Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

CIVIL ENGINEERING

U18CEE0003: Design of Reinforced Concrete Structures

(use of IS456 and SP:16 to be permitted)

COURSE OUTCOMES

CO1: Design counterfort and cantilever retaining walls.
CO2: Design underground and overhead R.C water tanks.
CO3: Analyze and design various types of slabs using yield line theory.
CO4: Design bridges as per IRC standards.
CO5: Design flat slab as per IS standards.
CO6: Apply the concepts of pre-stressing for structural elements analysis.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Describe buttressed retaining wall.	CO1	[K_2]
2.	Classify the modes of failure in retaining wall.	CO1	[K_2]
3.	List out the factors considered in designing the water tank.	CO2	[K_2]
4.	Explain how the walls are designed in rectangular water tanks while resting on ground.	CO2	[K_2]
5.	Explain any four characteristic features of yield line theory.	CO3	[K_2]
6.	Define virtual work method.	CO3	[K_2]
7.	List out various types of bridges based on super structures.	CO4	[K_2]
8.	Define flat slab.	CO5	[K_2]
9.	Distinguish between pre tensioning and post tensioning.	CO6	[K_2]
10.	List out various types of losses in prestress.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	Design a cantilever retaining wall to retain earth embankment 3m above the ground level. The unit weight of earth is 18 kN/m^3 and the angle of repose of the soil is 30°. The embankment is horizontal at the top. The safe bearing capacity of soil is 100 kN/m^2 and the coefficient of friction between soil and concrete is 0.5.	16	CO1	[K_3]

Use M20 concrete and Fe415 steel bars.

12.		Design a rectangular water tank resting on a ground for a capacity of 100 m^3. Use M25 concrete and Fe415 steel bars.	16	CO2	[K_3]
13.	a)	Find the ultimate moment carrying capacity for orthotropically reinforced rectangular slab with simply supported on all around subjected to uniformly distributed load.	10	CO3	[K_3]
	b)	Design a circular slab of diameter 5m isotropically reinforced carrying a live load of 3000 N/m^2 and floor finish as 700 N/m^2 . Use M25 concrete and Fe250 steel bars.	6	CO3	[K_3]
14.	a)	Design a circular water tank for a capacity of 5 lakh liters with flexible base resting on a ground. Use M25 concrete and Fe415 steel bars.	8	CO2	[K_3]
	b)	Find the ultimate load for isotropically reinforced square slab with simply supported on all sides subjected to uniformly distributed load.	8	CO3	[K_3]
15.	a)	Explain briefly about IRC loadings in design of bridges.	8	CO4	[K_3]
	b)	Design a interior panel of a flat slab for a building size of 24m x 24m with drops for a live load of 4 kN/m^2, panel size of 6m x 6m. Use M20 concrete and Fe415 steel bars.	8	CO5	[K_3]
16.	a)	A symmetrical I-section of size top and bottom flange as 400x100 mm and web as 100x300 mm is subjected to a pre-stressing force of 1800 kN at an eccentricity of 50 mm. It is subjected to a live load of 5 kN/m over a span of 10m. Find the extreme fiber stresses.	8	CO6	[K_3]
	b)	A pre-stressed beam 200mm x 300mm is prestressed with a wire of 160mm^2 area located at constant eccentricity of 50mm and initial stress is 1000 N/mm^2 with a prestress force of 160 kN. Calculate the total losses in the beam. Take E_s = 210 kN/m^2 , E_c = 35 kN/m^2 , ε_{ce} = 40 x 10^{-6} N/mm^2 , ε_{cs} = 300 x 10^{-6} N/mm^2. Relaxation = 4% of initial stress.	8	CO6	[K_3]

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