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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Civil Engineering **Duration: 4 hrs.**

Course Code: 21CV7PCDDG **Max Marks: 100**

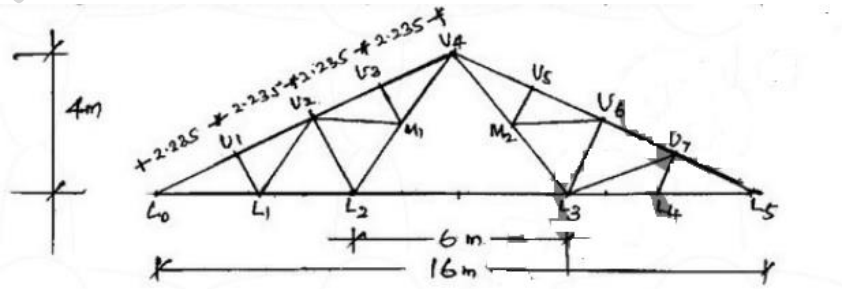
Course: Design and Drawing of RCC and Steel Structures

Instructions: 1. Answer any TWO full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
- Use of IS 456-2000, SP 16, IS 800-2007, SP(6), steel tables permitted

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.

PART A

			CO	PO	Marks
1	a)	Analyse and design a **cantilever retaining wall** to retain a **4.5 m high backfill** with the following details: **1. Backfill Details** • Type of soil: Cohesion less • Unit weight of soil, γ=18 kN/m^3 • Angle of internal friction, ϕ=30° • No surcharge load is acting on the backfill. **2. Foundation Details** • Soil bearing capacity (SBC): 200KPa **3. Materials** • Grade of concrete: M25 • Grade of steel: Fe500 Draw the reinforcement details – Sectional Elevation of stem and Cross section of retaining wall	*C01*	*P03*	**40**
	b)	Draw plan of two-way slab with corners held down for following data. Room dimension-5m x 4m Thickness of slab- 120mm Reinforcement in middle strip – Parallel to long span-8#@175c/c Parallel to short span-10#@150c/c Reinforcement in edge strip – Parallel to long span-8#@150c/c Parallel to short span-8#@100c/c. Corner reinforcement - 8#@100c/c provided as a mesh over a grid 800mm x 800mm.	*C01*	*P01*	**10**
		OR			
2	a)	Analyze and Design a **rectangular combined footing** for two columns as per **IS 456:2000**. The columns C1 (left) and C2 (right) carries a service of 700kN and 1000kN. Center to center spacing of columns is 4.6m. Given, Soil bearing capacity (SBC):	*C01*	*P03*	**40**

			130KPa.Use M25 and Mild steel. C1 is 350mm x 350mm. C2 is 400mm x 400mm. Draw the reinforcement details showing longitudinal sectional elevation and cross section.			
		b)	A rectangular beam of size 300mm x 450mm is supported on 4 columns which are equally spaced at 3.5m c/c. The column size is 300mm x 300mm. The reinforcement in beam consist of 4-16# at midspan(+ve reinforcement) in the bottom. and 4-16# at all supports (-ve reinforcement). 2-16# +ve reinforcement have been curtailed at the support. Anchor bars consist of 2-16#.Stirrups 2L-8#@200c/c. Draw reinforcement details- Longitudinal sectional elevation and cross section @ mid span and any one support.	*C01*	*P01*	**10**
			PART B			
	3	a)	Design a welded plate girder of span 24m carrying a super imposed load of 50kN/m and 2 concentrated loads of 150 kN each at one third points of the span. Assume the girder as laterally supported throughout and yield strength-250MPa. Draw i) Front elevation ii) Plan	*C02*	*P03*	**40**
		b)	A builtup column consist of 2-ISMC-300 @ 351.2N/m placed back to back at a spacing of 200mm. The individual members of built up column are connected by single lacing system consisting of lacing flats 50 ISF 12mm. One bolt of 16mm diameter is used to connect the lacing to each component. Draw the Plan and front elevation of builtup column.	*C02*	*P01*	**10**
			OR			
	4	a)	Design the principal rafter, principal tie and strut member for given forces. Design the end connections also. Principal Rafter (U1,U2) — 165 kN (C); L =2.235m Principal tie (L2, L3) — 150kN (T); L =6m Strut member (U2, L2) — 50kN (C); L = 2.24m  Draw half elevation of roof truss and support details at L_o. Assume size of bearing plate = 450mm x 450mm x 12mm.	*C02*	*P03*	**40**

		b)	A secondary beam ISLB 300 @ 369.3N/m is connected to the web of the main beam ISMB 450 @ 710.2 N/m using two framing angles ISA 150x115x10mm with top flanges of beams at the same level. Three bolts of 20mm are used to connect the each framing angle to the main beam, ISMB 450 and six bolts of 20mm diameter are used to connect the framing angle to secondary beam ISLB 300.Draw to a suitable scale front view and side view	*C02*	*P01*	**10**

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