**SP-90**

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# T.Y. B.Tech. (Civil Engineering) (Semester - V) (CBCS) Examination, November - 2023

## PCC-CV-502 : DESIGN OF STEEL STRUCTURES

## Sub. Code : 80764

9177

**Day and Date : Thursday, 30 - 11 - 2023** **Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

1) **IS 800-2007 and steel table is allowed in Examination.**
2) **Question no. 1 and question no. 5 are compulsory solve any two subquestions.**
3) **Solve any 2 Questions from Q.No. 2, 3, 4 and any 2 Questions from Q.No. 6, 7, 8.**
4) **Figures to the right indicate full marks.**
5) **Assume suitable data if necessary and state them clearly.**

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## SECTION - I

***Q1)*** **Attempt any two sub questions. :** **[7]**

a) Compare welded connection & bolted Connection

b) What is block shear

c) what is radius of gyration and effective length of compression member

**Attempt any Two from Q.No. 2,3,4**

***Q2)*** Design welded connection for an angle 80 x 50 x 8 mm connected to one side of gusset plate 12mm thick by longer leg. Design the weld for full strength of above angle section. Draw connection details. Consider field/site welding. **[14]**

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***Q3)*** Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 225kN. 5, M20 bolts of grade 4.6 in single line are used for connection, the steel used is of Fe 415 grade. **[14]**

***P.T.O.***

***Q4)*** Design a strut (Compression member) to carry factored compressive load of 170 kN. Use two angles connected back to back and draw the details. Take Fcd = 90 N/mm$^2$. **[14]**

## SECTION II

***Q5)*** **Attempt any two sub questions :** **[7]**

a) Differentiate between lacing and battening system

b) What are the loads that act on gantry girder

c) Explain bending and buckling of beam

**Attempt any Two from Q.No. 6,7,8**

***Q6)*** Design single lacing system and built up column composed of two channels placed back to back carrying an axial factored load of 1400 kN. The effective length of column is 10 m. Assume steel of grade Fe410 and 4.6 grade bolts. Assume Fcd = 135 N/mm$^2$ Design single lacing system also. **[14]**

***Q7)*** Design a simply supported beam of effective span 4 m carrying a factored uniformly distributed load of 15 kN/m. The beam is laterally supported throughout. **[14]**

***Q8)*** Calculate the design forces for a gantry girder to be used in an industrial building carrying a manually operated overhead traveling crane for the following data : **[14]**

- Crane capacity - 200kN
- Self-weight of the crane girder excluding trolley - 200kN
- Self-weight of the trolley, electric motor, hook, etc. - 40kN
- Approximate minimum approach of the crane hook to the gantry girder - 1.20m
- Wheel base - 3.5m
- c/c distance between gantry rails - 16m
- c/c distance between columns (span of gantry girder) - 8m
- Self weight of rail section - 300N/m
- Diameter of crane wheels - 150mm
- Steel is of grade Fe 410.

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