BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: PG/PRE-PHD **SEMESTER: I**
BRANCH: CIVIL & ENV.ENGG **SESSION : MO/2023**

SUBJECT: CE511 ADVANCED CONCRETE TECHNOLOGY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	In a concrete batching plant, 37 concrete cubes were tested. Compressive strength of these cubes is given below. No. of Samples — Cube strength (MPa) 1 — 23.2 2 — 23.6 4 — 24.0 7 — 24.4 9 — 24.8 7 — 25.2 4 — 25.6 2 — 26.0 1 — 26.4 Calculate the mean strength and standard deviation.	[5]	3	K3
Q.1(b)	Explain the meaning of M25 grade concrete and Characteristics strength of concrete. Knowing the standard deviation as calculated above, determine the target mean strength of M25 grade concrete with and without using super-plasticizer as per IS:10262-2019.	[5]	3	K1
Q.2(a)	Classify different chemical admixtures as per American Concrete Institute / Indian standard and describe their main function.	[5]	1	K1
Q.2(b)	Explain the mechanism of improving workability of concrete by using super-plasticizers. Describe other benefits of using super-plasticizers.	[5]	1	K2
Q.3(a)	Explain heat of hydration. Describe the methods to reduce temperature difference between the core and surface in mass concrete and their purpose. Draw and explain the graph showing the relation between the rate of evolution of heat and age of concrete in hours.	[5]	4	K3
Q.3(b)	For a concrete mix of Cement : CA : FA : W as 1:3.5:4.3:0.8, and assuming that 70% of the cement is hydrated after 14 days, calculate a) Volume of hydrated cement paste, b) Volume of capillary pores, c) Volume of Gel Pores and d) Total void content in the concrete. Use specific gravity of Cement, CA, FA as 3.15, 2.67 and 2.6 respectively and entrapped air content as 1%.	[5]	2	K2
Q.4(a)	Differentiate between porosity and permeability of concrete. Explain the process of corrosion on reinforcement bars in concrete.	[5]	2	K2
Q.4(b)	Explain the mechanism of chloride attack and carbonation and their effect on durability of concrete. Describe the measure of preventing chloride attack.	[5]	4	K3
Q.5(a)	Describe the process of using demolition concrete debris for making new concrete structures and the precautions to be taken. Explain the reasons for not using steel slag for RCC structures.	[5]	1	K2
Q.5(b)	Write a short note on self-compacting concrete – meaning, purpose, usage, curing and benefits.	[5]	1	K1

::::::22/11/2023::::::E