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Question	Paper	Code:	ACE012

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech VI Semester End Examinations (Regular) - May, 2019 **Regulation:** IARE – R16

DESIGN OF STEEL STRUCTURES AND DRAWING

Time: 3 Hours

(CE)

Max Marks: 70

Answer ONE Question from each Unit All Questions Carry Equal Marks All parts of the question must be answered in one place only

UNIT - I

- 1. (a) Explain different types of welded joints and their suitability with neat sketches.
 - (b) An ISLB 200 is used to carry factored tensile load 500kN in diagonal member of foot bridge. Both flanges are connected to two gusset plates of 16mm, diameter bolts of 16mm arranged symmetrically (8 bolts per flange). Thus there are four bolts on each side of web per flange. Determine the strength and check the connection. [7M]
- 2. (a) List various types of loads to be considered in the design of steel structures. [7M]
 - (b) Design a double cover butt joint with grade of steel Fe410 and grade of bolt 4.6 diameter 20mm to resist a factored load of 120 KN thickness of main plate is 20mm and butt plate is 8mm.

[7M]

UNIT - II

- 3. (a) Neatly sketch and explain different types of column bases and write its suitability. [7M]
 - (b) Design a laced column 10m long that carry factored load 1100kN. The column is hinged at both ends and provided with single lacing system with bolted connection. Assume the laced column formed with two channel sections placed toe-to-toe. [7M]
- 4. (a) What is battened column and what is a built up column? Explain with neat sketches. [7M]
 - (b) Design a laced column with two channels back to back of length 8 m to carry an axial factored load of 1200 kN. The column may be assumed to have restrained in position but not in direction at both ends. [7M]

UNIT - III

- (a) Write the expression to calculate web buckling and web crippling in beam sections. [7M]5.
 - (b) Calculate the moment carrying capacity of laterally unrestrained beam ISMB 400x140 The unsupported length of beam is 3m and simply supported at ends. [7M]

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[7M]

- 6. (a) What is guage, pitch and gusset plate? Specify the limits as per IS 800 for pitch and guage.
 - (b) Design a rolled steel beam of effective span 6 m, if the beam is restrained laterally, it carries total udl of 70 kN(including self-weight), f_y is 250 N/mm² and E is 2×10^5 N/mm². [7M]

$\mathbf{UNIT}-\mathbf{IV}$

- 7. (a) Write short notes on
 - (i) Bolted seat connections
 - (ii) Welded seat connections
 - (b) In a framed connection as ISLB 350 @ 485.6 N/m transmits an end reaction of 220 kN and a moment of 22 kNm, under factored loads to a column ISHB 300 @ 576.8 N/m. Design the connections. [7M]
- 8. (a) Write the assumptions made in the design of welded truss joints. [7M]
 - (b) Design the bolted connection for the following configuration shown in Figure 1. (Assume suitable data if required and as per I.S code. All dimensions are in mm) [7M]



Figure 1

$\mathbf{UNIT} - \mathbf{V}$

- 9. (a) Write the design checks for stiffened and un-stiffened plate girder as per IS code. [7M]
 - (b) Design a welded plate girder for simply supported bridge deck of 30m clear span and dead load 20kN/m, Imposed load 40kN/m. Assume top flange of girder is unrestrained laterally. Design stiffened plate girder with thin webs. [7M]
- 10. (a) Explain tension field and associated I.S code provisions in design of plate girders. [7M]
 - (b) Design the web stiffeners of thin plate girder simply supported and carrying a moment 120kN-m, shear 540kN. Assume span of girder 6m and size of web 800x8mm thick and size of each flange 400x10mm, stiff bearing length 75mm.Use tension field method. [7M]

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[7M]

[7M]