

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2018**

**Subject Code:2140608**

**Date:01/12/2018**

**Subject Name:Concrete Technology**

**Time: 02:30 PM TO 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.

**MARKS**

- Q.1 (a)** How is the cement checked on site? How is the field testing important? **03**  
**(b)** Differentiate between **04**

1. Mortar and concrete
2. Setting and Hardening of cement

- (c)** Determine the Fineness Modulus for the given Sieve analysis performed on Fine aggregate **07**

|                    |       |         |         |         |           |           |           |
|--------------------|-------|---------|---------|---------|-----------|-----------|-----------|
| IS sieve size      | 10 mm | 4.75 mm | 2.36 mm | 1.18 mm | 600 $\mu$ | 300 $\mu$ | 150 $\mu$ |
| Weight retained gm | 0     | 25      | 45      | 50      | 95        | 175       | 80        |

- Q.2 (a)** Explain the effect of size, shape, texture and grading on concrete. **03**  
**(b)** Discuss the various factors affecting the workability of concrete. **04**  
**(c)** Explain different methods of curing procedure. **07**

**OR**

- (c)** Explain soundness test in detail with neat sketch and also specify its Indian standards. **07**

- Q.3 (a)** What is alkali-silica reactivity (ASR) and how is it avoided? **03**  
**(b)** What are the essential characteristics of water that can be used for mixing and curing of concrete? **04**  
**(c)** Write short note on air entrained concrete. **07**

**OR**

- Q.3 (a)** Make a list of all the factors that affect Durability of Concrete structures. **03**  
**(b)** Draw the typical stress-strain curve of concrete and explain the various modulus of elasticity **04**  
**(c)** Write short note on ready mix concrete **07**

- Q.4 (a)** Briefly explain Gel-space ratio. **03**  
**(b)** Write a brief note on “Rotary Kiln”. **04**  
**(c)** The results of compressive strength test on 15 cubes of a batch in MPa are 19, 18, 21, 24, 19, 18.5, 20, 21.5, 22, 23, 19.5, 17.5, 24, 21, 20. Find Standard Deviation and Coefficient of Variation for the batch. **07**

**OR**

- Q.4 (a)** Define admixtures and creep. **03**  
**(b)** Define the term “Bulking of aggregates”. Explain its significance with reference to concrete making. **04**  
**(c)** What are Bouge’s compounds? Explain in detail how each one of these compounds influences the strength and setting properties of cement. **07**

- Q.5 (a)** What are the Principles of concrete mix design? **03**  
**(b)** Explain the adverse effect of excessive use of admixture? **04**  
**(c)** What is non-destructive testing of in-situ fresh and hardened concretes? Discuss the pulse velocity method. **07**

**OR**

- Q.5 (a)** Using IS-10262(2009) method of mix design, find out proportions of concrete for **14**  
following data:  
Grade of Concrete: M 25  
Degree of Control: Very good  
Maximum size of Aggregate: 10 mm  
Specific gravity of Cement: 3.15  
Specific gravity of FA: 2.70  
Specific gravity of CA: 2.82  
Condition of Exposure: severe  
Workability: Slump 75-100 mm  
**Refer table 1 to 4.**

| Table 1     |                        |                    |                        |                    |           |     |
|-------------|------------------------|--------------------|------------------------|--------------------|-----------|-----|
| EXPOSURE    | RCC                    |                    | PCC                    |                    | Min Grade |     |
|             | MINIMUM CEMENT CONTENT | MAX FREE W/C RATIO | MINIMUM CEMENT CONTENT | MAX FREE W/C RATIO | PCC       | RCC |
| MILD        | 300                    | 0.55               | 220                    | 0.6                |           | M20 |
| MODERATE    | 300                    | 0.50               | 240                    | 0.6                | M15       | M25 |
| SEVERE      | 320                    | 0.45               | 250                    | 0.5                | M20       | M30 |
| VERY SEVERE | 340                    | 0.45               | 260                    | 0.45               | M20       | M35 |
| EXTREME     | 360                    | 0.40               | 280                    | 0.4                | M25       | M40 |

| Table 2 |       |                |
|---------|-------|----------------|
| No.     | Grade | Std. deviation |
| 1       | 10    | 3.5            |
| 2       | 15    |                |
| 3       | 20    |                |
| 4       | 25    | 4              |
| 5       | 30    |                |
| 6       | 35    | 5              |
| 7       | 40    |                |

| TABLE 3 |                             |                            |
|---------|-----------------------------|----------------------------|
| No      | Max. size of aggregate (mm) | Maximum Water Content (kg) |
| 1       | 10                          | 208                        |
| 2       | 20                          | 186                        |
| 3       | 40                          | 165                        |

| TABLE 4                                                                                                                                         |                                                                                                                            |          |         |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------|---------|--------|
| Nominal Maximum size of aggregate, mm                                                                                                           | Volume of coarse aggregate per unit volume of total aggregate for different zones of fine aggregate (For w/c ratio of 0.5) |          |         |        |
|                                                                                                                                                 | Zone IV                                                                                                                    | Zone III | Zone II | Zone I |
| 10                                                                                                                                              | 0.5                                                                                                                        | 0.48     | 0.46    | 0.44   |
| 20                                                                                                                                              | 0.66                                                                                                                       | 0.64     | 0.62    | 0.6    |
| 40                                                                                                                                              | 0.75                                                                                                                       | 0.73     | 0.71    | 0.69   |
| Volume of coarse aggregate per unit volume of total aggregate needs to be changed at the rate of -/+ 0.01 for every +/-0.05 change in w/c ratio |                                                                                                                            |          |         |        |