

M.E./M.Tech. DEGREE EXAMINATIONS, JANUARY 2022.

Elective

Construction Engineering and Management

CN 4071 – ADVANCED CONCRETE TECHNOLOGY

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. With rise in temperature of atmospheric air, how is the setting time of cement is affected?
2. Which is an indicator of occurrence of metal fatigue?
3. How many bags of cement required per m³ of M25 Concrete?
4. Mention any four methods of mix proportioning.
5. Why curing is required?
6. Which is the most preferred method of batching? Why?
7. When will ready mix concrete be preferred?
8. What is meant by aspect ratio of fibre?
9. "High Strength Concrete is used" in bridges. Why?
10. Mention any two factors affecting workability of concrete.

11. (a) Discuss in detail any three tests carried out to decide the suitability of the cement for building construction.

Or

- (b) Briefly discuss the following tests on aggregates :

- (i) Flakiness Index
- (ii) Elongation Index
- (iii) Abrasion resistance test

12. (a) Design a concrete mix for an airfield pavement using ACI committee method. The pavement is to be designed for a minimum compressive strength of 30 MPa at 28 days. The laboratory tests on the controlling mix show a standard deviation of 4 MPa. The specific gravity of C.A is 2.70 and its dry rodded density is 1600 kg/m³ and its maximum size is 40 mm. The specific gravity of F.A is 2.65 and its fineness modulus is 2.80. A slump of 20 mm is specified. OPC will be used. Use ACI committee method of mix design. Assume any other essential data. (Himsworth constant 1.64, w/c = 0.47, water content = 185 kg/m³, volume of CA = 0.62, density of fresh concrete 2355 kg/m³)

Or

- (b) Describe in detail the step by step procedure for mix design for bituminous concrete with an example.

13. (a) (i) Discuss briefly the compaction of concrete. (8)
- (ii) List out the equipments used for transporting of concrete. (5)

Or

- (b) (i) Explain the different methods of Curing. (8)
- (ii) Give a short note on Placing of Concrete. (5)

14. (a) Write short notes on :

- (i) Polymer Concrete
- (ii) Fibre Reinforced Concrete

Or

- (b) Explain in detail on Geo polymer and self-compacting concrete.

15. (a) Explain in detail of various tests conducting to determine the strength properties of hardened concrete.

Or

- (b) Briefly explain the properties of fresh and hardened concrete with suitable examples.

PART C — (1 × 15 = 15 marks)

16. (a) Assume that you are appointed as a site engineer for the construction of National Highway and you have to submit the detailed quality analysis of the construction materials for the same. Write a detailed description based on the various analyses to be carried out with the construction materials.

Or

- (b) Design M20 grade concrete as per Bureau of Indian Standards Method for the following data and arrive quantities per bag of cement :

Characteristic strength	:	20 N/mm ²
Maximum size of aggregate	:	20 mm
Degree of workability	:	0.90
Degree of exposure	:	Mild
Specific gravity of cement	:	3.15
Specific gravity of CA	:	2.60
Specific Gravity of FA	:	2.60
Sand conforming to zone III	:	2%
