B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

Programme: B.E. Semester: VI
Branch: Civil Engineering Duration: 3 hrs.
Course Code: 20CV6PCDSS Max Marks: 100
Course: Design of Steel Structural Elements & Software
Applications Lab
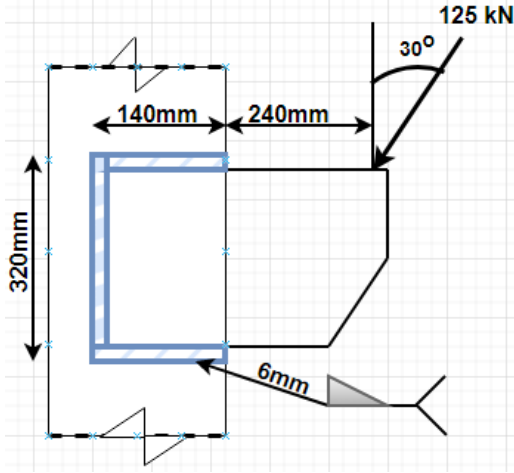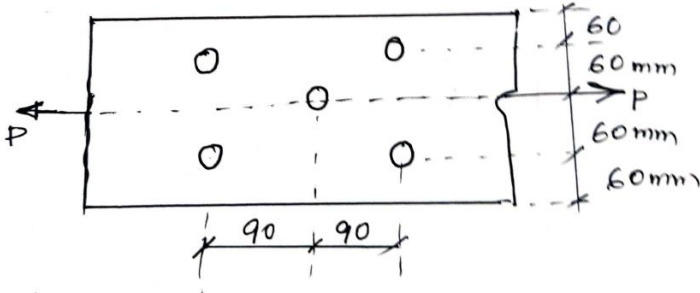
Instructions: Answer 5 full questions choosing one from each unit.
Missing data may be assumed appropriately and mentioned
Use of IS 800-2007, SP 6(1) handbook/ Steel tables are permitted
Grade of steel in all cases may be assumed as Fe410

			UNIT - I	CO	PO	Marks
1	a)		"Structural Steel is a viable material when compared with other structural material such as RCC for construction of high rise buildings/ bridges". Justify this statement suitably. What may be the limitation of structural steel?	CO1	PO1	**08**
	b)		With reference to IS-800-2007, What is "Limit state". Describe the different limit states stated in it in a detailed manner.	CO1	PO1	**07**
	c)		List the various loads and load combinations which are prescribed in IS-800-2007 for designing structural steel components	CO1	PO1	**05**
			UNIT - II			
2	a)		Explain the different modes of failure expected in bolted connections. Support your answer with suitable sketches.	CO2	PO1	**06**
	b)		Design a bolted connection between the flange of a column ISHB 300 @ 58.8 kg/m and a bracket plate 10 mm thick to carry a service load of 120 kN. The total eccentricity of the load is 250 mm from the tip of bracket to the centroid of the column. Use black bolts of 20# of grade 5.6. The plane of bracket lies in the plane of the flange of the column.	CO2	PO1	**14**
			OR			
3	a)		For the connection shown in Fig Q3(a), the load is 125 kN inclined at 30^0 to the vertical. Check whether the weld is safe? Assume weld is shop controlled.	CO2	PO3	**12**

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

Fig Q3(a)

	b)	A tie member of a truss consisting of an angle section ISA 70x70x6 mm, is welded to an 8mm- gusset plate. Design a weld to transmit a load equal to full strength of member. Assume field welding. Sketch the details neatly.	CO2	PO3	08

UNIT - III

4	a)	Design a tension member to carry a factored pull of 500kN using unequal angles back to back with long leg outstanding. The length of the member is 2.8m c/c of connection. Assume angles are connected to one side of a gusset plate of 10 mm thick.	CO3	PO3	12
	b)	Estimate the design tensile strength of the plate shown in Fig 4(b) based on net section rupture. Steel is Fe 410 grade and 16 mm diameter bolts of grade 4.6 are used. Plate thickness is 8 mm.	CO3	PO1 PO2	08

Fig Q4(b)

UNIT - IV

5		Design a laced column 9m long to carry a service load of 1200kN. The column is fixed at both ends. Provide single lacing system with bolted connection. The column consists of two channels placed back to back. Sketch the details. Use 16 mm diameter bolts of grade 4.6	CO3	PO3	20

OR

6	a)	Determine the design compressive strength for a column 5.5m long with one end hinged and the other end fixed. The section	CO3	PO3	06

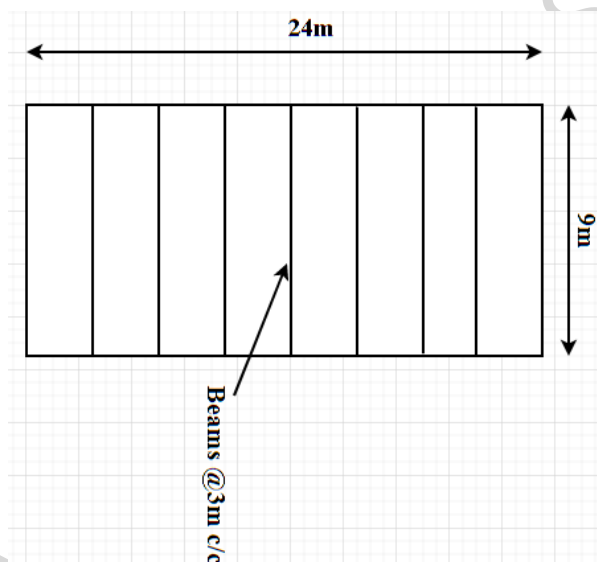|					
		of the column is ISHB350@500.31 N/m. The grade of steel is Fe410.			
	b)	Design a gusset base for a column ISHB@710 N/m with two plates 450mm x 20mm carrying a factored load of 2500kN. The column is supported on concrete pedestral of M20 grade.	*CO3*	*PO1*	**14**
		UNIT - V			
7	a)	Distinguish between laterally supported and laterally unsupported beams.	*CO3*	*PO3*	**06**
	b)	Design a simply supported beam using suitable I-sections to support the slab of a hall measuring 9m x 24m with beams spaced at 3 m c/c. The thickness of the slab is 100mm. Consider a floor finish load of 0.5 kN /m^2 and imposed load of 3 kN /m^2. Assume that an adequate lateral support is provided to the compression flange. Refer Fig Q7(b). Apply suitable checks recommended for beams as per IS 800-2007.	*CO3*	*PO3*	**14**

Fig Q7(b)

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