P265

[5257]-3002

S.Y. B.Arch. (Semester - III)
THEORY OF STRUCTURES - III (Backlog)
(2015 Pattern)

Time : 3 Hours]   *[Max. Marks : 70*

*Instructions to the candidates:*

1)   Q. nos. 1 & 5 are compulsory. Solve any two questions from 2,3 & 4 and two from 6,7 & 8.

2)   Assume Steel of grade Fe410 / E250. Yield stress = 250 N/mm².

3)   Take permissible bending stress in steel as 165 N/mm² and permissible shear stress as 100 N/mm².

4)   Take permissible tensile stress in steel as 150 N/mm².

5)   Take permissible bearing stress for bolt = 300 N/mm² and permissible shear stress for bolt as 100 N/mm².

6)   Take permissible Stress in weld = 108 N/mm².

7)   Use of Non-Programmable Scientific calculator & steel tables is allowed.

SECTION - I

Q1)   As per the sketch below,

Given, RCC Slabs S1, S2, S3 & S4 - 140 mm. thk., Floor finish load = 1.25 kN/m², Live load = 3 kN/m². Wall thickness - 230 mm

a)   Calculate load on girder B2.   **[5]**

b)   Design girder B2.   **[10]**

Assume permissible bending stress as 165 N/mm² and permissible shear stress as 100 N/mm². Check for shear and deflection. Take allowable deflection as Span/300.
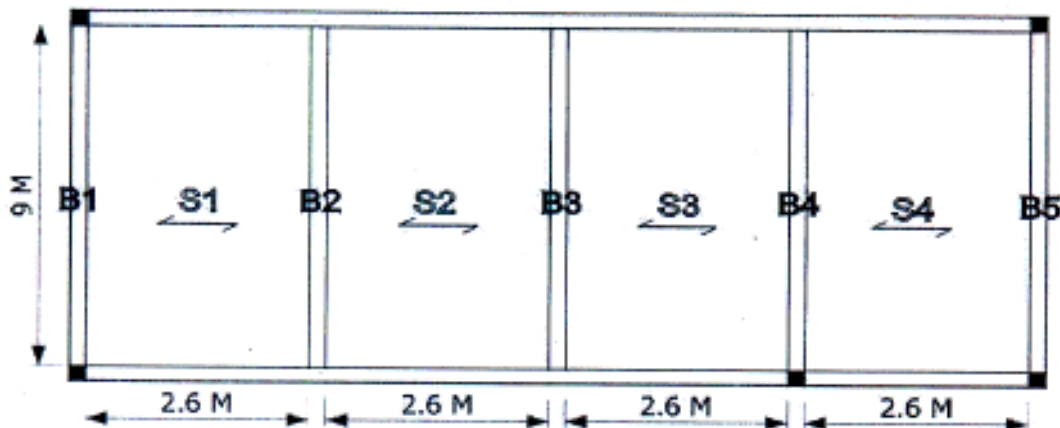
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Q2) a) What is Slenderness ratio ? Explain shortly with a sketch. **[2]**

b) Design a Stanchion for an effective height (L_e) 4.2 m to take a load of 700 kN. **[8]**

Q3) Write Short notes on any 3 of the following : **[10]**

a) Criteria for 1. Length of wall & 2. Openings in a load bearing structure.

b) Dead loads.

c) Live loads.

d) State the advantages & disadvantages of a continous beam.

e) Wind loads.

Q4) a) A fixed beam of span 8 m. carries an UDL of 15 kN/m and a central point load of 20 kN. Solve the fixed beam. **[7]**

b) What are the advantages of a fixed beam? **[3]**

SECTION - II

Q5) a) Design a steel tension member 1.5 m. long to take a force of 90 kN in a truss. **[9]**

b) Also design the bolted connection. **[6]**

Assume permissible tensile stress in steel as 150 N/mm²

Take permissible bearing stress in bolt = 300 N/mm² and permissible shear stress in bolt as 100 N/mm².

Q6) a) An ISA 75 × 75 × 8 is used as compression strut 2.1 m long to carry a load of 120 kN. It is to be welded to a gusset plate. Design the welded connection. **[6]**

Take permissible stress in weld as 108 N/mm².

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b) Explain any 2 of the following : **[4]**

 i) Advantages of bolted connections.

 ii) Disadvantages of riveted connections.

 iii) Advantages of welded connections.

Q7) Write Short notes on any 3 of the following : **[10]**

 a) Basic principles of load transfer in arches.

 b) What steel sections are recommended for 1. Stanchion, 2. Girder & 3. Strut?

 c) Common steel structures.

 d) Advantages of steel structures.

 e) Disadvantages of steel structures.

Q8) a) ISHB 350 @ 67.4 kg/m is used as a stanchion, 3.8 m. high, with both ends fixed. **[6]**

Determine its Crippling load using Euler's equation.
Given, $E = 2 \times 10^5$ N/mm^2.

 b) Explain shortly any 2 of the following : **[4]**

 i) Why are connections required in a steel structure?

 ii) Seismic load.

 iii) State any 3 cases of load transfer across lintels.

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