****Last Date of Submission ……..** **Section CE 41/CE 42**

Babu Banarasi Das -National Institute of Technology & Management, Lucknow
B. Tech Forth Year (Seventh Semester) 2018-19
Department of Civil Engineering

DESIGN OF STEEL STRUCTURE (NCE-701)
Assignment: I (Unit 1)

NOTE-ATTEMPT ALL PARTS

1. Give the chemical composition of structural steel and discuss the amount of carbon in it.
2. Explain advantages and disadvantages of steel structure over RCC structure. Support your views with practical examples.
3. With the help of stress-strain curve, explain how limit state design philosophy is different/superior to working stress design philosophy.
4. Classify Dead, Live and environmental loads. Explain their properties. How erection loads affects the Design of steel structures.
5. What are the partial safety factors for materials adopted by IS : 800 – 2007 code ?
6. Give the chemical composition of structural steel and discuss the amount of carbon in it.
7. Give reasons why steel is more suitable than wood or concrete as structural material.
8. Sketch various types of rolled steel section and show their conventional axes.
9. Discuss various limit states which are considered in design.
10. Estimate the design the wind pressure for a 100m high lattice tower located on the outskirt of Allahabad. Estimate also the wind load in terms of effective frontal area for tower.

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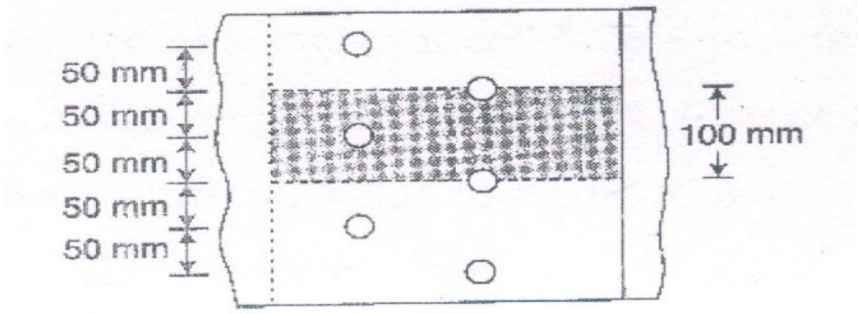
Babu Banarasi Das -National Institute of Technology & Management, Lucknow
B. Tech Second Year (Third Semester) 2018-19
Department of Civil Engineering

DESIGN OF STEEL STRUCTURE (NCE-701)

Assignment: II (Unit 2)

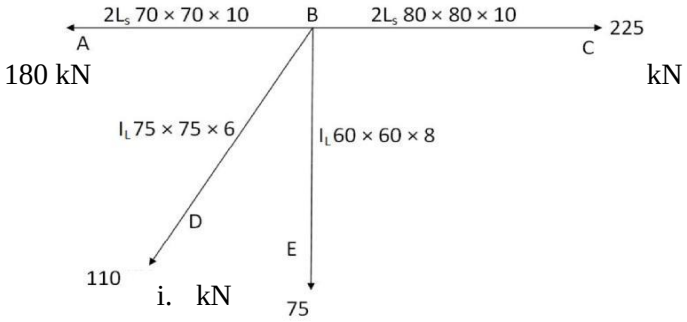
NOTE-ATTEMPT ALL PARTS

1. Determine the strength and efficiency of the lap joint shown in Fig. 2a. The bolts are of 20 mm diameter and of grade 4.6. The two plates to be jointed are 10 mm and 12 mm thick. Use steel of grade Fe 410.



1. Fig. 2a

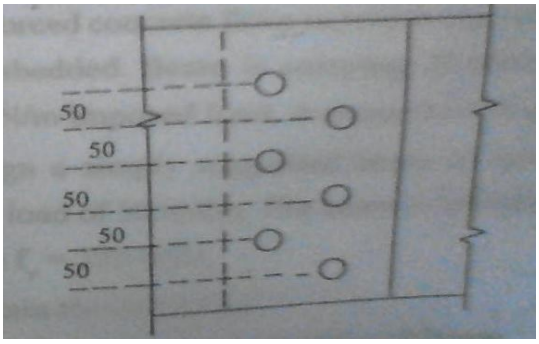
2. Design a joint B of a roof truss as shown in Fig. 2b. The members are connected with 16 mm diameter bolts of grade 4.6 to the gusset plate 120 mm thick.



a. kN

3. An ISLC 300 @ 324.7 N/m (Fe 410 grade of steel) is to carry a factored tensile force of 900 kN. The channel section is to be welded at the site to a gusset plate 12 mm thick. Design a fillet weld, if the overlap is limited to 350 mm.
4. Explain structural difference between slip critical and bearing type connection. What is the significance of nominal area and shank area of the bolt? Give conditions when nominal and shank area of the bolt is taken in design.
5. Design a butt joint to connect two plates 10mm thick and 175mm wide using grade 4.6 bolts for maximum efficiency.
6. A tie member of a truss consists of double angle section, each 80mm X 80mm X 8mm welded on the opposite side of a 12mm thick gusset plate at lower and upper side of the angle by 5 mm fillet weld in the workshop. Determine the length of welds at lower and upper side of angle if factored tensile load in the member is 300 kN.

7. Determine the strength and efficiency of the lap joint shown in figure-1. The bolts are 20mm diameter and of grade 4.6. The two plates to be jointed are 10 mm and 12 mm thick of grade Fe-410.



8. Discuss the following :
   (a) Prying Action
   (b) Advantages of fillet weld over butt weld
   (c) Comparison of welded joints with bolted joints

9. Discuss following:
   a. Gantry girder.
   b. Web buckling and web crippling.

10. Calculate the strength of a 20m diameter bolt of grade 4.6 for the following cases. The main plate to be joint are 12 mm thick.
    a) Lap joint
    b) Single cover butt joint ;the cover plate being 10mm thick
    c) double cover butt joint ;each of the cover plate being 8mm thick

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B. Tech Second Year (Third Semester) 2018-19
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DESIGN OF STEEL STRUCTURE (NCE-701)

Assignment: III (Unit 3)

NOTE-ATTEMPT ALL PARTS

1. Determine the effective net area of ISA 200 × 100 × 12 members shown in the following Fig. 3a.

2. Determine the block shear strength of the welded tension member shown in Fig. 3b. Use steel of grade Fe 410.

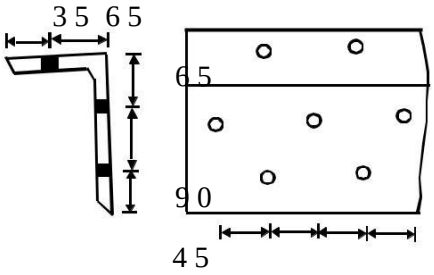


Fig. 3a

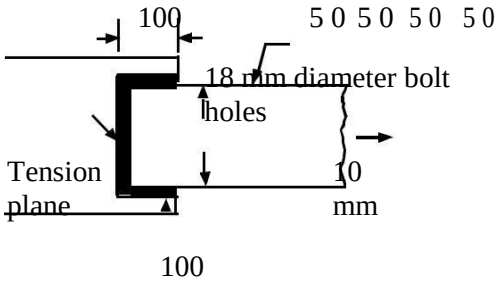
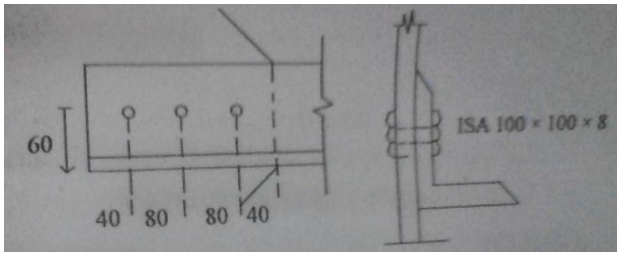
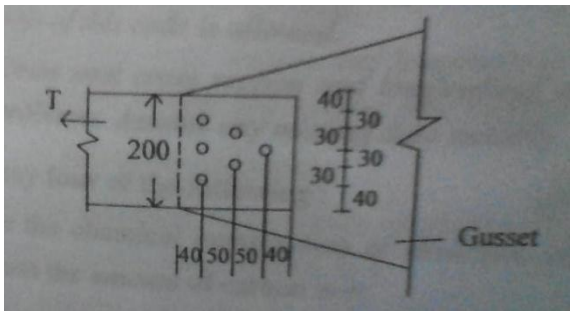


Fig. 3b

3. Select a suitable angle section to carry a factored tensile force of 290 kN. Assuming a single row of M 24 bolts and design strength f_y = 250 N/mm^2.
4. A tension member carries a factored axial tension of 450 kN. Design section and its connection with a gusset plate and lug angle. Take f_y = 250 N/mm^2 and f_u = 410 N/mm^2.
5. Find tension carrying capacity of single angle ISA 100 X 100 X 8 mm connected to gusset by three bolts of 22 mm in diameter at pitch of 80 mm c/c in one line as shown in figure-2. Take f_y = 250MPa and f_u = 410MPa.

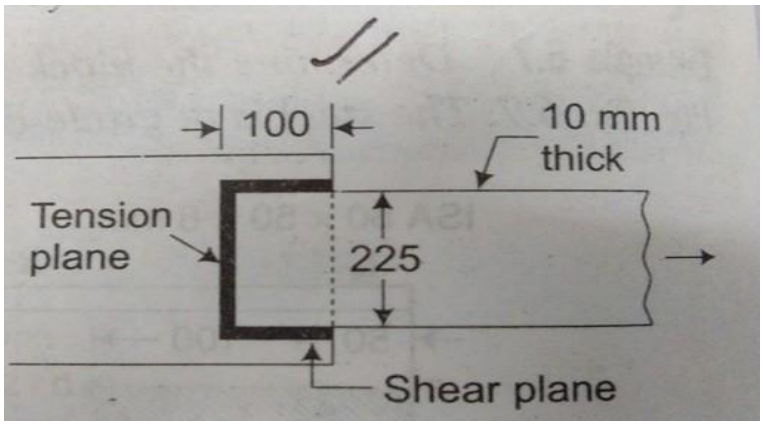


6. Determine the design tensile strength of plate 200mm X 8mm connected to 10 mm thick gusset using 20 mm bolts as shown in figure-3. Take f_y = 250MPa and f_u = 410MPa.



7. Design a suitable angle section to transmit tensile force of 250kN to a gusset plate of thickness 16 mm. Use bolted connection.

8. Determine the design tensile strength of plate 200mmx8mm connected to 10 mm thick gusset using 20 mm bolts as shown in figure take if Y is equals to fy=250MPa and fu=410MPa.
9. Find tension carrying capacity of single angle ISA 100 x 100 x 8 connected to a gusset plate by 3 bolts of 22 mm diameter at pitch of 80 mm centre to centre in a line as shown in figure.Take fy=250 and fu= 410MPa.
10. Determine the block shear strength of the welded tension member shown in figure. Use Steel of grade Fe-410.



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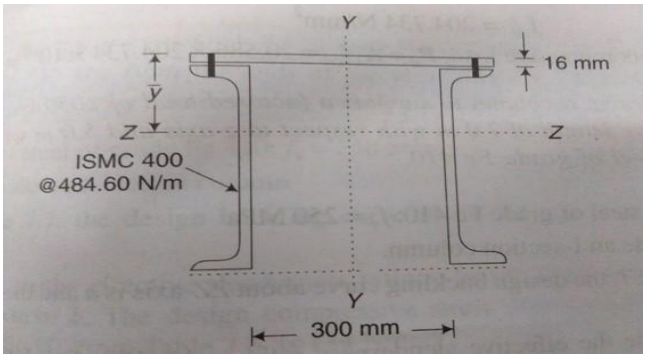
Babu Banarasi Das -National Institute of Technology & Management, Lucknow
B. Tech Second Year (Third Semester) 2018-19
Department of Civil Engineering

DESIGN OF STEEL STRUCTURE (NCE-701)

Assignment: IV (Unit 4)

NOTE-ATTEMPT ALL PART

1. Design a built up column with two channels placed face – to – face. The column is of 6.6 m effective length and supports a factored load 1500 kN. Also design the lacing system.
2. Design a double angle discontinuous strut to carry a load of 250 kN. The length of the strut between c/c of intersections is 3.85 m.
3. Design a column section to be used in a public building. Column is 4.80 m long with both of its ends restrained in direction and position in *zz* as well as *yy* directions. The column is to support a factored load of 2500 kN.
4. Design a simply supported beam of span 4.2m. Top compression flange is embedded in concrete floor. Beam is carrying 20 kN/m dead load and 20kN/m imposed load. Take Fe-410 grade steel section for design.
5. Design a simply supported beam of span 5 m to carry total load of 50kN/m. The beam is laterally unsupported. Take f_y = 250MPa.
6. Explain the following :
   (a) Local and lateral buckling of beam.
   (b) Web crippling in beams.
7. Design a built up column with two channels placed face to face. The column of 6.6m effective length and supports a factored load 1500 kN also designed the lacing system.
8. Calculate the value of the least radius of gyration for a compound column consisting of ISHB250@536.6 N/m with the cover plate 300mm x 20mm on each flange.
9. Design a column to support a factored load of 1050kn.the column has an effective length of 7m with respect to z axis and 5 m with respect to y axis. Use steel of grade fe410.
10. Calculate the design compressive load which the member shown in figure can support , if the member is of 5.5m effective length. Use steel of grade fe410



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****Last Date of Submission ……..** **Section CE 41/CE 42/43**

Babu Banarasi Das -National Institute of Technology & Management, Lucknow
B. Tech Second Year (Third Semester) 2018-19
Department of Civil Engineering

DESIGN OF STEEL STRUCTURE (NCE-701)

Assignment: V (Unit 5)

NOTE-ATTEMPT ALL PARTS

1. A simply supported steel joist of 4.0 m effective span is laterally unsupported throughout. It carries a total uniformly distributed load of 40 kN (inclusive of self-weight). Design an appropriate section using steel of grade Fe 410.

2. Design a laterally supported beam for the following data :

Effective span		4 m
Maximumbendingmon=		550k–m
Maximum shear force		200 kN
Steel of grade	:	Fe 410

3. Design a simply supported beam of span 4.2m. Top compression flange is embedded in concrete floor. Beam is carrying 20 kN/m dead load and 20kN/m imposed load. Take Fe-410 grade steel section for design.

4. Determine the design building strength of ISLB 350@486 N/m considering the beam to latterly considering the beam to be laterally unsupported,the design shear V is less than the desgn shear strength.the unsupported length of beam is 3.0m.Assume steel of grade fe410.

5. Design a simply supported beam of span 5 m to carry total load of 50kN/m. The beam is laterally unsupported. Take f_y = 250MPa.
6. Explain the following :
    a. Local and lateral buckling of beam.
    b. Web crippling in beams.
7. Design laterally supported beam from the following data

    Effective span 4 m
    Maximum bending moment 550kNm
    Maximum shear force 200kN
    Steel of grade Fe-410
8. Determine the design bending strength of a beam ISMB300@434N/m. Assume that the factors shear force is less than the design shear strength use Fe410 grade Steel.
9. Design laterally unsupported beam from the following data

    Effective span 4 m
    Maximum bending moment 550kNm
    Maximum shear force 200kN
    Steel of grade Fe-410

10. Determine the design building strength of ISLB 350@486 N/m considering the beam to latterly considering the beam to be laterally supported,the design shear V is less than the desgn shear strength.the unsupported length of beam is 3.0m.Assume steel of grade fe410.

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