Seat No.

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MAR_APR 2026 SUMMER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Design of Steel Structures

Sub. Code: 66236/80764/81001

Day and Date: Friday ,15-05-2026 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Draw neat labelled diagrams wherever necessary**
4. **Drawings must be drawn to the given scale**
5. **Use Sketches/Diagrams wherever necessary**
6. **Use of log table and calculator is allowed**

Q1) Attempt any two of the following: **[6]**

a. Write a note on high strength friction grip bolts. **[3]**
OR
Under what circumstances does block shear failure dominate?

b. Explain various factors affecting strength of compressive members. **[3]**

Q2) Two cover plates, 10 mm and 18 mm thick, are connected by a double cover butt joint using a 6 mm thick cover plate. Find the strength of the joint. **[8]**

Q3) A single unequal angle ISA 90×60×6 mm is connected to a 10 mm thick gusset plate at the ends with five 16 mm diameter bolts to transfer tension. Determine the design tensile strength of the angle if the gusset plate is connected to the 90 mm leg. **[10]**

Q4) Attempt any one of the following: **[10]**

a. A column 4 m long has to support a factored load of 6000 kN. The column is effectively held at both ends and restrained in direction at one of the ends. Design the column section. **[10]**

b. A column consists of two channel sections connected back to back. The section used is ISMC 350 @ 42.1 kg/m. The effective length of the member is 7 m, and the width of the column is 350 mm. Both ends are hinged. Calculate the load-carrying capacity of the compression member. **[10]**

Q5) Design a gusseted base for a column ISHB 350 @ 710 N/m with two plates of size 450 mm × 20 mm, carrying a factored load of 3600 kN. The column is to be supported on a concrete pedestal constructed with M20 concrete. **[10]**

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Q6) Attempt any two of the following: **[6]**

a. Write step-by-step procedure for lacing system. **[3]**
OR
How does buckling of beam and column differ?

b. What are the loads that act on gantry girders? **[3]**

Q7) Design a simply supported beam of 10 m effective span carrying a total factored load of 60 kN/m. The depth of the section should not exceed 500 mm. The beam is laterally supported and assumes ends with stiff bearing. **[10]**

Q8) Determine the design forces acting on a simply supported gantry girder which is to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data: **[10]**

- Crane capacity = 200 kN
- Self-weight of crane girder (excluding trolley) = 200 kN
- Self-weight of trolley, electrical motor, hook, etc. = 40 kN
- Approximate minimum approach of the crane hook to the gantry girder = 1.2 m
- Wheelbase = 3.5 m
- Centre-to-centre distance between gantry rails = 16 m
- Centre-to-centre distance between columns (span of gantry girder) = 8 m
- Self-weight of rail section = 300 N/m
- Diameter of crane wheels = 150 mm
- Steel is of grade Fe410
- The support bracket connection need not be designed

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (101) Bachelor of Engineering (81001) Design of Steel Structures Part 3 SEM 5
2] (1154) B.Tech. CBCS (80764) Design of Steel Structures Part 3 SEM 5
3] (101) Bachelor of Engineering (66236) Design of Steel Structures Part 3 SEM 5

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