P P SAVANI UNIVERSITY

7th Semester of B. Tech. Examination
November 2022
SECV4011 Structural Design – II

17.11.2022, Thursday   Time: 10:00 a.m. To 12:30 p.m.   **Maximum Marks: 60**

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.
5. Use of IS: 456-2000, IS: 800-2007 and Steel Table is permitted.

SECTION – I

			CO	BTL
Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]	CO	BTL
(i)	Define Pitch of Bolts.		CO1	1,2,3
			CO2	
			CO3	
			CO4	
			CO5	
			CO6	
(ii)	Define Edge Distance of Bolts.			
(iii)	Write the Partial Safety Factor for the Material of Bolts.			
(iv)	Write the Equation to find the Effective Length of Filled Weld.			
(v)	Write the Partial Safety Factor for the Shop Welding.			
(vi)	Enlist the Different Modes of Failure of Tension Member.			
(vii)	Define Slenderness Ratio.			
Q - 2 (a)	Enumerate the design steps for single lacing system for column	[05]	CO1 CO2 CO4	3
Q - 2 (b)	Two Plates, 100 mm X 12 mm and 100 mm X 20 mm, are connected by Lap Joint to resist Design Tensile Load of 75 kN. Design the Lap Joint using M16 Bolts of Grade 4.6 and Grade 410 Plates.	[05]	CO1 CO2 CO4	4
	OR			
Q - 2 (a)	Explain the lap and butt joint with neat sketches.	[05]	CO1 CO2 CO3 CO4	2
Q - 2 (b)	Design Suitable Fillet Weld to connect a Tie Plate 90 mm X 8 mm to a 12 mm Thick Gusset Plate. The Plate is subjected to Load equal to Full Strength of Member. Assume Shop Welding and Fe410.	[05]	CO1 CO2 CO3 CO4	5
Q - 3 (a)	Define Effective Length of Column and Explain in detail the Short, Medium and Long Columns.	[05]	CO1 CO2 CO3 CO4	2
Q - 3 (b)	Design a Suitable Angle Section to carry a Factored Tensile Force of 210 kN using a Single Row of M20 Bolts. Take fy = 250MPa and fu = 410 MPa.	[05]	CO1 CO2 CO3	5

OR

Q - 3 (a)	Explain in detail the Shear Lag Effect.	[05]	CO1	1
			CO2	
			CO3	
			CO4	
Q - 3 (b)	Design a Double Angle Discontinuous Strut to Carry a Factored Load of 200 kN. The Length of Strut is 3.0 m between intersections. The two angles are connected back-to-back on opposite sides of Gusset Plate and tack bolted. Assume Grade Fe410 Steel with fy = 250 MPa.	[05]	CO1	5
			CO2	
			CO3	
			CO4	
Q - 4	Attempt Following (Any One)	[05]		
(i)	Explain Step by Step Design Requirements for Lacing of Built-up Columns.		CO1	2
			CO2	
			CO3	
			CO4	
(ii)	Design a Simply Supported Beam of Span 6 m carrying Working Load of 25 kN/m. Assume that Compression Flange of Beam is Laterally Restrained throughout. Check the Adequacy of Section for Shear, Bending and Deflection only.		CO1	5
			CO2	
			CO3	
			CO4	

SECTION – II

Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]		
(i)	What are different types of column bases?		CO1	1,2,3
			CO2	
			CO3	
			CO4	
			CO5	
			CO6	
(ii)	Mention 5 types of roof trusses			
(iii)	What are the conditions in plastic analysis			
(iv)	Wind load on a steel truss for an industrial building will depend on			
(v)	Formula to calculate design wind speed _____			
(vi)	What is a gantry girder?			
(vii)	Draw a neat sketch for web buckling and web crippling.			
Q - 2 (a)	Design the base plate for an ISHB 350 column to carry a factored load of 1200kN. Assume Fe 410 grade steel and M25 grade of concrete.	[10]	CO4	5

OR

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Q - 2 (a)	Design the base plate for the column subjected to factored moment of 45 kN-m and a factored load of 500kN. The column size is ISHB 250. The cube compressive strength of concrete in the foundation is fck = 25 N/mm². Use grade 410 steel.	[10]	CO4	5
Q - 3 (a)	Design a pressed steel tank for the following data: Capacity = 85000 liters Height of tank container = 2.5 m Bottom of tank bearers above ground level = 9.0 m Size of pressed plates = 1.25m x 1.25m Horizontal acceleration = 6%	[10]	CO6	5

OR

Q - 3 (a) Design the staging for the cylindrical tank for a capacity of 2,50,000 liters. The [10] CO6 5
height of the tank bottom above the ground level is 8.7m. The tank is supported
over 8 columns and is situated at the railway station in Allahabad.

Q - 4 Attempt any one/two. [05]

(i) Design a gantry girder as laterally supported beam to be used in an industrial CO5 5
building carrying a hand operated travelling crane for the following data:
Crane capacity = 50kN.
Self-weight of crane girder excluding trolley = 40 kN.
Weight of trolley car = 10 kN.
Approximate minimum approach of the crane hook to gantry girder = 1m.
Wheel base = 3m.
c/c distance between gantry rails = 14m.
c/c distance between columns = 5.5m
self-weight of rail section = 300N/m.
yield stress of steel = 250N/m².

(ii) Calculate the reactions for the steel roof truss of 16m span and resting on brick CO5 4
masonry walls. The trusses are placed 8m c/c. the rise of the truss is 1/4th of
span. Roofing is of asbestos cement sheets of dead weight 171 N/m². the wind
load normal to the roof truss is 940N/m². One end of the truss is hinged and the
other end is supported on rollers.

4m

16m

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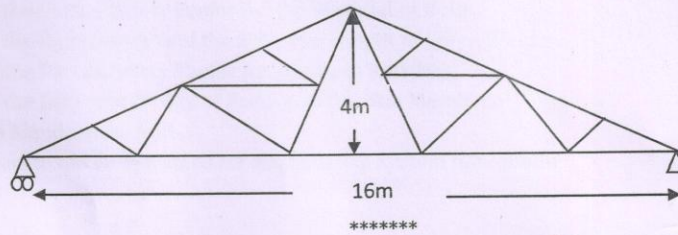
CO   : Course Outcome Number   BTL   : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create