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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: 3 hrs.**

Course Code: 22CV7PEADR **Max Marks: 100**

Course: Advanced Design of RC Structures

Instructions: 1. Answer any FIVE 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 3370 is permitted

				CO	*PO*	Marks
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.			**UNIT - I**			
	1		Design a continuous rectangular R.C. beam with 3 spans (5.5 m clear length each for first and last span; 5m clear length for middle span) to support a uniformly distributed dead load of 20 kN/m and a live load of 12 kN/m. Assume mild exposure condition. Assume M20 concrete and Fe 415 steel.	**C01**	**P03**	**20**
			OR			
	2		Design a three-span continuous R.C. beam in accordance with IS 456:2000. The beam has the following specifications: Beam Details: • Span length: 6 m each (effective) • Width: 200 mm • Overall depth: 600 mm • Support conditions: Simply supported at the ends and continuous over intermediate supports Loading Details: • Dead load (excluding self-weight): 13.5 kN/m • Live load:9 kN/m Assume mild exposure condition Materials: M 25 concrete, Fe500 steel	**C01**	**P03**	**20**
			UNIT - II			
	3		Design a flat slab for an office building with the following specifications as per IS 456:2000: **Specifications** • **Column Grid Spacing:** 6m x 6 m (square grid) • **Live Load:** 3kN/m² • **Dead Load (excluding self-weight):** 1.8 kN/m² • **Floor Finish Load:** 1 kN/m² • **Material Properties:**	**C01**	**P03**	**20**

			○ Grade of Concrete: M25 ○ Grade of Steel: Fe500			
			OR			
	4		Design a flat slab for the following conditions as per IS 456:2000. **Structure Details:** • The slab is supported on a square grid of columns spaced 5 m center-to-center in both directions. • Column dimensions: 500 mm x 500 mm. • No drop panels or column heads are provided. **Loading Details:** • Dead load (excluding self-weight): 4.5 kN/m². • Live load: 4 kN/m². **Exposure: Mild** • Grade of concrete: M25. Grade of steel: Fe500.	**C01**	**P03**	**20**
			UNIT - III			
	5		A reinforced concrete grid floor is to be designed to cover a floor area of size 12m x 18m. The spacing of ribs in mutually perpendicular direction is 2m c/c. Take Live load as 3kN /m^2 and load due to floor finishes as 0.8 kN /m^2. Assume mild exposure condition. Design the ribs of the grid floor using IS method. Assume Grade of concrete: M25and Grade of steel: Fe500.	**C02**	**P03**	**20**
			OR			
	6		Design a reinforced concrete waffle slab system for the following conditions using Rankine Grashoff method. **Structure Details:** • A hall measuring 10 m x 15 m is to be covered using a grid floor system. • Grid beams are spaced at 2m center-to-center in both directions. • The grid beams are monolithic with the supporting columns at the intersections. **Loading Details:** • Dead load (excluding self-weight of the grid beams): 3 kN/m². • Live load: 2 kN/m². **Material Properties:** • Grade of concrete: M25. Grade of steel: Fe415.	**C02**	**P03**	**20**
			UNIT - IV			
	7		Design an elevated circular water tank with a capacity of 500 kL, supported on a masonry tower. The water depth is 4 m, and the tank has a top dome. Consider the unit weight of water as 9.8 kN/m³ and a live load of 1.2 kN/m² on the dome. Design the roof dome, ring beam, and tank walls. Grade of concrete: M25 and Grade of steel: Fe415. Permissible stresses should comply with the values recommended in IS:3370 and IS: 456-2000 codes.	**C03**	**P03**	**20**

			OR			
	8		An underground water tank of size 9m x 4m x 4m is planned to store water. For the following data given below, Design the long wall and short wall of the rectangular tank for critical conditions. Type of soil- Submerged soil, γs= 18.5kN /m^3 and ϕ=30^0 Water table can rise up to ground level. Take unit weight of water = γw=9.8 kN /m^3 Take M30 concrete and Fe 415 steel. Permissible stresses should comply with the values recommended in IS:3370 and IS: 456-2000 codes.	**C03**	**P03**	**20**
			UNIT - V			
	9		The columns in a portion of a building are arranged in a grid of size 9m x 9m with their spacing of 3.0 m apart in mutually perpendicular directions. Take the SBC of soil = 190 kN /m^2. The factored load on each column can be taken as 600 kN. Assume mild exposure condition. Take the size of column = 0.4m x 0.4m. Design a mat foundation. Grade of concrete: M25, Grade of steel: Fe415	**C04**	**P03**	**20**
			OR			
	10		Design a mat foundation for a building as per IS 456:2000. The building has the following conditions: **Structure Details:** • The building is located on clay soil with a safe bearing capacity of 190 kN/m². • There are 9 columns in a 6 m x 6 m grid arrangement, equally placed apart. Each column size is 450mm x450mm • Overall service load due to all columns is 4440kN **Assume** • Grade of concrete: M30. Grade of steel: Fe500.	**C04**	**P03**	**20**

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