

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

# GUJARAT TECHNOLOGICAL UNIVERSITY

SEMESTER– 3 EXAMINATION – WINTER 2012

**Subject code: 130605**

**Date: 03/01/2013**

**Subject Name: Concrete Technology**

**Time:10:30 – 01:00**

**Total Marks: 70**

## Instructions:

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

- Q.1** (a) What are the Bogue compounds of Portland cement? Write the different grades of OPC with their compressive strength, according to BIS. **07**
- (b) What is soundness of cement and how is it tested, describe in details. **07**
- Q.2** (a) Design a concrete mix using DOE method for a reinforced concrete work for the following data: **10**  
Desired slump = 50mm.  $k=1.65$   
Wet density of concrete is  $2400 \text{ kg/m}^3$   
The proportion of fine aggregate is 30%.  
Required characteristic compressive strength = 35 MPa at 28 days  
Type of cement used = sulphate resisting Portland cement  
Maximum size of aggregate = 20mm  
Type of aggregate = uncrushed  
Specific gravity of aggregate = 2.65  
Fine aggregate conforms to the grading zone III with percentage passing 600 micron sieve being 70%  
Exposure condition is moderate.  
Standard deviation is 5.0 and defective rate is 5%  
Take water cement ratio as 0.48.  
Determine proportions of ingredients without fly ash. Use appropriate data from the tables.
- (b) Describe the importance of quality of water used for concrete. **04**
- OR**
- (b) Define plasticizers and super plasticizers and write their types? **04**
- Q.3** (a) Define Admixtures. Write the functions of Admixtures used in concrete? **07**
- (b) Define workability. What are different tests used to measure workability, describe any one in detail? **07**
- OR**
- Q.3** (a) What is curing? State different methods of curing, describe any one method. **07**
- (b) What are the stages of transformation of fresh concrete to harden concrete? Write the stages of manufacturing process of cement? **07**

- Q.4 (a)** Enlist the test perform on harden concrete and explain any one in detail. **07**
- (b)** What are the effects of shape and texture of aggregate and on the strength and workability of concrete? Write the role of gypsum in cement. **07**

**OR**

**Q.4 (a)** What are the factors effecting creep of concrete. Give the definition of creep? **07**

**Q.4 (b)** Distinguish between segregation and bleeding of concrete. **07**

**Q.5 (a)** Explain ready mixed concrete. Write their advantages? **07**

**(b)** What are the different methods of concreting under water? Explain any one in detail? **07**

**OR**

**Q.5 (a)** What are methods of concrete mixed design? Explain any one? **07**

**(b)** Discuss the repair techniques that are used to repair various types of cracks. **07**

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TABLE NO. 1

## REQUIREMENTS OF BS: 8110 PART 1-1985 TO ENSURE DUREBLITY

Minimum grade Mpa	30	35	40	45	50
Maximum w/c ratio	0.65	0.6	0.55	0.50	0.45
Maximum cement content in kg/m <sup>3</sup>	275	300	325	350	400

TABLE NO. 2

## APPROXIMATE FREE WATER CONTENT REQUIRE TO GIVE VARIOUS LEVELS OF WORKABILITY

Description	Level of workability	Very low	Low	Medium	High
	Slump, mm	0-10	10-30	30-60	60-180
	Vee-Bee, sec	>12	12-6	6-3	3-0
	Compacting factor	0.75-0.85	0.85-0.9	0.90-0.93	>0.93

TABLE NO. 3

## APPROXIMATE COMPRESSIVE STRENGTH OF CONCRETE MIXES WITH WATER –CEMENT RATIO AS 0.5 (AS PER BRITISH METHOD 1988)

Type of Cement	Type of coarse aggregate	Compressive strength MPa Age (Days)			
		3	7	28	91
Ordinary or Sulphate- resisting Portland cement	Uncrushed	22	30	42	49
	Crushed	27	36	49	56
Rapid hardening Portland cement.	Uncrushed	29	37	48	54
	Crushed	34	43	55	61

TABLE NO.4

## Water Content

Maximum size of aggregate, mm	Type of aggregate	Water content, Kg/m <sup>3</sup>			
		150	180	205	225
10	Uncrushed	150	180	205	225
	Crushed	180	205	230	250
20	Uncrushed	135	160	180	195
	Crushed	170	190	210	225
40	Uncrushed	115	140	160	175
	Crushed	155	175	190	205