

Roll No.

320654(20)

B. E. (Sixth Semester) EXAMINATION,

Nov-Dec 2021

(New Course)

(Branch : Civil)

CONCRETE TECHNOLOGY

Time : Three Hours]

[Maximum Marks : 80

[Minimum Pass Marks : 28

Note : (i) Part (a) of every question is compulsory and solve any *two* from (b), (c), (d) for Question Nos. 1, 2, 3, 5 and one from (b) and (c) for Question No. 4.

(ii) Assume suitable data with justification may be assumed.

1. (a) What is curing related with concrete ? 2
- (b) Explain the process of hydration of cement with suitable diagram of hydrated product. 7
- (c) What is the need of Grading ? Explain your answer with suitable example in tabular form for coarse and fine aggregate both. 7
- (d) Write short notes on any *two* of the following : 7
 - (i) Surface Index

- (ii) Alkali Aggregate Reaction
 - (iii) Testing procedure of crushing value of aggregate.
 - (iv) Special purpose cements.
2. (a) What is workability ? 2
- (b) What is the classification of admixture ? Explain any *two* admixtures for their reaction mechanism and suitability ? 7
- (c) What are the factors affecting workability ? Explain each point in detail. 7
- (d) Write short notes on any *two* of the following : 7
- (i) Slump test
 - (ii) Mineral additives and their effect on concrete properties.
 - (iii) Segregation and bleeding related to concrete.
3. (a) What are the properties of hardened concrete ? 2
- (b) What are the factors affecting compressive strength of concrete ? Explain each with supporting graphs and data. 7
- (c) The strength of fully matured concrete was found to be 45 N/mm^2 . Find the strength of an identical concrete at the age of seven days when cured at an average temperature during day time at 20°C and night time at 10°C . (Take constant $A = 32, B = 54$) 7
- (d) Write short notes on any *two* of the following : 7
- (i) Modulus of Elasticity of concrete
 - (ii) Creep behaviour in concrete
 - (iii) Shrinkage of concrete

4. (a) What are the need of concrete mix design ? 2
- (b) Write short notes on any *two* of the following : 7 each
- Sampling and acceptance criteria of concrete
 - Difference between destrutive and non-destructive testing of concrete and its suitability.
 - Concept and variable of concrete mix design.
- (c) Design M-30 grade of concrete by IS-Code method for the given data using given graphs/tables : 14
- Cement OPC 43, specific gravity = 3.15.
 - FA- Specific gravity = 2.53, Zone III.
 - CA-Specific gravity 2.69, MSA = 20 mm.
 - Strength of cement as per IS code.

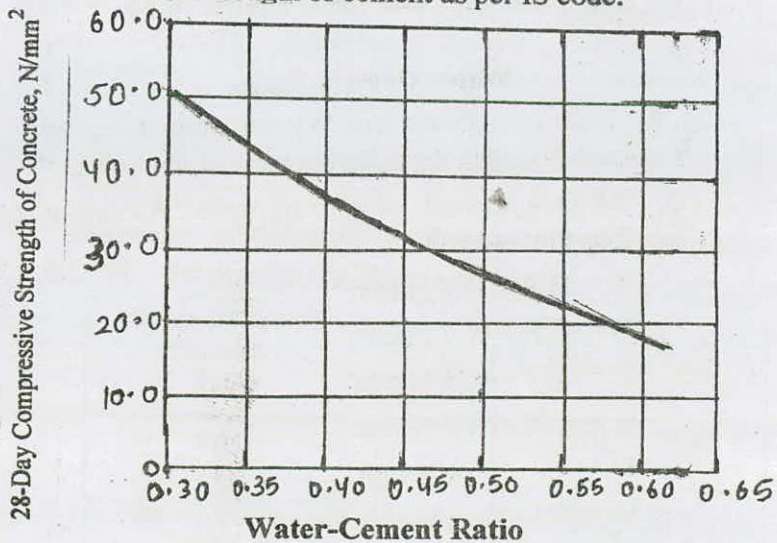


Fig. 1. : Generalised Relation between free Water-Cement Ratio and Compressive strength of concrete

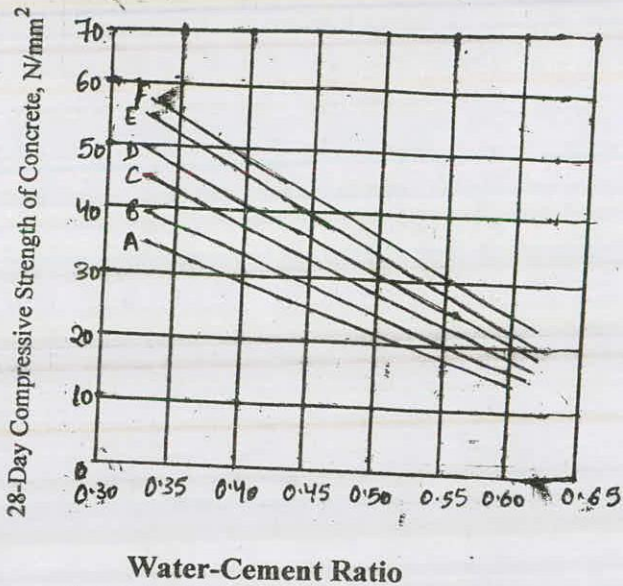


Fig. 2. : Relation between free Water Cement Ratio and Concrete Strength for different cement strengths.

2.8 Day strength of cement, tested According to IS : 4031—1968

$$A = 31.9 - 36.8 \text{ N/mm}^3$$

$$B = 36.8 - 41.7 \text{ N/mm}^2$$

$$C = 41.7 - 46.6 \text{ N/mm}^2$$

$$D = 46.6 - 51.5 \text{ N/mm}^3$$

$$E = 51.5 - 56.4 \text{ N/mm}^2$$

$$F = 56.4 - 61.3 \text{ N/mm}^2$$

Approximate Sand and Water Contents Per Cubic Metre of Concrete W/C = 0.60, Workability = 0.80 C. F.

Maximum Size of Aggregate (mm)	Water Content including surface water per cubic metre of concrete (kg)	Sand as per cent of Total Aggregate by Absolute volume
10	200	40
20	186	35
40	165	30

Approximate Sand and Water Contents Per Cubic Metre of Concrete W/C = 0.35, Workability = 0.80 C. F.

Maximum Size of Aggregate (mm)	Water Content including surface water per cubic metre of concrete (kg)	Sand as per cent of Total Aggregate by Absolute volume
10	200	28
20	180	25

Adjustment of Values of Water Content and Sand Percentage for Other Conditions

Change in Conditions calculated for Tables	Adjustment Required in	
	Water Content	% Sand in Total Aggregate
For sand conforming to grading Zone 1, Zone III or Zone IV of Table 4, IS : 383—1979	0	+ 1.5% for Zone 1 - 1.5% for Zone III - 3% for Zone IV

Increase or decrease in the value of		
Compacting factor by 0.1	$\pm 3\%$	0
Each 0.05 increase or decrease in water cement ratio	0	$\pm 1\%$
For rounded aggregate	- 15 kg	- 1%

5. (a) What do you mean by no-fines concrete ? 2
- (b) Explain the need and procedure of vacuum dewatered concreting. 7
- (c) Explain the manufacturing process of light weight concrete. 7
- (d) Write short notes on any *two* of the following : 7
- (i) Shortcreting
 - (ii) Fiber reinforced concrete
 - (iii) Cold weather concreting
 - (iv) Under water concreting