BACHELOR OF ENGINEERING (CIVIL ENGINEERING)

FOURTH YEAR 2nd SEM. EXAM. 2023

Subject: CONCRETE TECHNOLOGY.   PART-I   TIME: 3 Hours   Full Marks: 100

(50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I (Answer all questions)	Marks (20+12+8+10=50)
1. (a) (b) (c) (d)	Write Short note Bleeding and segregation Shrinkage of concrete Sulphate attack on concrete Carbonation of concrete	5x 4 =20
2.	What do you mean by indirect tensile strength of concrete? Why direct tensile strength of concrete is not determined? Describe the procedure of measuring the indirect tensile strength in the laboratory.	2+2+8=12
3.	Describe slump flow test for measuring the workability of self-compacting concrete.	8
4.	What do you mean by workability of concrete? Describe the factors affecting the workability of concrete.	2+8=10

[Turn over

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) FOURTH YEAR SECOND SEMESTER EXAM
2023

CONCRETE TECHNOLOGY
PART- II

Time: Three Hours

Full Marks 100
(50 marks for 1ˢᵗ part)

Use a separate Answer-Script for each part
[No code or handbook is allowed, assume any suitable data]

No. of questions		Marks (50)
1.	Design a mix proportion of following concrete (15) a) Grade designation- M35 b) Type of cement -OPC 43 grade conforming to IS 8112 c) Type of mineral admixture -Fly ash conforming to IS 3812 (Part I) d) Maximum nominal size of aggregate -20mm e) Minimum cement content -320 kg/m' f) Maximum water-cement ratio -0.45 g) Workability-100 mm (slump) h) Exposure condition -mild (for reinforced concrete) j) Method of concrete placing- Pumping k) Degree of supervision -Good m) Type of aggregate -Crushed angular aggregate n) Maximum cement (OPC) content-450 kg/m' p) Chemical admixture type- Superplasticizer TEST DATA FOR MATERIALS a) Cement used- OPC 43 grade conforming to IS 8112 b) Specific gravity of cement- 3.15 c) Fly ash Conforming to- IS 3812 (Part I) d) Specific gravity of fly ash - 2.2 e) Chemical admixture- Superplasticizer conforming to IS 9103 f) Specific gravity of: 1) Coarse aggregate-2.74 2) Fine aggregate-2.74 g) Water absorption: 1) Coarse aggregate-0.5% 2) Fine aggregate-1% h) Free (surface) moisture:	15

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CONCRETE TECHNOLOGY
PART-II

Time: Three Hours

Full Marks 100

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No. of questions		Marks (50)

1) Coarse aggregate-Nil 2) Fine aggregate- Nil

g) Sieve analysis:

Table 1 Value of X (Clause 4.2)

Sl No. (1)	Grade of Concrete (2)	Value of X (3)
i)	M10, M15	5.0
ii)	M20, M25	5.5
iii)	M30, M35, M40, M45, M50, M55, M60	6.5
iv)	M65 and above	8.0

IS Sieve Sizes mm — Analys Coar Aggre Fract

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            1
20   100   1C
10    0    7
4.75
2.36

Conforming
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Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate (Clause 5.3)

Sl No. (1)	Nominal Maximum Size of Aggregate mm (2)	Water Content[1] kg (3)
i)	10	208
ii)	20	186
iii)	40	165

[1] Water content corresponding to saturated surface dry aggregate.

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No. of questions		Marks (50)

Table 3 Approximate Air Content
(Clause 5.2)

Sl No.	Nominal Maximum Size of Aggregate mm	Entrapped Air, as Percentage of Volume of Concrete
(1)	(2)	(3)
i)	10	1.5
ii)	20	1.0
iii)	40	0.8

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50
(Clause 5.5)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.54	0.52	0.50	0.48
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.73	0.72	0.71	0.69

NOTES
1 Volumes are based on aggregates in saturated surface dry condition.
2 These volumes are for crushed (angular) aggregate and suitable adjustments may be made for other shape of aggregate.
3 Suitable adjustments may also be made for fine aggregate from other than natural sources, normally, crushed sand or mixed sand may need lesser fine aggregate content. In that case, the coarse aggregate volume shall be suitably increased.
4 It is recommended that fine aggregate conforming to Grading Zone IV, as per IS 383 shall not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions.

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CONCRETE TECHNOLOGY
PART- II

Time: Three Hours

Full Marks 100
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No. of questions		Marks (50).
2)	The oxide composition of OPC is as follows: CaO (66.6%), SiO$_2$ (21.5%), Al$_2$O$_3$ (6%), Fe$_2$O$_3$ (5%), SO$_3$ (1%) Find the percentage of C3S, C2S, C3A and C4AF. What is lime saturation factor of this cement? On the basis of the result comment on this cement.	10
3) a)	Write down the chemical reactions takes place while adding water into cement.	5
b)	What is admixture. Mentions different kinds of chemical admixture	5
4)	Answer any three of the followings a) Write a short note on shotcrete process. b) Write a note on fiber reinforced concrete? c) Write a short note on Ready Mix Concrete. d) Write a short note on accelerator and retarder. e) Describe with diagram that how super plasticizer acts on concrete.	5X3 = 15