Code No. : 5036/M

FACULTY OF ENGINEERING
B.E. 3/4 (Civil) II Sem. (Main) Examination, May/June 2012
STEEL STRUCTURES

Time: 3 Hours] [Max. Marks :75

Note : *Answer **all** questions of Part **A**. Answer **five** questions from Part **B**.*

PART – A **(25 Marks)**

1. Draw the neat sketch of a
   a) Single riveted lap joint
   b) Single riveted double corer butt joint **3**
2. Diameter of the rivet hole should be greater than the nominal diameter of a rivet by about _____ for a rivet of diameter 20 mm. **2**
3. Draw a neat sketch of a column gusseted base. **3**
4. Differentiate between stiffened and unstiffened beam end connections. **3**
5. What are the various types of lateral systems available for compression members ? **2**
6. Write a short notes on column splices ? **3**
7. What are the various loads considered in the design of roof trusses ? **2**
8. Define load factor. **2**
9. State upper bound theorem. **2**
10. Design an angle purlin of length 3.5 m to carry a moment of 4KN-m. Take $\sigma_{bt} = 165$ N/mm^2. **3**

PART – B **(50 Marks)**

11. A double riveted double corer butt joint is used to connect plates 12 mm thick. Determine the diameter of the rivet, rivet value, pitch and efficiency of the joint. Adopt the following working stresses. $f_s = 100$ N/mm^2, $f_b = 300$ N/mm^2, $f_t = 150$ N/mm^2. **10**

12. Design a simply supported plated rolled steel beam to carry a udl of 65 KN/m inclusive of self weight of the beam. The effective span of the beam is 10m. The depth of the beam should not be more than 500 mm. The compression flange of the beam is laterally supported by floor construction. **10**

13. A tension member consists of an ISA 150 × 115 × 10 mm. Determine the safe axial pull it can carry if :
    i) It is connected by sufficient number of 22 mm rivets at the end.
    ii) If it is connected by suitable weld at each end. **10**

14. A beam ISMB 500 @ 86.9 kg/m transmits an end reaction of 350 KN to the flange of ISHB 300 @ 58.8kg/m. Design a stiffened seat connection. **10**

15. Design single lacing system for the composite column composed of two I sections placed back to back carrying an axial load of 1600 KN. Effective length of column is 5.5 m $f_y = 250$ N/mm^2. **10**

16. Design an angle section purlin for the following data :
    Spacing of roof truss = 4.5 m
    Spacing of purlins = 2 m
    Pitch of roof = $\frac{1}{4}$
    Weight of G.I. sheeting = 150 N/m^2.
    Wind load intensity normal to roof = 1500 N/m^2. **10**

17. A fixed steel beam of length (L) carries a udl of w/m over the entire length. Derive an expression for the collapse load. **10**
