# **INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous) Dundigal-500043, Hyderabad

B.TECH IV SEMESTER END EXAMINATIONS (REGULAR/SUPPLEMENTARY) - AUGUST 2023

Regulation: UG20

CONCRETE TECHNOLOGY

Time: 3 Hours

(CIVIL ENGINEERING)

Max Marks: 70

Answer ALL questions in Module I and II Answer ONE out of two questions in Modules III, IV and V All Questions Carry Equal Marks All parts of the question must be answered in one place only

## $\mathbf{MODULE}-\mathbf{I}$

- 1. (a) Discuss in detail about alkali aggregate reaction in concrete. How it influences the nature of concrete? [BL: Understand| CO: 1|Marks: 7]
  - (b) Explain about the property changes that occur in concrete when added with ground granulated blast furnace slag. [BL: Understand] CO: 1|Marks: 7]

## $\mathbf{MODULE}-\mathbf{II}$

- 2. (a) How will you measure the workability of concrete prepared on site? Explain in detail with the procedure and neat sketch. [BL: Understand] CO: 2|Marks: 7]
  - (b) Describe the significant variables affecting workability of concrete. Explain about the effect of time and temperature on the workability of concrete. [BL: Understand] CO: 2|Marks: 7]

### $\mathbf{MODULE}-\mathbf{III}$

3. (a) Elaborate on the effect of water cement ratio on strength and durability of concrete.

[BL: Understand] CO: 3|Marks: 7]

- (b) In concrete compression test, normally 150mm x 150mm x 150mm concrete cube samples are used for testing. Why isn't 100mm x 100mm x 100mm concrete cube samples used in the test instead of 150mm x 150mm x 150mm concrete cube samples? [BL: Apply] CO: 3|Marks: 7]
- 4. (a) Explain the procedure to determine the compressive strength of concrete.

[BL: Understand| CO: 4|Marks: 7]

(b) Write the relation between compressive strength and flexural strength of concrete. If the compressive strength of concrete achieved is 30 MPa at 28 days of testing, determine the flexural strength.
(BL: Apply| CO: 4|Marks: 7]

## $\mathbf{MODULE}-\mathbf{IV}$

- 5. (a) List out the data required for mix proportioning. Outline the effect of moisture present in sand while concrete mix- proportioning. [BL: Understand| CO: 5|Marks: 7]
  - (b) Design the concrete mix for the following date: characteristic compressive strength=40 MPa, maximum size of aggregate =20mm (angular), degree of workability=0.9 CF, degree of quality control =good and type of exposure=severe. Water absorption by CA=1% and moisture content in FA =1.5%. Assume any suitable missing data. [BL: Understand] CO: 5|Marks: 7]

6. (a) Infer the necessary test results required in order to justify that the given grade of concrete has good quality and properties for an aggressive environmental condition.

[BL: Understand| CO: 5|Marks: 7]

- (b) Design a concrete mix by BIS method with the following data
  - i) Characteristics compressive strength: 15 MPa
  - ii) Maximum nominal size of aggregated: 20 mm
  - iii) Degree of workability: 0.90
  - iv) Degree of supervision: Good
  - v) Type of exposure: Mild
  - vi) Specific gravity: Cement 3.14, Coarse aggregate 2.85, Fine aggregate 2.65
  - vii) Water Absorption: Coarse aggregate 1.9 percent, Fine aggregate Nil

viii) Water cement ratio: 0.48

Assume any other necessary data if necessary. Also calculate the quantity of cement, sands, coarse aggregate and water required per cubic metre of concrete. [BL: Apply] CO: 5|Marks: 7]

#### MODULE - V

7. (a) Discuss the properties of structural light weight concrete and its applications.

[BL: Understand] CO: 6|Marks: 7]

- (b) Write in detail about different types of concrete made with polymers. List the property and applications of geopolymer concrete. [BL: Understand| CO:6|Marks: 7]
- 8. (a) Explain SIFCON in detail along with manufacturing process. Also lists its advantages and applications. [BL: Understand] CO: 6|Marks: 7]
  - (b) Describe in detail about the various fresh properties tests to be carried out in a self-compacting concrete [BL: Understand] CO: 6|Marks: 7]

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