Reg. No. : .....

Name : .....

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**D – 1491**

# Seventh Semester B.Tech. Degree Examination, November 2017
## (2013 Scheme)
## 13.701 : DESIGN OF STEEL STRUCTURES (C)

Time : 3 Hours  Max. Marks : 100

***Instructions*** *:1)* ***Use*** *of IS : 800 – 2007, IS : 811 – 1987, IS : 801 – 1975 and steel table* ***permitted****.*
*2)* ***Assume*** *suitable data* ***if*** *not given.*

PART – A

Answer **all** questions : **(5×4=20 Marks)**

1. With neat sketches, explain the various ways of failure of bolted joints in simple steel connections.
2. Discuss the various steps involved in the design of lug angles.
3. What is bearing stiffener ? Explain how it can be placed in plate girder.
4. Discuss the various steps involved in the determination of effective length of a compression member.
5. Explain the various theorems of plastic analysis.

PART – B

Answer **any one** question from **each** Module. **Each** full question carries **20** marks. **(4×20=80 Marks)**

**Module – I**

6. Explain in detail about the following :
   a) Principle of High-Strength Friction Grip Bolts
   b) Shear strength of HSFG Bolts
   c) Bearing strength of HSFG Bolts
   d) Tensile strength of HSFG Bolts

   OR

7. Design a bridge truss diagonal subjected to a factored tensile load of 400 kN. The length of the diagonal is 3.5 m. the tension member is connected to a gusset plate of 20 mm thick with one line of 20 mm diameter bolts of grade 8.8.

**P.T.O.**

## Module – II

8. Design a laterally supported beam of effective span 7 m for the following data :
   Grade of steel : Fe 410
   Maximum Bending Moment, M : 160 kNm
   Maximum shear force : 220 kN
   Check for deflection is not required.

OR

9. Design a welded plate girder 24 m in span and laterally restrained throughout. It has to support a uniform load of 110 kN/m through-out the span exclusive of self weight. Design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410. Design the cross section and the end load bearing stiffener.

## Module – III

10. Design a double angle discontinuous strut for the conditions given below to carry a factored load of 150 kN. The length of the strut is 3.5 m between intersections. The two angles are placed back to back and are tack bolted.
    a) Angles are placed on opposite sides of 12 mm gusset plate
    b) Angles are placed on same side of 12 mm gusset plate.

OR

11. A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1800 kN. Design a suitable gusset base. The base rests on M20 grade of concrete.

## Module – IV

12. A continuous beam is subjected to loads as shown in Figure 1. Assume a load factor of 1.6 and design its section.

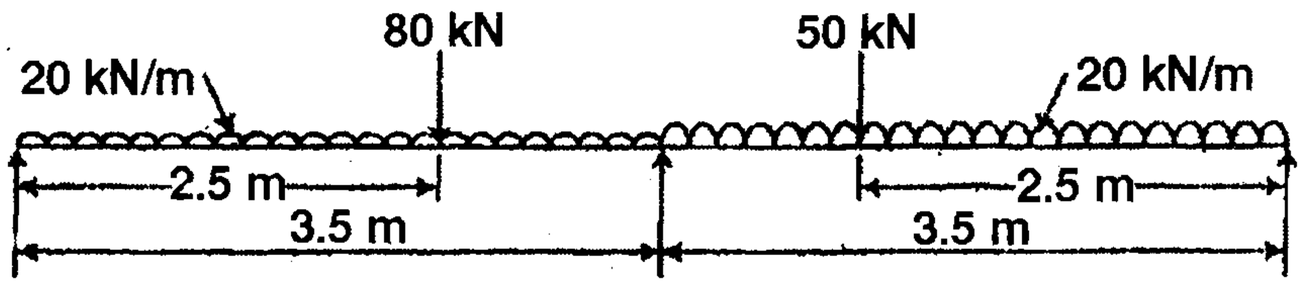


Figure 1

OR

13. Design a steel beam section (light gauge) for supporting roof of a big hall for the following data and apply the usual checks. Assume steel of grade Fe 410.
    Clear span : 7 m
    End bearings : 140 mm
    Centre to centre spacing of beams : 3 m
    Imposed load on the beam : 10 kN/$m^2$
    Dead load : 4.5 kN/$m^2$
    Restriction on beam depth : 375 mm
    The compression flange of the beam is laterally supported throughout.