FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester Examination, June 2014

Subject : Steel Structures

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.
PART – A (25 Marks)

1	List any six types of structural steel.	2
2	Distinguish between the working stress method and limit state method.	3
3	Give four practical examples where tension rods are used.	2
4	How the residual stresses and initial crookedness affect the strength of tension members?	3
5	Draw any six sections used as beam members.	2
6	Distinguish between web buckling and web crippling.	3
7	Why battens and laces are provided to built-up columns?	2
8	Sketch any three typical welded column bases.	3
9	Draw a typical Howe triangular truss with six panels.	2
10	Show that, for economical system, the cost of trusses is equal to cost of roof coverings plus twice the cost of purlins.	

PART – B (50 Marks)

11 a) List the advantages of high strength friction grip HSFG bolts.   5

   b) A tie member ISA 80 mm x 50 mm x 8 mm of Fe 410 grade is welded to a 12 mm thick gusset plate at site. Assuming welds on two sides, design the welds to transmit a load equal to the design strength of the member.   5

12 a) A tie member in a bracing system consists of two angles 150 mm x 115 mm x 10 mm of Fe 410 grade with long legs connected to a gusset plate by 18 mm diameter rivets in such a way that each angle is reduced in section by one rivet hole only. Determine the tensile strength of the member, if the angles are connected on the opposite sides of the gusset plate 12 mm thick and are not tack riveted. Use working stress method.   5

   b) Design a single angle discontinuous strut to carry 100 kN load. The length of strut between c/c of intersections is 3m. Use working stress method.   5

13 S single angle ISA 100 mm x 115 mm x 10 mm is connected to a 10 mm thick gusset plate at the ends with six M16 bolts of 4.6 grade in one row. Determine the design tensile strength of angle if the gusset is connected to 100 mm leg. Assume the yield and ultimate stresses of steel as 250 MPa and 410 MPa respectively. Use limit state method. 10

14 A simply supported beam of span 6 m carries a u.d.l. of 80 kN/m. Design the beam if it is laterally supported and carry-out the necessary checks. Take grade of steel as Fe 410. Use limit state method. 10

15 Design a double angle discontinuous strut to carry a factored load of 150 kN. The length of strut between c/c of intersections is 3.2 m. The two angles are placed on the same side of the gusset plate. Take grade of steel as Fe 410. Use limit state method. 10

16 Design a slab base for a column ISHB 350 to carry a factored load of 1200 kN. Assume the load is transferred to base plate by welded connections; and the column end and base plate are not machined for bearing. Take Fe 410 grade steel and M25 grade concrete. Use limit state method. 10

17 The trusses for a factory building are spaced at 5 m c/c and the purlins are spaced at 2 m c/c. The pitch of truss is ¼ and span of roof is 12 m. The vertical load from roof sheets is 200 N/m^2 and wind load normal to roof is 1400 N/m^2. Design a channel section purlin. 10

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