



# PRESIDENCY UNIVERSITY **BENGALURU**

## SCHOOL OF ENGINEERING **END TERM EXAMINATION - JUN 2023**

Semester : Semester VI - 2020 Course Code : CIV3004 Course Name : Sem VI - CIV3004 - Design of Structural Steel Elements Program : CIV

Date: 14-JUN-2023 Time: 9.30AM - 12.30PM **Max Marks**: 100 Weightage: 50%

### Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the guestion paper other than Roll Number.

### PART A

## **ANSWER ALL THE QUESTIONS**

#### 1. A tension member is a structural member that is subjected to tensile force in the direction of its longitudinal axis. They are also known as a tie member or just a tie. The type of tension member in structural steel construction is determined by the structure and method of end connections. Explain briefly the block shear failure in tension members.

## (CO2) [Knowledge]

(5 X 5 = 25M)

2. Determine the bolt value of M30 bolts and property class 4.6 used to connect two plates of thicknesses 12mm and 10mm respectively. Assume the tolerances, pitch and end distances suitably as per IS800: 2007.

(CO1) [Knowledge]

3. Two plates of width 200mm and thickness 10mm are to be connected by providing lap joint. Determine the strength of the fillet weld provided. Assume the size of the weld as per codal provisions.

(CO1) [Knowledge]

4. A tension member is a structural member that is subjected to tensile force in the direction of its longitudinal axis. They are also known as a tie member or just a tie. With the help of neat sketches mention the use of tension members in structural applications.

(CO2) [Knowledge]

5. A compression member is a very commonly encountered structural member whose function is to receive a compressive force. A compression member is known by various terms like column, stanchion, strut etc. With the help of neat sketches mention the use of compression members in structural applications.

(CO3) [Knowledge]

## ANSWER ALL THE QUESTIONS

## (3 X 10 = 30M)

**6.** Determine the tensile strength of the angle section ISA 150 x 75 x 10 mm connected to the gusset plate of thickness 10mm by longer leg of the angle. Use bolts of your choice for the end connection.

(CO2) [Comprehension]

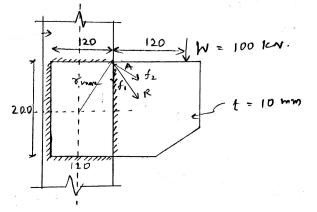
- 7. Design a suitable weld for ISA 125 x 75 x 10 mm to carry a service load of 200 kN. Angle is connected to a gusset of thickness 12mm. Provide weld only along horizontal direction. Determine the lapping length of angle section.
  (CO1) [Comprehension]
- 8. Determine the safe load on ISHB 300 @ 58.8 kg/m column section having length 3.5 m. Ends of the column are hinged and buckling of column takes place along minor axis. Take fy = 250 MPa and E = 200 GPa. Solve from the first principles using IS800: 2007. (CO3) [Comprehension]

#### PART C

### ANSWER ALL THE QUESTIONS

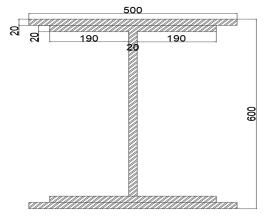
#### (3 X 15 = 45M)

**9.** Determine the size of the weld required for the bracket connection shown in the figure. Thickness of the bracket is 10mm and is connected to ISHB 400 @ 77.4 kg/m column section.



## (CO1) [Application]

**10.** Determine the safe load to be caried by the symmetrical built-up column section shown in the figure and having length 3m. Ends of the column are hinged and assume major axis buckling of column section. Take fy = 250 MPa and E = 200 GPa. Solve from the first principles using IS800: 2007.



(CO3) [Application]

**11.** Design a single unequal angle section like a tension member to carry a service load of 400 kN. Take fy = 250 MPa, fu = 410 MPa. Use M20 bolts of property class 4.6 for connection.

(CO2) [Application]