Reg. No.															

Question Paper Code	13261

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

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) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which type of retaining walls develop no tension? (a) Gravity walls (b) Cantilever walls (c) Counterfort walls (d) Buttressed walls	1	K1	CO1
2.	Which type of retaining wall can resist both the horizontal and vertical pressure? (a) Gravity walls (b) Cantilever walls (c) Counterfort walls (d) Buttressed walls	1	K1	CO1
3.	Cantilever retaining walls can safely be used for a height not more than (a) 3 (b) 4 (c) 5 (d) 6	1	K1	CO1
4.	According to the shape which of the following is not a type of water tank? (a) Circular (b) Conical (c) Rectangular (d) Spherical	1	K1	CO2
5.	Which grade of concrete is commonly adopted for construction of water tanks? (a) M30 (b) M40 (c) M45 (d) M10	1	K1	CO2
6.	Which design method is used for the design of water tank (a) Working stress (b) limit stress (c) both a and b (d) none of these	1	K1	CO2
7.	A Stair turning through one right angle is known as a _____ stair (a) Quarter turn (b) Half turn (c) Dog legged (d) Open navel	1	K1	CO3
8.	_____ stairs have any geometrical shape and they require no newel posts (a) helical (b) circular (c) dog legged (d) geometrical	1	K1	CO3
9.	The vertical portion between each tread on the stair is called (a) Going (b) Nosing (c) Winder (d) Riser	1	K1	CO3
10.	A structure that allows water to flow under a road, rail road trail or similar obstruction from one side to the another side is called (a) Drainage (b) bridges (c) tunnels (d) culverts	1	K1	CO4
11.	Usually raft are designed as (a) Reinforced slab (b) Reinforced concrete flat slab (c) ordinary flat slab (d) invert flat slab	1	K1	CO4
12.	The net pressure can be calculated for raft having width greater than (a) 6m (b) 20cm (c) 30cm (d) 4m	1	K1	CO4
13.	A triangular slab is clamped along the three edges and subjected to a point load p away from the _____ and corners. (a) edges (b) center (c) bottom half (d) top half	1	K1	CO5
14.	Yield pattern 2 is found in a_____ slab. (a) One-way (b) Simply supported (c) Two-way (d) Continuous	1	K1	CO5
15.	In the context of yield line analysis, which condition primarily influences the choice of yield pattern for a simply supported rectangular slab? (a) Aspect ratio (b) Load type (c) Material properties (d) Temperature	1	K1	CO5
16.	The fan pattern of yield lines is mainly used to determine the collapse loads of _____ slabs. (a) triangular and circular (b) rectangular and square (c) hexagonal and elliptical (d) polygonal and trapezoidal	1	K1	CO5

17.	Which of the following is not a benefit of using a shear wall system in a building? (a) Increases seismic resistance (b) Reduces building sway (c) Reduces foundation loads (d) Increases floor area	*1*	*K1*	*CO6*
18.	What is the maximum allowable deflection for a shear wall? (a) L/500 (b) L/400 (c) L/300 (d) L/200	*1*	*K1*	*CO6*
19.	Which type of shear wall system is used for tall buildings with irregular shapes? (a) Coupled shear wall system (b) Cantilever shear wall system (c) Diagonal shear wall system (d) Planar shear wall system	*1*	*K1*	*CO6*
20.	What is the recommended spacing of vertical reinforcement bars in a shear wall? (a)150 mm (b) 200 mm (c) 300 mm (d) 250 mm	*1*	*K1*	*CO6*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	What are the stability conditions should be checked for the retaining wall?	*2*	*K1*	*CO1*
22.	What is retaining wall?	*2*	*K1*	*CO1*
23.	Name the three factors that must be considered while designing a RCC tank.	*2*	*K1*	*CO2*
24.	What are the methods available for analysis of circular water tank?	*2*	*K1*	*CO2*
25.	Summarize under what circumstances flat slab construction is preferred.	*2*	*K2*	*CO3*
26.	What is the load acting on stair cases?	*2*	*K1*	*CO3*
27.	Sketch the cross section of a box culvert and indicate the components.	*2*	*K1*	*CO4*
28.	List the components of a bridge.	*2*	*K1*	*CO4*
29.	Draw the typical yield line pattern in reinforced concrete slab.	*2*	*K1*	*CO5*
30.	Define shear wall.	*2*	*K1*	*CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Design the stem of the Cantilever retaining wall to retain 5m of horizontal backfill. The Density of the soil is 17 KN/m^3 Safe Bearing Capacity of the Soil=165 KN/m^2 Angle of internal Friction of Soil=30^o. The Coefficient of friction between base slab and concrete is 0.50. Factor safety against sliding and over turning is 1.45 Use M20 concrete & Fe415 HYSD bars. Check the stability.	*10*	*K3*	*CO1*
		OR			
	b)	Analyze the different types of retaining walls their forces with neat sketches.	*10*	*K3*	*CO1*
32.	a)	Design a circular tank with a fixed base with a capacity of 3 lakh litres. The depth of water is 3.5m and free board is 150mm. Use M20 grade concrete. Permissible stress in concrete is 1.0 N/mm^2 and steel is 100 N/mm^2. Sketch the reinforcement details of tank wall.	*10*	*K3*	*CO2*
		OR			
	b)	A reinforced concrete water tank resting on ground is 6m x 2m with a maximum depth of 2.5m. Using M20 concrete and grade I Steel, Design the tank walls.	*10*	*K3*	*CO2*
33.	a)	Design an Interior Panel of a flat slab of size 5m x 5m without providing drop and column head. Size of column is 500 x 500 mm and the live load on the panel is 4 kN/m^2.Take floor finishing load as 1 kN/m^2. Use M20 concrete and Fe_{415} steel.	*10*	*K3*	*CO3*
		OR			
	b)	Design a dog legged stair case for a room of 4.5m wide the height between floors is 4m.Use M 20 grade of concrete & Fe415 grade of steel. Assume Relavent Data.	*10*	*K3*	*CO3*

34.	a)	Explain briefly about loads considered in the design of concrete road bridge with neat sketches.	*10*	*K2*	*CO4*
		OR			
	b)	Explain in detail about the design principles of box culvert.	*10*	*K2*	*CO4*
35.	a)	Derive the expression for calculating the ultimate moment (virtual work method) for simply supported square slab.	*10*	*K3*	*CO5*
		OR			
	b)	A right angled triangle simply supported slab the adjacent edges AB and BC. The side AB=4M and BC=3m and CA=5m .The slab is isotropically reinforced with 10 mm diameter at 100mm c/c at an effective depth of 120mm and D=150mm.Use M20 grade of concrete and Fe415 HYSD bars. Determine permissible live load by using yield line theory.	*10*	*K3*	*CO5*
36.	a)	Analyze in detail about general dimensions of rectangular shear walls, vertical and horizontal reinforcements and strength Requirements of shear wall.	*10*	*K3*	*CO6*
		OR			
	b)	A bar bell type shear wall with central part 3500 x 100mm and two 300 x 300mm strong bands at each end is supported on a footing 8m x 4m, which rests on soil whose modulus is 25000kN/m^3. Determine the lateral stiffness of the wall. Assume fck = 20 and height of the wall as 12m.	*10*	*K3*	*CO6*