

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
END SEMESTER EXAMINATION-2015

B.Tech IV Semester

COURSE CODE: 11B11CE411

MAX. MARKS: 45

COURSE NAME: CONCRETE TECHNOLOGY

COURSE CREDITS: 04

MAX. TIME: 3 HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume suitable data if required.

Section A

(9 × 1 = 9)

1. What is bottom ash to be one of the raw materials for cement manufacturing?
2. Under normal conditions using ordinary cement, what is the period of removal of formwork?
3. Plot the stress strain curve of normal strength concrete specifying the stress percentage of ultimate stress.
4. What is mechanism of viscosity modifying mixtures.
5. What is the difficulty in performing the direct tension test of concrete?
6. When phenolphthalein indicator is used in the concrete, the colourless concrete indicates the acidic nature of concrete. (T/F)
7. As per Indian standard specifications concrete is designated into:
(a) 3 Grades (b) 5 Grades (c) 7 Grades (d) 10 Grades (e) 12 Grades.
8. Which one of the following does not react with concrete?
(a) Sewage Water (b) Sulfuric acid (c) Vegetable oil (d) Alcohol
(e) None of the above.
9. The concrete for sea water application should not be leaner than:
(a) 1:2:6 (b) 1:2:4 (c) 1:2:3 (d) 1:3 (e) 1:1:2

Section B

(3×4.5=13.5)

1. (a) A concrete mixing plant has to supply M15 grade mass concrete in large quantity to a dam project. The mix proportion has been estimated as 1:1.91:4.46 (by mass). The

concrete requires sand and gravel (CA) mixture of 30% sand and 70% gravel by mass. The natural deposits as fine pits near the dam site are found to have different compositions and their cost including transportation to the site also varies as given in the table. However, the constituents satisfy the specifications. Determine the quantities of deposit to be obtained from each source in order to minimize the cost per cubic meter.

(b) The strength of the sample of fully matured ordinary concrete is determined to be 38 MPa using maturity concept. Estimate the strength of identical concrete at 21 days when cured at an average temperature of 10° C for 8 hours and 15°C for 16 hours and 18°C for the rest of the period.

2. Discuss the bulking of sand. If sand is measured by volume and no allowance is made for the bulking of sand what will be its effect on a nominal concrete mix 1:1.5:3 for a bulking of 20 percent?
3. (a) In their composition and mechanism of action, how do superplasticizers differ from the normal water reducing admixtures? Addition of 1 to 2 percent of a normal water reducing agent to a concrete mixture may cause segregation and severe retardation. These effects do not take place in the superplasticized concrete. Explain.
(b) Mineral acids are accelerators for Portland cement, but organic acids do not show a consistent behavior. Explain.

Section C

(5×4.5=22.5)

1. Your company has been hired to perform the assessment of the damage of a building that had been exposed to a fire for 1 hour. Write a memo describing the protocol of the site investigation including what non destructive tests should be used to determine the best repair strategy for the reinforced concrete structure specifying the principles of the tests.
2. What does the strength in concrete mean? List the different types of concrete strengths. How are the compressive strength and flexural strengths determined with the detailed sketch and procedure? What is the relationship between compressive strength and flexural strength?
3. Briefly explain the causes and control of scaling and D-cracking in concrete. What is the origin of laitance and what is its significance.

4. A heavily reinforced and massive concrete structure is to be designed for a coastal location in Kolkata. As a consultant to the primary contractor; write a detailed report explaining the choice of cement type, aggregate size, admixtures, Mix proportions, concrete placement and curing procedures keeping in mind the durability considerations.
5. Design a concrete mix for grade M 20. Other data is as follows.

Maximum Size of Aggregate: 20 mm (crushed and angular)

Workability: 0.90

Exposure: Severe

Specific gravity of cement: 3.15

Specific gravity of coarse aggregates: 2.60

Specific gravity of fine aggregates: 2.60

Water Absorption: C.A- 0.50%

F.A – 1.0 %

Free surface Moisture for coarse aggregate is nil and for fine aggregates is 1%.

Fine aggregates conforming to zone III according to IS 383:1970

Maximum w/c ratio= 0.50, Take standard deviation as 4.00 with minimum cement content 320 kg/m³ and maximum free water cement ratio 0.45.

Other data as per IS 10262:1982 are specified in table 1 and table 2.

Table 1

Maximum Size of Aggregate	Water Content including Surface Water Per Cubic Metre of Concrete (kg)	Sand as per cent of Total Aggregate by Absolute Volume
10	200	28
20	180	25

Table 2

Change in Conditions Stipulated for Tables	Adjustment Required in	
	Water Content	% Sand in Total Aggregate
For sand conforming to grading Zone I, Zone III or Zone IV of Table 4, IS: 383-1979	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%