

KATHMANDU UNIVERSITY  
End Semester Examination  
June/July, 2023

Marks Scored:

Level : B.Arch.  
Year : III

Course : CIEG 341  
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 29 JUN 2023

Use of code IS 800:2007 & IS 883:1994 is not allowed in this section.

SECTION "A"

[20Q.  $\times$  0.5 = 10 marks]

Encircle the most appropriate alternative from each set of choices.

- The structural advantage of using steel as a structural material is \_\_\_\_\_.  
a. Small weight-to-strength  
b. Speed of dismantling  
c. Speed of erection  
d. Scrap value
- Which of the following is **NOT** a limit state of strength?  
a. Fracture due to fatigue  
b. Rupture of the structure  
c. Brittle fracture  
d. Vibrations in structures
- If the diameter of a bolt is 20 mm then the maximum number of bolt(s) that can be accommodated in one row in a 180 mm wide flat is (are) \_\_\_\_\_.  
a. 5  
b. 2  
c. 3  
d. 6
- The shear-carrying capacity of a bolt in a double cover butt joint as compared to lap joint is \_\_\_\_\_.  
a. Half  
b. Same  
c. Twice  
d. Thrice
- In a fillet weld cross section, the throat is the \_\_\_\_\_.  
a. Leg length  
b. Minimum dimension  
c. Average dimension  
d. Maximum dimension
- For a standard 45° fillet, the ratio of size of fillet to throat thickness is \_\_\_\_\_.  
a.  $\sqrt{2}:1$   
b.  $1:\sqrt{2}$   
c. 1:1  
d. 2:1
- A steel plate is 30 cm wide and 10 mm thick. If two holes of diameter 20 mm and one hole of diameter 24 mm is made on the plate, the net section area of the plate is \_\_\_\_\_.  
a. 21.60 mm<sup>2</sup>  
b. 23.60 mm<sup>2</sup>  
c. 25.60 mm<sup>2</sup>  
d. 27.60 mm<sup>2</sup>
- The design strength of a tension member is given by \_\_\_\_\_.  
i) Axial load on member  
ii) Yielding of gross section  
iii) Block shear of end region  
a. Only (i) is correct  
b. Both (i) and (ii) are correct  
c. Both (ii) and (iii) are correct  
d. All (i), (ii) and (iii) are correct
- The effective length of a battened column is increased by \_\_\_\_\_.  
a. 5%  
b. 10%  
c. 15%  
d. 20%



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Level : B.Arch.  
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Time : 2 hrs. 30 mins.

Course : CIEG 341  
Semester : II  
F. M. : 40

*Use of code IS 800:2007, 808: 1989 & IS 883:1994 is allowed.*

SECTION "B"

Attempt *ALL* questions. Make a suitable assumptions if necessary

1. Design a built-up column 10 m long to carry service axial load of 720 kN. The column is restrained against translation at both ends but not restrained against rotation. Provide single lacing system with bolted connections. Assume steel of grade Fe 410 and ultimate strength of bolt as 400 MPa. [10]
2. A simply supported steel joist of 4.0 m effective span is laterally supported throughout. It carries a uniformly distributed load of 10 kN/m (inclusive of self-weight). Design an appropriate section using steel of grade Fe 410. Perform the necessary checks required. [10]
3. A tension member 0.95 m long is to resist a service dead load of 20 kN and a service live load of 60 kN. Design a rectangular bar of standard structural steel of grade Fe 410. Assume that the member is connected by one line of 20 mm diameter bolts having ultimate tensile strength of 400 MPa. [10]
4. An angle section ISA 80 mm × 50 mm × 8 mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate with 80mm leg at site. Design a fillet weld to carry factored axial load of 222.27 kN with welding to be done on its three sides as shown in Figure 1. [4]

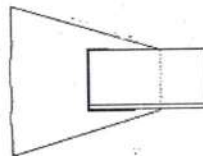


Figure 1

5. A timber beam is freely supported on supports 6m apart. It carries a uniformly distributed load of 12 kN/m and a concentrated load of 9 kN at midspan. Design a suitable section of timber made up of Sal wood. The width of timber is restricted to 250mm. Perform necessary checks. [4]
6. Briefly write about In-plane and Out-of-plane behavior of masonry wall. [2]