

**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code 

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Fifth Semester B.E. Degree Examinations, February 2025

**ADVANCED CONCRETE TECHNOLOGY**

Duration: 3 hrs

Max. Marks: 100

- Note:**
1. Answer any FIVE full questions, choosing ONE full question from each module.
  2. Missing data, if any, may be suitably assumed
  3. Use of IS CODE 10262:2019 is permitted

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<b><u>Module-1</u></b>			
1.	a. Briefly explain fibre reinforced concrete with its definition and explain the different type of steel fibres with a neat sketch.	10	(2 :1: 1.2.1)
	b. List and explain all the qualities of fibre reinforced concrete.	10	(2 :1: 1.2.1)
<b>(OR)</b>			
2.	a. What is balling effect in fiber-reinforced concrete? Discuss the causes of balling effect and how the balling effect is decreased.	10	(2 :1: 1.2.1)
	b. Discuss the advantages and disadvantages of Ferro cement.	10	(2 :1: 1.2.1)
<b><u>Module-2</u></b>			
3.	a. Define ready mix concrete. With a neat flow chart, explain the manufacturing process of ready mix concrete and write any two advantages.	10	(2 :2: 1.2.1)
	b. Explain the following with examples: (i) Water-reducing Admixtures, (ii) Retarding Admixtures, (iii) Accelerating Admixtures, (iv) Superplasticizers and (v) Air-entraining Agents	10	(2 :2: 1.2.1)
<b>(OR)</b>			
4.	Design a concrete mix for M75 grade using GGBS and Silica fume as partial replacement. Other data are given below: <b><u>Stipulations for Proportioning</u></b> (i) Grade designation: M75 (ii) Type of cement: OPC 53 grade conforming to IS 269 (iii) Silica fume: Conforming to IS 15388 (iv) Maximum nominal size of aggregate: 20 mm (v) Minimum cement content and maximum: Severe water-cement ratio to be adopted and/or Exposure conditions as per Table 3 and Table 5 of IS 456 (vi) Workability: 100mm (slump) ; (vii) Method of concrete placing: Pumping (viii) Degree of supervision: Good (ix) Type of aggregate: Crushed angular aggregate (x) Maximum cement content (OPC content): As per IS 456 (xi) Chemical admixture type: Superplasticizer-(Poly-carboxylate ether based) @ 0.5 percent	20	(3 :2: 3.1.4)

**Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)**

### **Test Data for materials**

- (i) Specific gravity of cement: 2.90
- (ii) Specific gravity of GGBS: 3 & Silica fume: 2.20
- (iii) Specific gravity of
  - i. Coarse aggregate (at SSD condition): 2.70
  - ii. Fine aggregate (at SSD condition): 2.60
  - iii. Chemical admixture: 1.145
- (iv) Water absorption
  - i. Coarse aggregate: 0.5 percent
  - ii. Fine aggregate: 1.0 percent
- (v) Moisture content: Coarse and fine aggregates- Nil
- (vi) Sieve analysis:

Grading of coarse aggregate is conforming to table 7 of IS 383 and grading of fine aggregate is falling in zone II.

**Note:** Increase 10 percent cementitious material content. Take GGBS @ 25 percent & Silica fume @ 10 % of total cementitious material content.

### **Module-3**

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|-----------|--|-----------|----------------------|
| <b>5.</b> | <b>a.</b> Write a note on No Fines concrete. List the properties of No Fines concrete.   | <b>10</b> | <b>(2 :3: 1.2.1)</b> |
|           | <b>b.</b> A light weight concrete mix is required for structural concrete work. Minimum 28-day strength of 32 N/mm <sup>2</sup> is required. Control factor = 0.75, water-cement ratio = 0.63, cement content = 460 kg and the relative density of the concrete 1700 kg/m <sup>3</sup> . Workability required is medium to high. Available aggregate is Aglite. Design the most economical mix and set out dry batch weights and find the field mix quantities as per cubic meter of concrete, if the fine and coarse aggregate contain 3 to 2 % of moisture by dry weight respectively. | <b>10</b> | <b>(3 :3: 3.1.4)</b> |

**(OR)**

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|-----------|--|-----------|----------------------|
| <b>6.</b> | <b>a.</b> Explain radiation shielding ability of concrete in detail.   | <b>10</b> | <b>(2 :3: 1.2.1)</b> |
|           | <b>b.</b> Discuss the points required to increase concrete's density against different radiations and also explain all the difficulties faced in making high density concrete. | <b>10</b> | <b>(2 :3: 1.2.1)</b> |

### **Module-4**

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|-----------|---|-----------|----------------------|
| <b>7.</b> | <b>a.</b> Define self-compacting concrete. List and explain the key benefits of self-compacting concrete in precast industry. | <b>10</b> | <b>(2 :4: 1.2.1)</b> |
|           | <b>b.</b> List and discuss the acceptance criteria for self-compacting concrete.  | <b>10</b> | <b>(2 :4: 1.2.1)</b> |
- (OR)**
- |           |   |           |                      |
|-----------|---|-----------|----------------------|
| <b>8.</b> | <b>a.</b> What is polymer concrete? List the different types of polymer concrete and explain any one with applications. | <b>10</b> | <b>(2 :4: 1.2.1)</b> |
|           | <b>b.</b> Discuss the properties and applications of polymer impregnated concrete.                                      | <b>10</b> | <b>(2 :4: 1.2.1)</b> |

### **Module-5**

9.    **a.** Explain the physical and mechanical properties of recycled aggregates and how they compare to natural aggregates.    **10**    **(2 :5: 1.2.1)**
- b.** Discuss the pozzolanic reaction of silica fume in concrete. How does it contribute to the strength and durability of concrete?    **10**    **(2 :5: 1.2.1)**
- (OR)**
10.    **a.** Write a short note on fly ash concrete with respect to its applications and properties.    **10**    **(2 :5: 1.2.1)**
- b.** Elaborate on the benefits of using GBFS concrete, including improved durability, strength, and sustainability.    **10**    **(2 :5: 1.2.1)**

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