Ex/CE/PE/B/T/415A/2024

B. E. CIVIL ENGIEERING FOURTH YEAR FIRST SEMESTER EXAM 2024

CONCRETE TECHNOLOGY

PART-I (50 marks)

Time: Three Hours

Full Marks 100
(50 marks for each 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 for reinforced cement concrete with following data. CO4 Use given tables and charts. a) Grade designation- M25 b) Type of cement -OPC 53 grade conforming to IS 8112 c) Maximum nominal size of aggregate -40mm d) Minimum cement content =300 kg/m^3 e) Maximum water-cement ratio =0.5 f) Desired Workability-75 mm (slump) g) Exposure condition -moderate (for reinforced concrete) h) Degree of supervision -Good i) Type of aggregate -Crushed angular aggregate j) Maximum cement (OPC) content-450 kg/m^3 k) Chemical admixture type- Superplasticizer TEST DATA FOR MATERIALS a) Cement used- OPC 53 grade conforming to IS 8112 b) Specific gravity of cement- 3.1 e) Chemical admixture (0.8 percent by weight of cement. Specific gravity of cement=1.14)- Superplasticizer conforming to IS 9103 f) Specific gravity of: 1) Coarse aggregate-2.76 2) Fine aggregate-2.68 (Zone II) g) Water absorption: 1) Coarse aggregate-Ni 2) Fine aggregate-Nil h) Free (surface) moisture: 1) Coarse aggregate-Nil 2) Fine aggregate- Nil	**18**

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

[Turn over

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Table 2 Assumed Standard Deviation
(Clause 4.2.1.3)

Sl No.	Grade of Concrete	Assumed Standard Deviation N/mm²
(1)	(2)	(3)
i)	M10, M15	3.5
ii)	M20, M25	4.0
iii)	M30, M35, M40, M45, M50, M55, M60	5.0
iv)	M65, M70, M75, M80	6.0

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

Sl No.	Nominal Maximum Size of Aggregate mm	Water Content[1] kg
(1)	(2)	(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)

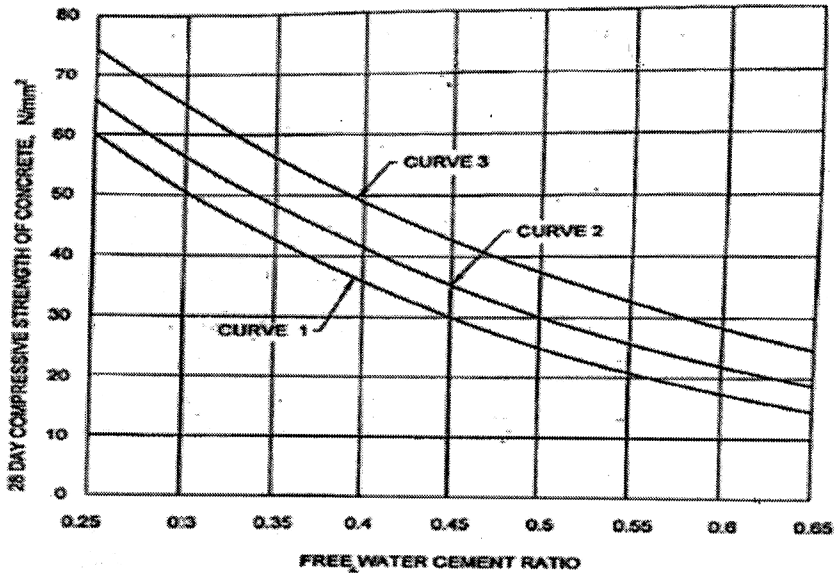

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50

(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

Time: Three Hours | Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part

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No. of questions		Marks (50)
2)	CO3 a) Describe the slump test for measuring the workability of concrete in the laboratory b) Describe the procedure of measuring the indirect tensile strength of concrete in the laboratory	**7+7=14**
3)	CO5 Describe the procedure of V-funnel test for measuring the passing ability of Self-compacting concrete.	**8**
4)	CO4 Write short note a) Sulphate attack on concrete b) Shrinkage and creep of concrete	**5+5=10**

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B.E. CIVIL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAM 2024

CONCRETE TECHNOLOGY

PART-II (50 marks)

Time: Three Hours | Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part II (Answer Any four of the following questions.) Answer any two question form Question number 1-3 And Other two from rest of the questions	Marks
1) **(CO1)**	The oxide composition of OPC is as follows: CaO (66.6%), SiO_2 (21.5%), Al_2O_3 (6%), Fe_2O_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
2)a)	Briefly discuss the hydration process of cement.	5
b) **(CO1)**	Write a short note on Bougue's reaction.	5
3)a)	Write a brief description of voids in concrete and their effects.	5
b) **(CO1)**	Write a short note on Interfacial Transition Zone (ITZ) and its effect on concrete.	5
4)a)	Write a short note on shotcrete process.	7
b) **(CO2)**	Write a note on fiber reinforced concrete?	8
5) a)	Write a short note on Ready Mix Concrete (RMC).	7
b) **(CO2)**	Write short note on super plasticiser.	8
6) a)	Write a short note on air entraining admixture.	2+5
b) **(CO2)**	Write a short note on accelerator and retarder.	4+4