R19

Set No. 1

IV B.Tech I Semester Advance Supplementary Examinations, March – 2023
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

Time: 3 hours   Max. Marks: 75

Question paper consists of Part-A and Part-B
Answer any ONE question from Part-A
Answer any THREE questions from Part-B
Use of IS 800:2007, IS: 875 (Part III)-1987, structural steel tables are to be permitted in the examination hall
*****

PART–A(30 Marks)

1   Design a laced column 12 m long to carry a factored axial load of 1000 KN. The column is restrained in position but not in direction at both ends. Providing single lacing system with welded connection. Design the column with two channels placed toe to toe. Draw the detailing of the column. Assume any missing data. Draw to scale the cross section and longitudinal section.   [30]

(OR)

2   Design a welded plate girder subjected to a maximum factored moment of 2000 KN-m and a factored shear force of 250 KN. The top compression flange is restrained laterally. Design the cross section with a thinner web and suitable stiffeners conforming to the IS 800-2007 codal specifications. Draw the cross section and longitudinal section of the plate girder. Assume any missing data.

[30]

PART–B(3x15=45 Marks)

3   A purlin is to be designed to support a GI sheet as roofing material for a truss spaced at 3.5m c/c. purlin along the principal rafters are arranged at a distance of 1.35mc/c. The pitch of truss is 0.2m. Design a section for the purlin. Assume basic wind speed as 44m/s.   [15]

4   a)   With the help of suitable diagram, explain the concept of shear lag   [3]
    b)   Design a suitable double angle section to carry a factored tensile load of 450 KN. The length of the member is 2.9m. Use M20 bolts of 4.6 grade. The grade of steel is Fe410.   [12]

5   a)   Write any six features of structural steel   [3]
    b)   An ISMC 250 @ 298kg/m is used as a tie member to transmit a factored load of 800KN. The channel section is connected to a gusset plate of 10mm thickness. Design a fillet weld if the lap length is limited to 300mm. Provide slot welds if required.   [12]

6   a)   Distinguish between laterally restrained and unrestrained beams.   [3]
    b)   A conference hall 8mx12m is provided with a 120 mm RCC slab over rolled steel I beams spaced 4m centre to centre. The super imposed load is 4KN/m^2 and floor finish of 1.5 KN/m^2. Design one of the beam as laterally supported. Assume any missing data.   [12]

7   a)   Explain the failure modes of axially loaded columns   [5]
    b)   Determine the design load capacity of the column ISHB 300@577 N/m if the length of the column is 3m and its both ends are hinged.   [10]

|'''|'|'|'|'|'|''|''|''|