SUBJECT CODE NO:- K-172
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(CIVIL) Examination Oct/Nov 2016
Design of Structure - I (Steel)
(Revised)

**[Time:Three Hours]**   **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
  i) Attempt any three questions from each section.
  ii) Assume suitable data if necessary.
  iii) Figures to the right indicate full marks.
  iv) Use of IS 800-2007 and steel table is allowed.

Section A

Q.1   a.   A tie member of roof truss consists of 2 ISA 90,60,10 mm. The angles are connected on both sides 06
           of 12 mm thk gusset plate and subjected to a factored pull of 500 KN. Design welded connection if
           welding is to be done on all three sides. Assume shop welding.

      b.   Design connections for members of roof truss, with gusset plate 10 mm thk,, as shown in the fig.   07
           Using 16 mm dia. Bolt of grade 4-6.
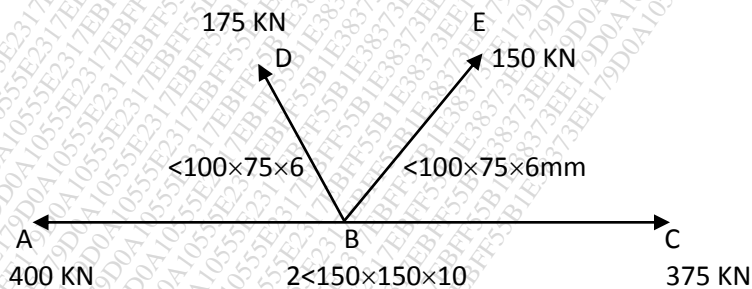
Q.2   Design suitable angle member to carry a tensile factored load of 300 KN. The length of the member is   13
      3.0m and the member is subjected to reversal of stresses. The tension member is connected to a gusset
      plate of 16 mm thk. With one line of 20mm dir. bolt of grade 8.8. Use steel of grade Fe 410.

Q.3   a)   In case of single angle strut, when the loading is eccentric, how the slenderness ratio is   03
           calculated?

      b)   A compression member of roof truss is subjected to carry axial load of 300 KN. The length of the 10
           member is 3.0 m. Design a suitable double angle section such that the angles are placed on both
           sides of 10 mm thk. Gusset plate. Also design connections using suitable dir. of bolts of grade 4.6.

Q.4   Design a built up column of 5.0 m length to carry factored axial load of 1350 KN, using lacing system. The 13
      column is restrained in position and not in direction at both the ends. Assume grade of steel as Fe 410.
      Consider bolted connections.

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Q.5   Answer the following,
       1)   Write the procedure for design of battering which should cover all the guidelines as per IS.   05
       2)   Which are the various design strengths of the tension member? Explain in detail block shear   05
            strength.
       3)   Explain,   04
            a)   Shear lag
            b)   Types of weld with neat sketches and advantages of weld

Section B

Q.6   a.   Differentiate between slab base and gusseted base.   02
       b.   A column ISHB 350 about 661.20 N/m carries an axial factored load of 1700 KN. Design suitable   11
            bolted gusset plate base. The base rests on M 15 grade concrete pedestal. Use 24 mm bolts of
            grade 4.6 for making the connections. Draw neat sketch.

Q.7   A simply supported beam of 5.50 m span carries an u.d.l. of 50 KN/m, in addition to central point load of   13
       60 KN. The flanges of the beam embedded in the concrete. Design the section and check the same for
       shear, deflection, web buckling and web crippling.

Q.8   a.   Explain the concept of curtailment of flange plate in plate girder.   02
       b.   A welded plate girder is spanning over a length of 30 m and is simply supported. It carries u.d.l. of   11
            40 KN/m and two concentrated loads of 200 KN each acting at 10 m from both the ends. It is fully
            restrained at both the ends against lateral buckling. Design the section giving following checks,
            section classification, service-ability, compression flange buckling, moment carrying capacity, web
            capacity.

Q.9   Design simply supported gantry girder to be used in an industrial building for following data,   14
       i)   Crane capacity = 120 KN
       ii)   Wt-of crane & crab = 200 KN
       iii)   Minimum clearance between crane hook and gantry girder is '1-0m'
       iv)   Wheel base = 3 m
       v)   c/c distance between gantries = 16 m
       vi)   c/c distance between gantry columns = 5.0 m
       vii)   Crane type: Electrically operated

Q.10   Answer the following,
       a)   i) Draw a neat sketch of compound fink truss showing all its components   03
            ii) How pitch and spacing is decided for a truss   02
       b)   i) How laterally unsupported beam differs from laterally supported beam?   01
            ii) How design bending strength is calculated in case of laterally unsupported beam.   04
       c)   Write short note on beam connections.   03

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