Reg. No.															

Question Paper Code	13441

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Seventh Semester

Civil Engineering

20CEPC702 - ADVANCED REINFORCED CONCRETE STRUCTURES

Regulations - 2020

(Use of IS 456-2000 , IS 3370 is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Cantilever retaining walls can safely be used for a height not more than (a) H (b) H/2 (c) H/3 (d) H/4	*1*	*K1*	*CO1*
2.	All are the component of retaining wall except? (a) Toe slab (b) heel slab (c) stem (d) surcharge	*1*	*K1*	*CO1*
3.	According to IS : 3370 (Part-2) permissible tensile stress in HYSD bars ? (a) 140 (b) 120 (c) 130 (d) 150	*1*	*K1*	*CO2*
4.	According to IS : 3370 (Part-2)permissible direct tensile stress in M25 grade of concrete. (a) 1.1 (b) 1.2 (c) 1.3 (d) 1.5	*1*	*K1*	*CO2*
5.	The minimum width of a stair in residential buildings, is (a) 55 (b) 75 (c) 85 (d) 100	*1*	*K1*	*CO3*
6.	The vertical member fixed between steps and hand rail, are known (a) balusters (b) strings (c) newel post (d) soffits	*1*	*K1*	*CO3*
7.	Usually raft are designed as (a)Reinforced slab (b) Reinforced concrete flat slab (c)ordinary flat slab (d)invert flat slab	*1*	*K1*	*CO4*
8.	The net pressure can be calculated for raft having width greater than (a) 6m (b) 20cm (c) 30 cm (d) 4m	*1*	*K1*	*CO4*
9.	Which method is considered totally safe from a design point of view? (a) Virtual work method (b) Equilibrium method (c) Lower bound method (d) Upper bound method	*1*	*K1*	*CO5*
10.	Which of the following is not a type of shear wall system? (a) Coupled shear wall (b) Cantilever shear wall (c) Diagonal shear wall (d)Planar shear wall	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
11.	What are the forces acting on retaining wall?	*2*	*K1*	*CO1*
12.	Describe what are the stability condition should be checked for the retaining wall.	*2*	*K2*	*CO1*
13.	Mention the reinforcement details that should be provided in water tank.	*2*	*K1*	*CO2*
14.	What are the different types of RCC water tanks?	*2*	*K1*	*CO2*
15.	Define flat slab.	*2*	*K1*	*CO3*
16.	What are the types of stair cases? Explain its components.	*2*	*K1*	*CO3*
17.	Summarize the functions of a pier.	*2*	*K2*	*CO4*
18.	What are the various types of IRC loading on bridges?	*2*	*K1*	*CO4*
19.	What is the direction of yield line in one way slab?	*2*	*K1*	*CO5*
20.	List the assumption of yield line theory.	*2*	*K1*	*CO5*
21.	List out the codes for design of shear wall.	*2*	*K1*	*CO6*
22.	Classify RC walls according to their behavior.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Design the stem of Counter fort retaining wall to retain 6m of horizontal backfill. The Density of the soil is 16 KN/m^3. Safe Bearing Capacity of the Soil=160KN/m^2. Angle of internal Friction of Soil=33^o. Spacing of counter fort is 3m c/c. Use M20 concrete and Fe415 Steel. Check the stability.	*11*	*K3*	*CO1*
		OR			
	b)	Design the stem of cantilever retaining wall to retain earth embankment 4.75m high above G.L. The density of earth is 16 KN/ m^3 and its angle of repose is 30 degrees. The embankment is horizontal at its top. The safe bearing capacity may be taken as 180 KN/m^2 & the coefficient of friction between the soil and concrete is 0.45. Adopt M20 grade of concrete and Fe415 HYSD bars. Check the stability.	*11*	*K3*	*CO1*
24.	a)	Design a Rectangular RC water tank (resting on ground) with an open top for a capacity of 70000 liters. The inside dimension of the tank may be taken as 6 m X 4 m. Use M20 grade of concrete and Fe 250 grade I mild steel. Sketch the reinforcement details.	*11*	*K3*	*CO2*
		OR			
	b)	Design a circular tank with flexible base for capacity of 4.5 lakh liters. The depth of water is to be 4.5 m, including a free board of 150 mm. Overall height of the tank is restricted to 4.8 m. Use M20 grade concrete and Fe415 grade steel.	*11*	*K3*	*CO2*
25.	a)	Design one of the flights of a dog legged stairs spanning between landing beams using the following data. Assume width of landing beam=300 mm, Number of flight=1, Riser = 150 mm, Thread = 250 mm. Assume relevant data.	*11*	*K3*	*CO3*
		OR			
	b)	Calculate the reinforcement and design the interior panel of a flat slab for a live load of 5 kN/m^2 and a column grid of 6 m x 6 m. Columns are of 600 mm diameter. Drops shall be provided. Show the reinforcement details in the flat slab. Use M20 concrete and Fe415 steel.	*11*	*K3*	*CO3*
26.	a)	Explain briefly about loads considered in the design of concrete road bridge with neat sketches.	*11*	*K2*	*CO4*
		OR			
	b)	Explain in detail about the design principles of Mat foundation.	*11*	*K2*	*CO4*
27.	a)	A circular RCC roof slab is simply supported all around with an effective of 4.5m.live load on slab is 2KN/m^2. Analyze the slab using yield line approach and design the slab.	*11*	*K3*	*CO5*
		OR			
	b)	Design a triangular slab which is simply supported on 5m×5m side, the slab carries a live load of 5 KN/m^2 and floor finish load 1 KN/m^2. Use M20 and Fe415 HYSD bars. Assume suitable data.	*11*	*K3*	*CO5*
28.	a)	A bar bell type shear wall with central part 3500 x 100 mm and two 300 x 300 mm strong bands at each end is supported on a footing 8m x 4m, which rests on soil whose modulus is 25000 kN/m^3. Determine the lateral stiffness of the wall. Assume fck = 20 and height of the wall as 12m.	*11*	*K3*	*CO6*
		OR			
	b)	Analyze the forces acting on shear walls and also explain two classification of shear wall with neat sketch.	*11*	*K3*	*CO6*