

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: CIVIL ENGG.**

**SEMESTER: IV
SESSION : SP/2019**

SUBJECT : CE4003 STRUCTURAL DESIGN - I

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
 6. IS Code 800: 2007 is allowed in the exam.
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- Q1 What are the assumptions for Plastic Analysis in design of steel structures? [5]
- Q2 Consider a Square cross section for which the permissible stress is 0.66 times of the yield stress. Find load factor of the section. [5]
- Q3 Two plates (Made of Fe410) of thickness 10mm each are attached together by a single bolt of grade 4.6 having nominal diameter 16mm. Calculate the shear capacity of the bolt considering the intersection of two plates lies within the threaded part of the bolt in the connection. [5]
- Q4 Consider a lap joint where two plates of thickness 16mm and 12mm respectively are connected with 4 number of bolts of grade 4.6, having nominal diameter 16mm. Steel plates are made of Fe410 grade steel. What would be the total bearing capacity of the bolts in the connection? [5]
- Q5 Consider an angle ISA 75x75x8 for which only one leg is connected to a gusset plate of thickness 8mm with one row of chain bolting having bolts of grade 5.6 with nominal diameter 20mm. Gusset plate is made of Fe410 grade steel. If we use welding instead of bolting for this connection, what would be the change in net area of the cross section? [5]
- Q6 Two plates (Made of Fe410) width 200 mm width and 16mm thickness each are attached together with 3 bolts (Each of Grade 4.6, having nominal diameter 16mm) as shown in the figure (Fig: 1). Calculate the design rupture strength of the plate in tension only for the failure line A-B-C-D-E as shown in the figure. (Consider appropriate pitch, end distance, edge distance and gauge distance as per IS 800: 2007) [5]

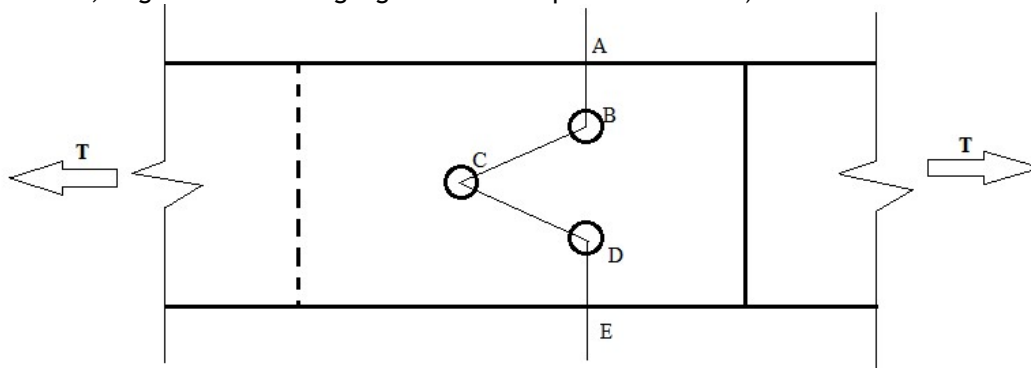


Fig: 1