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**Total No. of Pages: 02**  
**Total No. of Questions: 09**

**B.Tech.(C E) (Sem.5<sup>th</sup>)**  
**Design of Steel Structure-I**  
**Subject Code: CE-303**  
**Paper ID: [A0613]**

**Time: 3 Hrs.****Max. Marks: 60****INSTRUCTIONS TO CANDIDATE:**

1. Section –A, is Compulsory. And consists of ten sub-parts carrying two marks each.
2. Attempt any four questions from Section-B.
3. Attempt any two questions from Section-C.
4. Any missing data can be suitably assumed clearly stating the same.
5. Support your answers with labelled sketches wherever possible.
6. Use of IS: 800 and Handbook on Structural Steel is allowed.
7. Marks are shown against each question.

**Section –A****(10x2=20)****Q.1.**

- (a) Compare bolted connections with riveted connections.
- (b) List advantages of HSFG bolts.
- (c) Differentiate between pitch and gauge for bolted connections.
- (d) Write short notes on Butt Joint.
- (e) List the different profiles of which are used for compression members?
- (f) Show with a neat sketch different elements of a plate girder.
- (g) What are the functions of an eaves strut?
- (h) What is curtailment of plates in plate girder and how the same is achieved?
- (i) What are the various checks performed for beam member design?
- (j) Write down the expression given in IS code for net section of angle tension members.

**Section –B****Q2.**

Two flats Fe 410 Grade steel each 210mmx8mm are to be jointed using 20mm diameter 4.6 grade bolt to form a lap joint. The joint is supposed to transfer a factored load of 260kN. Design the joint and determine the suitable pitch of the bolts. **(5)**

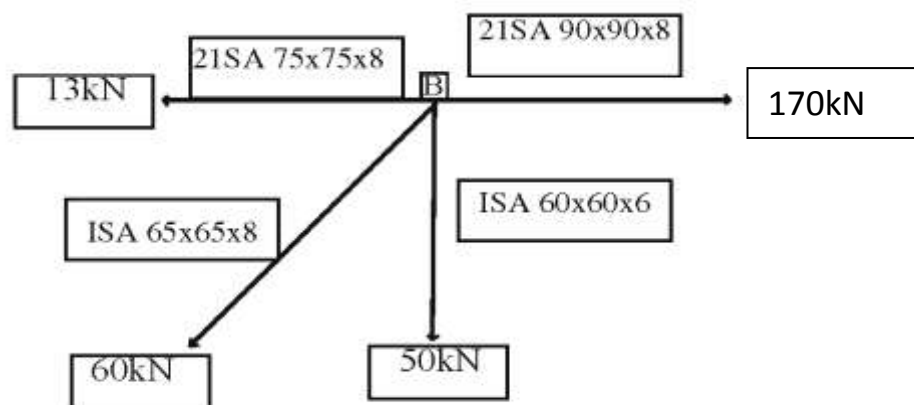
**Q3.**

Calculate the tensile strength of truss member ISA 100x75x8mm ( $F_y 250\text{N/mm}^2$ ) Which is connected to a gusset plate by 16mm diameter bolts of grade 4,6 in one row along the length of the member, at a pitch of 60mm and edge distance of 30mm. The short leg of angle is kept outstanding. **(5)**

- Q4.** An industrial building of 18m span is to be provided with a pitched roof. The supporting trusses are provided with a spacing of 4m. The purlins are spaced at a distance of 1.4m. If the pitch of the roof is  $30^{\circ}$ , Design the purlin. Take dead load of the roofing as  $160\text{N/m}^2$  live load on the roofing as  $500\text{N/m}^2$  and that of wind pressure as  $1100\text{N/m}^2$  (5)
- Q5.** A simply supported steel joist with 4.5m effective span carries a UDL of 45 KN/m. If the beam is laterally supported throughout, select a suitable section. Perform the check for deflection. (5)
- Q6.** A Column ISHB 350@ 674N/m carries an axial load of 850KN. Design suitable slab base using M20 Conc mix. (5)

**Section –C****(2x10=20)**

- Q7.** A plate girder has a simply supported span of 25m. It carries a superimposed UDL of 120 KN/m. Design the horizontal, vertical and intermediate stiffeners along with their Connections .The section of plate girder is  
 Web plate : 2090 mm x 8mm  
 Depth between the backs of flange angle: 2100mm  
 Flange angles : 150mm x150mm x 15mm  
 Cover plates for each flange : 2 plates 350mm x 15mm (10)
- Q8.** Design a built up column to support an axial load of 1200KN.The column is 8m in length and is restrained in position but not in direction at both the ends. Using single lacing system with bolted connections Design the column with two channels placed back-to-back. (10)
- Q9.** Design the joint B of a truss as shown in Fig.The members are connected by power driven rivets of 20 mm diameter in gusset plate 12mm thick. (10)



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