

B.E./B.TECH. Degree Examination, December 2020

Semester - VI

**CE16604 - Design of Steel and Timber Structures**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

IS 800:2007, IS 883, IS 808, IS 875, Steel tables are allowed.

Assume data wherever necessary

**PART A - (8 X 2 = 16 marks)**

1. Which design philosophy is used in IS 800:2007?
  - a. Ultimate load method
  - b. working stress design
  - c. limit state method
  - d. Plastic method
2. For a lap joint provided to connect plates, what is the minimum spacing to be provided, if 'd' is the diameter of bolt?
  - a. 2d
  - b. d
  - c. 1.7d
  - d. 2.5d
3. Which of the following section can be used as compression member?
  - a. Circular hollow section
  - b. angle section
  - c. rectangular hollow section
  - d. all of these
4. The industrial structure used to carry heavy load is designed as
  - a. Laterally supported beam
  - b. laterally unsupported beam
  - c. Braced column
  - d. Stiffened beam.
5. Can structural steel be used for construction of earthquake resistant structures? Justify.
6. What are the failures possible in bolted connection and how is that considered in the connection design?
7. What is meant by buckling class? and mention its significance in design of a column.
8. Discuss about section classification with respect to width/thickness ratio.

**PART B - (4 X16 = 64 marks)**

09. (a) (i) Discuss the design considerations for a column using structural timber (10)
- (ii) Write in detail about the different classifications of structural timber. (06)

**(OR)**

- (b) (i) Discuss in details the different design methodologies. ( 8 )  
(ii) What are the different loads to be considered while designing a residential building using structural steel. ( 8 )

10. (a) Two plates 200 x 8 mm of grade Fe410 are connected by 20mm dia bolts of grade 4.6 using butt joint. Design the bolted connection to transmit a pull equal to the strength of the plate. Also sketch the detailing drawing. ( 16 )

**(OR)**

- (b) (i) Design a tension member to carry a load of 300kN using two angle sections. The length of the member is 3 m. ( 12 )  
(ii) Can the same member be designed with a channel section and justify the answer. ( 4 )
11. (a) (i) Calculate the compressive capacity of a built up column made of ISHB 300 with two cover plates of 350 x 20 mm one on each flange and having a length of 5 m. Assume the bottom of column is fixed and the other end is pinned. ( 12 )  
(ii) For the above problem, draw an alternate built up section that can be used instead of I section with cover plates. ( 4 )

**(OR)**

- (b) Design a built up column using two channel sections to carry a service load of 800kN. The column is to be built for 5 m high and is effectively held in position at both ends and restrained against rotation at one end. ( 16 )
12. (a) A simply supported steel joist of 4 m effective span is laterally supported throughout. It carries a total load of 10kN/m inclusive of its self weight. Design an appropriate section using steel of grade Fe410. ( 16 )

**(OR)**

- (b) Design a laterally supported beam of 6 m effective span. It carries a shear force of 210kN and bending moment 150kNm. Design an appropriate section using steel of grade Fe410. ( 16 )