

(2)

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) : $2 \times 7 = 14$

- (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/cm² (ii) 1500 kg/cm²
- (iii) 2125 kg/cm² (iv) 1810 kg/cm²

8AK/420

(Turn Over)

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(3)

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

- (i) d
- (ii) $1.25d$
- (iii) $1.5d$
- (iv) $1.75d$

- (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)

(4)

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

- (i) $1/30$ th length between inner end rivets
- (ii) $1/40$ th length between inner end rivets
- (iii) $1/50$ th length between inner end rivets
- (iv) $1/60$ th 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)

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
