Total number of printed pages: **Programme(UG)/Semester 4th/UCE 404**

2025

Concrete Technology

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **Q1** and **any four** from the rest questions.*

1.	a)	Match the following. i) Tamping — a) bridge floors, road slabs ii) platform vibrator — b) concrete cubes iii) surface vibrator — c) floor slab iv) rodding — d) pipes, poles v) centrifugation method — e) railway sleepers	5
	b)	Fill in the blanks, i) _____ imparts quick setting property to the cement and alkaline matter causes _____. ii) _____ hydrates rapidly and contributes to early strength whereas _____ hydrates little later and contributes to strength after 7 days. iii) The amount of gypsum to be added depends upon _____ and _____ content. iv) As the concrete in phase-II is in fluid state, therefore this phase is used for _____ and _____ of concrete. v) As surface smoothness increases, contact area _____ hence a highly polished particle will have _____bonding area with the matrix.	5x2=10
	c)	What is M20?	2
	d)	Mention the curing method for the following, i) For laboratory specimens like concrete cubes. ii) For slabs or floors. iii) Curing of concrete in remote places where there might be as acute shortage of water.	3
2.	a)	What is bond strength? How it develops?	5
	b)	Differentiate between fresh concrete and hardened concrete. Also enlist their properties which determine their respective quality.	6
	c)	Curing plays an important role in concrete strength and durability, Justify.	5

	d)	Give any 4 problems which generally occurs due to poor compaction.	4
3	a)	What are retarders? Discuss any four areas where retarders are to be used in concrete.	6
	b)	How rapid hardening Portland cement is different form low heat Portland cement? Also discuss its area of application.	6
	c)	Discuss hydration of cement. Give a suitable diagram showing the different phases of the hydration process. Also discuss what happens in phase 4 and 5.	2+1+4
4	a)	At what condition the risk of segregation is found to be greater?	6
	b)	What do you understand by the term rheology of fresh concrete? Also enlist the parameters that are considered in rheology of fresh concrete.	2+3
	c)	Discuss the two parameters that measure the stability of the mixture.	5
	d)	What are air entrained admixtures? Also enlist the properties which are supposed to be modified in fresh concrete.	2+3
5.	a)	How segregation, bleeding and laitance are reduced greatly by air entrainment?	6
	b)	Why slump loss occurs in concrete? Give any 5 steps/actions that can be adopted to manage the slump loss?	2+5
	c)	What is the action of plasticizers? Also discuss the mechanisms involved in this process.	2+5
6	a)	How destructive testing is different from non-destructive testing?	4
	b)	What does dimensional stability of a construction material refers to? What are the phenomena's that comprises the dimentional stability of concrete?	5
	c)	How plastic shrinkage occurs in concrete? Give its appearance and preventive measures.	6
	d)	Define instantaneous strain and creep in concrete. What are the detrimental effects of creep in concrete?	5
7	a)	How the accepted nominal size of aggregate is calculated for heavily reinforced concrete?	3
	b)	What is reduction ratio of aggregate?	2
	c)	How design mix concrete is different from nominal concrete mix? Give examples.	5
	d)	Calculate the following for M30 grade. i) Target strength ii) Approximate air content. iii) Water content iv) Cement content v) Proportion of volume of coarse aggregate and fine aggregate content. Given, cement =OPC 43 Maximum nominal size of aggregate = 20mm Workability = 75mm (slump) Superplasticizer = water content reduction by 22%	10