Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – WINTER • 2014

Subject Code: 130605 Date: 18-12-2014

Subject Name: Concrete Technology

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Design a concrete mix for M30 grade of concrete for severe exposure condition for RCC work as per IS:10262-1982 for 1 bag of cement for the following data. **14**

Maximum size of aggregate (Angular) : 20 mm
Water-Cement ratio : 0.48
Specific gravity of Cement : 3.10
Specific gravity of Fine Aggregate : 2.6
Specific gravity of Coarse aggregate : 2.65
Water Absorption of Fine Aggregate : Nil
Water Absorption of Coarse aggregate : 0.50%
Free surface moisture on Fine Aggregate: 1%
Compaction Factor :0.85 Targeted Slump: 50 mm
Sand Zone: III Take standard deviation: 5
and Tolerance factor: 1.65
Use Table 1 to 4.

Q.2 **(a)** **Answer following questions in short.** **07**

1. Why gypsum is added during the process of manufacturing of Cement?
2. What is the effect of size of aggregate on workability?
3. What is the effect of Water cement ratio on compressive strength of Concrete?
4. Define fineness modulus.
5. Give the value of initial and final setting time for OPC cement.
6. What is the allowable maximum w/c ratio for RCC?
7. Which property of cement is measured by Soundness test?

(b) Enlist different types of Chemical and Mineral admixture. Explain any one of each in detail. **07**

OR

(b) Explain dry process for manufacturing of cement. **07**

Q.3 **(a)** Define workability. Enlist the test for measurement of workability. Explain compaction factor test. **07**

(b) What is NDT? Explain ultrasonic pulse velocity test in detail. **07**

OR

Q.3 **(a)** Define standard consistency of cement. Explain test for compressive strength of cement. **07**

(b) Enlist the test performed on hardened concrete specimen. Explain any one in detail. **07**

Q.4 **(a)** Write short note on segregation and bleeding. **07**

(b) Explain factors affecting hot weather concreting. **07**

OR

Q.4 **(a)** Write short note on permeability of concrete. Explain factors affecting permeability of concrete. **07**

(b) Write short note on underwater concreting. **07**

Q.5 **(a)** Write short note on pumped concrete. **07**

(b) Write short note on alkali aggregate reaction and sulfate attack. **07**

OR

Q.5 **(a)** Enlist different repairing materials. Explain repairing techniques for concrete. **07**

(b) Define flakiness and elongation index of aggregate. Explain aggregate impact test. **07**

Table-1 Approximately Sand and water content per m^3 of concrete for grade upto M35

Nominal maximum size of aggregate mm	Water content per meter cube of concrete in Kg	Sand as % of total aggregate by absolute volume
10	208	40
20	186	35
40	165	30

Table-2 Approximate air Content

Nominal Maximum size of Aggregate mm	Entrapped air as % of volume of concrete
10	3.0
20	2.0
40	1.0

Table-3 Adjustment in values of Water and Sand content for other condition (Other than Sand Zone II, W/C ratio 0.6 and Compaction Factor 0.8)

Change in Conditions	**Adjustment Required in**	
	Water Content	**% Sand in total Aggregate**
For sand confirming to grading Zone I, Zone III or Zone IV	0	+1.5% for Zone I -1.5% for Zone III -3% for Zone IV
Increase or Decrease in the value of compacting factor by 0.1	±3%	0
Each 0.05 increase or decrease in water-cement ratio	0	±1%
For Rounded Aggregate	-15 kg	-7%

Table-4 Minimum Cement content and Maximum W/C ratio for 20 MSA (IS-456-2000)

Sr. No.	**Exposure**	**Reinforced Concrete**		
		Minimum Cement Content kg/m3	**Maximum free W/C ratio**	**Minimum Grade of Concrete**
1	Mild	300	0.55	M20
2	Moderate	300	0.50	M25
3	Severe	320	0.45	M30
4	Very Severe	340	0.45	M35
5	Extreme	360	0.40	M40

****