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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; August - 2023

Advanced Design of R.C. Structures

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Analyze, design and to prepare detailing of grid floors and yield line analysis of slabs in line with IS codal provisions.

CO2: Analyze, design and to prepare detailing of flat slabs in line with IS codal provisions.

CO3: Analyze, design and to prepare detailing of overhead circular water tanks in line with IS codal provisions.

CO4: Distinguish between Janssen's theory and Airy's theory, application of the theory in the Design of silos and analysis of shell roofs in line with IS codal provisions.

***Note**: I) **PART - A** is compulsory. **Two** marks for each question.*
*II) **PART - B**: Answer **One** full question in each unit for a Maximum of **23 marks** from each unit.*
III Use of IS456:2000 is permitted.

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**08**			
1 a.	Define grid floor.	2	L1	CO1	PO1
b.	List the advantages of flat slab.	2	L1	CO2	PO1
c.	Which force do we analyse and design the top ring beam of the water tank?	2	L1	CO3	PO1
d.	What is Silo?	2	L1	CO4	PO1
	II : PART - B	**92**			
	UNIT - I	**23**			
2 a.	A RC grid floor is to be designed to cover an area of 16 m × 12 m. The floor system is simply supported on bearing walls with ribs spaced at 1.5 m C/C in two mutually perpendicular directions. The floor is to support a live load of 4 kN/m^2, and finishes may be taken as 1 kN/m^2. Analysis and design the grids of the floor using Rankine's method. Adopt M20 concept and Fe 415 steel. Sketch the requirement details in both directions.	23	L4	CO1	PO1,3, 4,8,12
b.	List any five advantages of a yield line and then design a rectangles slab of size 4 m × 5 m that is simply supported along the edges and has to carry a service live load of 3.5 kN/m^2. Assume the Coefficient of orthotropy = 0.75. Use M25 concrete and Fe 415 steel.	23	L4	CO1	PO1,3, 4,8,12

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	UNIT - II	**23**				
3 a.	A flat stress floor system constructing of 8 panels in each direction supports a live load of 4 kN/m^2. Using the provisions of IS 456-2000 for the direct design method, design an interior panel of size 6 m × 6 m with a drop. The supporting column use 550 × 550 mm The materials used are M25 concrete and HYSD steel of grade 415. Sketch the reinforcement details of the column strips and middle strip in any direction.	23	L4	CO2	PO1,3, 4,8,12
b.	A flat slab floor system consisting of 10 panels in each direction supports a live load and floor finish of 2.5 kN/m^2 and 0.5 kN/m^2, respectively. The supporting column are 550 mm in diameter, using the provision of 15:456-2000 for the direct design method, design an interior panel of size 7 m × 7 m without drop and with a column head. The materials used are M25 concrete and HYSD steel of grade 415.Sketch the requirement details of the column strip and middle strip in any direction.	23	L4	CO2	PO1,3, 4,8,12
	UNIT - III	**23**				
4 a.	Design a top dome, top ring beam, cylindrical wall and tank floor for a flat–bottom circular elevated water tank of 9 m diameter and 3.5 m total height that is to be supported by a bottom ring beam. The bottom ring beam is to be supported by six columns equally spaced. Use M25 concrete and Fe 415 steel sketch the requirement details.	23	L4	CO3	PO1,3 4,8,12
b.	Design the top dome, top ring beam, and cylindrical wall a flat bottom elevated water tank to store 1,50,000 liters of water. The ring beam is supported by six columns, equally spaced. Adopt M-30 grade concrete and Fe-500 grade steel. Sketch the details of requirement.	23	L4	CO3	PO1,3, 4,8,12
	UNIT - IV	**23**				
5 a.	Design a silo for storing wheat with a height of 20 m and a diameter of 6 m. The conical dome has a central opening of 50 cm in diameter. Use Janssen's theory for pressure calculations. Use M25 grade concrete and Fe 415 steel. Sketch the requirement details.	23	L4	CO4	PO1,3, 4,8,12
b.	A silo with an internal diameter of 5.5 m, a cylindrical position with a height of 18 m, and a central opening of 0.5 m is to be built to store sugar .Design the silo using M25 grade of concrete and Fe 415 steel. Use Janssen's theory for pressure calculations sketch the requirement details.	23	L4	CO4	PO1,3, 4,8,12

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