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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; July / Aug. - 2022

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**			
I a.	What is grid floor?	2	L1	CO1	1,3,4, 8,12
b.	With respect to flat slabs, define; Column strip and ii) Panel.	2	L1	CO2	1,3,4, 8,12
c.	With a neat sketch, depict the structural elements of an elevated water tank.	2	L1	CO3	1,3,4, 8,12
d.	For a storage structure to be classified as a silo, what is the criteria to be satisfied with respect to h, b, ϕ, where h = height of structures b = breadth of structure, ϕ = angle of repose.	2	L1	CO4	1,3,4, 8,12
	II : PART - B	**92**			
	UNIT - I	**23**			
1 a.	A RC grid floor is to be designed to cover floor area of 12 m × 18 m. The spacing of the ribs in mutually perpendicular direction is 1.5 m c/c, live load on floor is 3 kN/m^2. Adopt M20 grade concrete and Fe415 grade steel. Assume ends are simply supported. Analyze the grid floor by Rankine's Grashoff method and design suitable reinforcement in the grid floor. Sketch the details.	23	L4	CO1	1,3,4, 8,12
b.	List any four characteristic features of yield lines and hence design a rectangular slab of size 4 m x 6 m which is simply supported along the edges and has to carry a service line load of 4 kN/m^2. Assume coefficient of orthotropy, μ = 0.75 m. Use M20 grade concrete and Fe415 grade steel. The design is restricted to bending only.	23	L4	CO1	1,3,4, 8,12

UNIT - II **23**

2 a.	Design the interior of a flat slab for a ware house to suit the following date: Size of warehouse = 24 m × 24 m divided into panels of 6 m x 6 m loading class = 5 kN/m^2. Materials – M20 grade concrete and Fe415 grade steel. Adopt diameter of column head = D = 1.5 m, slab drop = 200 mm. Sketch reinforcement details.	23	L4	CO2	1,3,4, 8,12
b.	Design an interior panel of a flat slab with panel size 5 m × 5 m supported by columns of size 500 x 500 mm. Provide suitable drop. Consider line load as 4 kN/m^2. Use M20 concrete and Fe415 steel. Sketch the reinforcement details.	23	L4	CO2	1,3,4, 8,12

UNIT - III **23**

3 a.	A circular flat bottom elevated water tank is to designed having a diameter of 9 m and total height = 3.8 m which is to be supported by ring beam. The ring beam is in turn supported by six columns which are equally spaced. Using M20 grade concrete and Fe415 grade steel, design; i) Top dome ii) Top Ring beam iii) Cylindrical wall Sketch the details.	23	L4	CO3	1,3,4, 8,12
b.	A circular elevated water tank needs to be designed to store 200 m^3 of water. The top of the tank shall be coved with a dome and bottom shall be flat. Using M25 grade concrete and Fe415 grade steel, design; i) Top dome ii) Top ring beam iii) Cylindrical wall iv) Bottom slab	23	L4	CO3	1,3,4, 8,12

UNIT - IV **23**

4 a.	i) Explain the principal involved in calculation of pressure intensity in silos by H. Janssen's and W. Airy's theories. ii) Differentiate between bunkess and silos.	23	L4	CO4	1,3,4, 8,12
b.	A cylindrical silo has an internal diameter of 6 m and 20 m deep (cylindrical portion) with a conical hopper bottom. The material stored is wheat with a density of 8 kN/m^3. Design; i) Side walls ii) Hopper Bottom Sketch the reinforcements. Adopt M20 grade concrete, Fe415 grade steel and Janssen's theory for pressure calculations.	23	L4	CO4	1,3,4, 8,12

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