

(d) The most economical section for a column is

(i) rectangular

(ii) solid round

(iii) flat strip

(iv) tubular section

(e) The distance between e.g. of compression and e.g. of tension flanges of a plate girder is known as

(i) overall depth

(ii) clear depth

(iii) effective depth

(iv) None of the above

(f) The allowable stress, in axial tension for rolled I-sections and channels, is taken as

(i) 1420 kg/cm^2 *(ii)* 1500 kg/cm^2

(iii) 2125 kg/cm^2 *(iv)* 1810 kg/cm^2

(g) If d is the distance between the flange angles, the vertical stiffeners in plate girders are spaced not greater than

(i) d

(ii) $1{\cdot}25d$

(iii) $1{\cdot}5d$

(iv) $1{\cdot}75d$

(h) The cross-section of a standard fillet is a triangle whose base angles are

(i) 45° and 45°

(ii) 30° and 60°

(iii) 40° and 50°

(iv) 20° and 70°

(i) A second horizontal stiffener is always placed at the neutral axis of the girder if the thickness of the web is less than

(i) $d/250$ for structural steel

(ii) $d/225$ for high tensile steel

(iii) Both (i) and (ii)

(iv) Neither (i) nor (ii)

(j) The thickness t of a single flat lacing should not be less than

(i) 1/30th length between inner end rivets

(ii) 1/40th length between inner end rivets

(iii) 1/50th length between inner end rivets

(iv) 1/60th length between inner end rivets

2. Explain the following : 14

(a) Local and lateral buckling of beam

(b) Checks required for beam design

3. Calculate the design compressive load for a column made up of ISHB 350 @ 710·2 N/m and 3·5 m high. The column is restrained in direction and position at both the ends. Use steel of grade Fe 410. 14

4. Design a simply supported beam of span 4·2 m carrying reinforce concrete floor in which top compression flange is embedded. Beam is carrying 20 kN/m dead load and 20 kN/m imposed load, resume Fe 410 grade steel. 14

5. Design a suitable angle section to carry tensile force of 250 kN. Use welded connection. 14

6. Discuss the following : 14

(a) Prying action

(b) Advantage of fillet weld over butt weld

(c) Comparison of welded joints with bolted joints

7. *(a)* Explain some of the common defects in the welds. 7

(b) Write the advantage of welded joints over bolted joints. 7

8. Design a tension member to carry a pull of 830 kN. The member is 3·2 m between c/c of intersections. Design the member using channel section. 14

9. A tie member of truss consists of double angle section each 80 mm × 80 mm × 8 mm welded on the opposite side of a 12 mm thick gusset plate. Design a fillet weld for making connection in the workshop. The factored tensile force in the member is 300 kN. 14

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