

Total No. of Questions : 8]

SEAT No. :

P2918

[Total No. of Pages : 3

[5062]-3002

S.Y. B. Arch.

THEORY OF STRUCTURES - III

(End Sem.)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q. no. 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 is allowed.
- 8) Allow use of steel tables.

SECTION - I

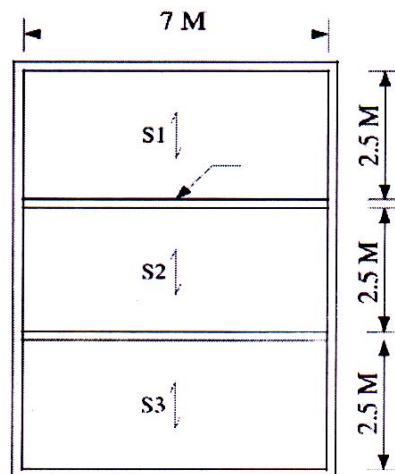
Q1) Refer to the plan given below.

Given that RCC Slabs S1, S2 & S3 are 110 mm. thk., Floor finish load = 2 kN/m², Live load = 4 kN/m².

- a) Calculate load on the girder shown with the arrow. [5]
- b) Design the same girder. [10]

Take permissible bending stress = 165 N/mm² and permissible shear stress = 100 N/mm².

Check the girder for shear and deflection. Take allowable deflection = Span /300.



P.T.O.

- Q2)** a) Explain shortly, Slenderness ratio with a sketch. [2]
 b) Design a Stanchion for an effective length (L_e) of 4 m to take a load of 750 kN. [8]

Q3) Answer any 3 of the following : [10]

- Write a short note on Seismic loads
- Write a short note on Wind loads & reversal of stresses
- Disadvantages of load bearing structures as compared to framed structures.
- Advantages & disadvantages of working stress method?
- Advantages & disadvantages of a continuous beam.

- Q4)** a) A fixed beam of span 7 m. is subjected to a full UDL of 15 kN/m and a central point load of 22 kN. Solve the fixed beam. [7]
 b) Differentiate between a fixed beam and a simply supported beam. [3]

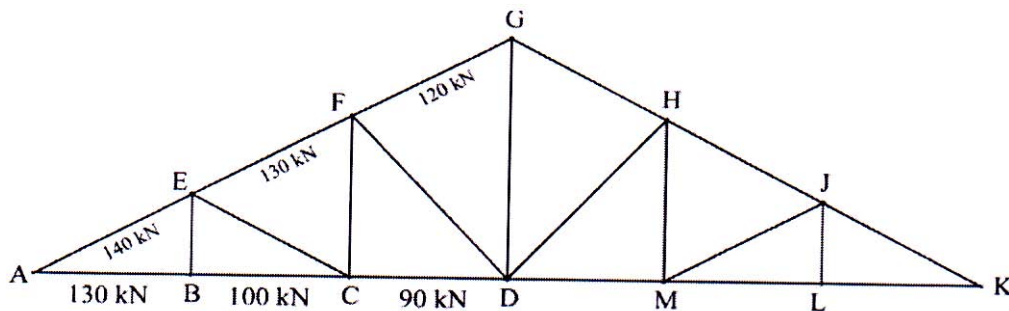
SECTION - II

Q5) Refer to the sketch of the truss below,

- Design the tension member AB to take a force of 130 kN. & [9]
- Design the bolted connection. [6]

Assume permissible tensile stress in steel = 150 N/mm².

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



Q6) a) An equal angle section, ISA $70 \times 70 \times 8$ is used as a compression strut 2.1 m in length, to take a load of 90 kN and is welded to a gusset plate. Design the welded connection. [6]

Assume permissible stress in weld = 108 N/mm^2 ,

b) Explain any 2 of the following [4]

i) Different connections used in structural steel

ii) Various rolled steel section used in building construction.

iii) Disadvantages of bolted connections.

Q7) Answer any 3 of the following : [10]

a) Write a short note on load transfer in arches with sketches.

b) What are common steel structures?

c) Any 3 cases of transfer of load across lintels.

d) Advantages of steel structures over concrete structures.

e) Draw a cross section of a rolled steel beam and identify, its parts with a sketch.

Q8) a) ISHB 300 @ 63.0 kg/m is used as a Stanchion, 6 m high, fixed at one end and hinged at the other. [6]

If $E = 2 \times 10^5 \text{ N/mm}^2$, calculate Crippling load of the stanchion.

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

i) Disadvantages of steel structures.

ii) Dead loads

iii) Live loads on buildings

