B.Tech 6th Semester Mid-Term Examination, 2018

Design of steel structures (011x20) **Full Marks:20**

Note: Question number 1 is compulsory. Attempt any four questions.

1. **Choose the correct option. (Any five)** **(1x5)**

a. Which of the following types of riveted joint is free from bending stresses?
   i. Lap joint
   ii. Butt joint with single cover plate
   iii. Butt joint with double cover plate
   iv. None of the above

b. The difference between gross diameter and nominal diameter for the rivets up to 25 mm diameter is
   i. 1.0mm
   ii. 1.5mm
   iii. 2.0mm
   iv. 2.5mm

c. By providing sufficient edge distance, which of the failures of riveted joint can be avoided?
   i. Tension failure of the plate
   ii. Shear failure of the rivet
   iii. Shear failure of the plate
   iv. Crushing failure of rivet

d. Bolts are most suitable to carry
   i. Shear
   ii. Bending
   iii. Axial tension
   iv. Shear and bending

e. The heaviest I-section for same depth is
   i. ISMB
   ii. ISLB
   iii. ISHB
   iv. ISWB

f. Bolt value is equal to
   i. Bearing capacity of bolt
   ii. Shearing capacity of bolt
   iii. Minimum of bearing and shearing capacity of bolt
   iv. None of these

g. Find the Bearing capacity of bolt. Given nominal diameter of bolt=20mm, f_u=410Mpa, f_{ub}=400Mpa, e=50 mm, p=50mm, thickness of plate=10mm.
   i. 104.053KN
   ii. 101.515KN
   iii. 151.4KN
   iv. None of these

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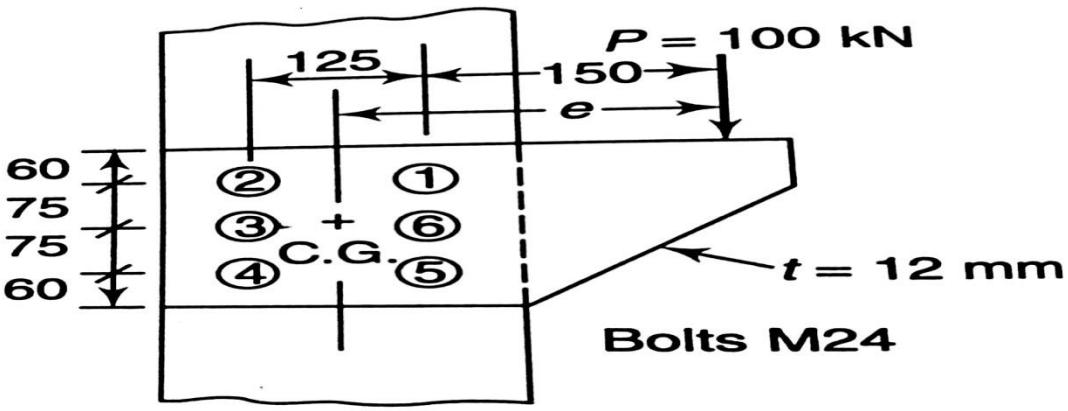
2. Write short notes on following. (1.25x4)

i. Define and differentiate between pitch and gauge for riveted joint.
ii. Define characteristic load and characteristic strength
iii. Define different load and its load combination used for analyzing the structure.
iv. LRFD Method of Design

3. Write short notes on following.

i. Limit State Method of Design 1
ii. Working State Method of Design 1
iii. Differentiate riveted and bolted connection. Which of the following connection is favored? Provide logical explanation. In which case we prefer riveted connection over bolted connection and also explain why? 3

4. Given the bracket connection shown in figure. With 24 mm-diameter grade 4.6bolts and plate of Fe410 steel, is the bolt pattern and plate adequate for the given load in bearing type connection assuming threads in the shear plane. 5



5. Design a connection to joint two plates of size 250x12 mm of grade Fe 410, to mobilize full plate tensile strength using shop fillet welds, if

i. A lap joint is used
ii. A double cover butt joint is used 5

6. Determine the design tensile strength of plate (160x8 mm) connected to 10 mm thick gusset using 16 mm bolts, as shown in Figure, if the yield and ultimate stress of the steel used are 250 MPa and 410 MPa, respectively.

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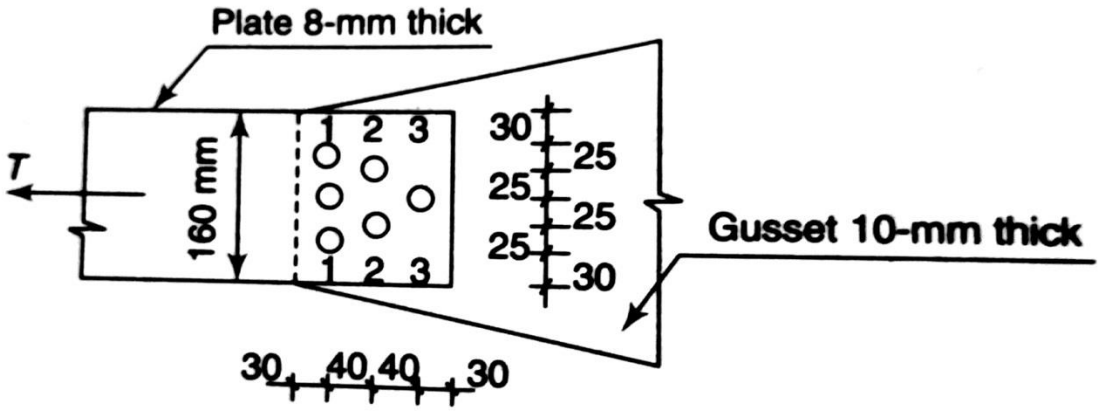

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