

Hall Ticket Number:

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**KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR**  
**23CE28PC603**

**III. B. Tech. II. Semester Regular Examinations, April/May- 2026**  
**STRUCTURAL ENGINEERING -II (STEEL STRUCTURES)**  
**(CE)**

Time: 3 Hours

Max. Marks: 60

Note: Question paper consists of Part-A &amp; Part-B.

i) **Part-A** for 10M, ii) **Part-B** for 50marks

- **Part A** is compulsory, consisting of 10 sub questions from all units carrying equal marks.
- **Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

| <b>PART-A (10Marks)</b> |                                                                                                                                                                                                                                       |              |            |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|
| <b>Q.No</b>             | <b>Questions</b>                                                                                                                                                                                                                      | <b>Marks</b> | <b>BTL</b> |
| <b>1.a)</b>             | Summarize the advantages and disadvantages of using steel structures.                                                                                                                                                                 | <b>1M</b>    | <b>2</b>   |
| <b>1.b)</b>             | Differentiate nominal diameter and gross diameter of bolt.                                                                                                                                                                            | <b>1M</b>    | <b>2</b>   |
| <b>1.c)</b>             | What is the use of lug angles?                                                                                                                                                                                                        | <b>1M</b>    | <b>1</b>   |
| <b>1.d)</b>             | Show the various sections are used as compression members.                                                                                                                                                                            | <b>1M</b>    | <b>1</b>   |
| <b>1.e)</b>             | How will you calculate the shape factor for various section?                                                                                                                                                                          | <b>1M</b>    | <b>1</b>   |
| <b>1.f)</b>             | Define the term built-up beam.                                                                                                                                                                                                        | <b>1M</b>    | <b>1</b>   |
| <b>1.g)</b>             | Write the equation to calculate the economical depth of plate girder.                                                                                                                                                                 | <b>1M</b>    | <b>1</b>   |
| <b>1.h)</b>             | Name the classifications in stiffeners.                                                                                                                                                                                               | <b>1M</b>    | <b>1</b>   |
| <b>1.i)</b>             | Why the sag rod in a roof truss.                                                                                                                                                                                                      | <b>1M</b>    | <b>1</b>   |
| <b>1.j)</b>             | List the various components of a roof truss.                                                                                                                                                                                          | <b>1M</b>    | <b>1</b>   |
| <b>PART-B (50Marks)</b> |                                                                                                                                                                                                                                       |              |            |
| <b>Q.No</b>             | <b>Questions</b>                                                                                                                                                                                                                      | <b>Marks</b> | <b>BTL</b> |
| <b>2. a)</b>            | Discuss the design philosophies for structural steel with reference to IS 800: 2007.                                                                                                                                                  | <b>5M</b>    | <b>3</b>   |
| <b>b)</b>               | Explain the sectional classification and properties of structural steel.                                                                                                                                                              | <b>5M</b>    | <b>5</b>   |
| <b>OR</b>               |                                                                                                                                                                                                                                       |              |            |
| <b>3.</b>               | Determine the design strength of a 22 mm diameter bolt for the cases of Lap joint, Single cover butt joint with 12 mm cover plate and double cover Butt joint with 10 mm cover plates Main plate is 16 mm thick. Use 4.6 grade bolts. | <b>10M</b>   | <b>5</b>   |
| <b>4.</b>               | Determine the suitable dimensions to design a tension member using 2 unequal angles with a 10 mm thick gusset plate. The short leg is outstanding. The pull on the member of 250 kN.                                                  | <b>10M</b>   | <b>5</b>   |

| OR    |                                                                                                                                                                                                                                                                                                                                           |     |   |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|
| 5. a) | List out the maximum values of effective slenderness ratio for various members as per IS recommendations.                                                                                                                                                                                                                                 | 5M  | 4 |
| b)    | Explain the different failure modes of column in detail.                                                                                                                                                                                                                                                                                  | 5M  | 5 |
| 6.    | A two-span continuous beam ABC has span length AB=6m and BC=6m and carries an UDL of 30 kN/m completely covering the spans AB and BC. A and C are simple supports. If the load factor is 1.8 and the shape factor is 1.15 for the I-section, Evaluate the section modulus, assume yield stress for the material as 250N/mm <sup>2</sup> . | 10M | 5 |
| OR    |                                                                                                                                                                                                                                                                                                                                           |     |   |
| 7.    | Design a beam of 5 m effective span, carrying a uniform load of 20 kN / m if the compression flanges are laterally unsupported. Assume $f_y = 250 \text{ N/mm}^2$ .                                                                                                                                                                       | 10M | 5 |
| 8.    | Explain the step-by-step procedure for design of vertical, intermediate and horizontal stiffeners in a plate girder.                                                                                                                                                                                                                      | 10M | 5 |
| OR    |                                                                                                                                                                                                                                                                                                                                           |     |   |
| 9.    | Discuss briefly the design procedure of welded plate girders with stiffeners.                                                                                                                                                                                                                                                             | 10M | 3 |
| 10.   | Discuss briefly the various elements of the roof truss and mark all its significances                                                                                                                                                                                                                                                     | 10M | 3 |
| OR    |                                                                                                                                                                                                                                                                                                                                           |     |   |
| 11.   | An industrial roof shed of size 20 m x 30 m is proposed to be constructed at Mangalore near a hillock of 160 m and slope is 1 in 2.8. The roof shed is to be built at a height of 120 m from the base of the hill. Determine the design wind pressure on the slope. The height of roof shed shall be 12 m.                                | 10M | 5 |

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