Total No. of Questions – [08] Total No. of Printed Pages: 02

G.R. No.	

Paper Code: U359-113 (ESE)

DECEMBER 2019/ENDSEM

T. Y. B. TECH. (Civil Engg.) (SEMESTER - I)

COURSE NAME: DESIGN OF STRUCTURES - I

COURSE CODE: CVUA31173

(PATTERN 2017)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:
1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Assume suitable data if necessary
5) Use of IS: 800- 2007 and Steel Table is allowed

Q.1) a) Enlist advantages of steel structure over RC structure. [6 marks]

OR

b) A beam fixed at both ends is subjected to central point load W. The beam is of uniform plastic moment M_P. Determine the magnitude of collapse load. [6 marks]

Q.2) a) Design a bolted connection for single angle ISA 125 x 75 x 8 mm subjected to factored tensile force of 105 kN connected to 8 mm thick gusset plate with longer leg. Use M20 bolt of grade 4.6 [6 marks]

OR

b) Design a welded connection for single angle ISA 125 x 75 x 8 subjected to factored tensile force of 105 kN connected to 8 mm thick gusset plate with longer leg. [6 marks]

Q.3) a) Determine the tensile strength due to block shear and rupture of an ISA 150 x 115 x 10 mm connected to 10 mm thick gusset plate with longer leg using 4 nos. of M20 bolts of grade 4.6. [6 marks]

OR

b) Design a tension member using unequal single angle connected to a gusset plate 10 mm thick and subjected to factored tensile force of 110 kN. Use fillet weld. [6 marks]

Q.4) a) Determine the compressive strength of ISA 90 x 90 x 8 mm connected to 10 mm thick gusset plate with fillet weld. The unsupported length of the member is 1.8 m. [4 marks]

OR

b) Design a double angle discontinuous strut using unequal angles subjected to working compressive force of 200 kN. The unsupported length of the member is 2.25 m. [4 marks]

Q.5) a) Design a simply supported beam of span 6 m subjected to central point load of 300 kN. The compression flange of the beam is restrained. [6 marks]

b) An ISHB 450 @ 92.2 kg / m is used as simply supported beam over a span of 4 m. Determine the safe UDL beam can carry. The compression flange of the beam is unrestrained. [4 marks]

c) Explain the concept of high shear and its relevant codal provision. [4 marks]

OR

Q.6) a) Design a simply supported beam of span 5 m subjected to UDL of 50 kN/m throughout the span. The compression flange of the beam is unrestrained [6 marks]

b) An ISLB 600 @ 99.4 kg / m is used as simply supported beam over a span of 6 m. Determine the safe UDL beam can carry. The compression flange of the beam is restrained. [4 marks]

c) Explain laterally supported and unsupported beams with suitable sketches. [4 marks]

Q.7) a) A column 8 m long consisting 2 ISMB 550 @ 103.7 kg/m spaced 440 mm to carry a factored load of 2000 kN. The column is restrained in translation but not in rotation at both ends. Design a suitable lacing system. [6 marks]

b) Differentiate lacing and battening system in built-up column section on the basis of general and design considerations. [4 marks]

c) Design a 10 m long column using two channels back to back to carry a factored load of 1100 kN. The column is restrained in position but not in direction at both ends. [4 marks]

OR

Q.8) a) A column ISHB 350 @ 67.4 kg/m carries an axial factored load of 1700 kN. Design a suitable gusseted base. The base rests on M20 grade of concrete pedestal. [6 marks]

b) Explain the term "beam-column member" with suitable examples. [4 marks]

c) Explain Slab base footing with suitable sketch and write the codal provisions for the same. [4 marks]