Roll No.													

PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING

Mid Term Examination – AUGUST 2024

Odd Semester: II Sem (AY 2023-24)
Course Code: CIV820
Course Name: Advanced Concrete Technology
Program & Sem: PhD, II Sem

Date: 12-08-2024
Time: 2:00 PM to 3:30 PM
Max Marks: 50
Weightage: 25%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Scientific and non-programmable calculator is allowed.
(iii) Assume missing data. Data book / Code book is not required

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Part A [Memory Recall Questions]

Choose the correct answer. Each question carries 2 marks. (9Qx2M=18M)

1. Which of the following is NOT a strategy to prevent sulphate attack?
(C.O.NO. 1) [Knowledge]

a) Maintain low curing temperature
b) Maintain high w/c ratio
c) Use of cement with low CA content
d) Use of SCMs

2. Brucite is: (C.O.NO. 1) [Knowledge]

a) Magnesium Sulphate
b) Magnesium Hydroxide
c) Calcium Sulphate
d) Calcium Hydroxide

3. Which Bogue's compound accounts for 45-55% percentage by mass in cement?
(C.O.NO. 1) [Knowledge]

a) Aluminate
b) Belite
c) Ferrite
d) Alite

4. Steel passivates in concrete due to its (C.O.NO1) [Knowledge]

(a) High pH
(b) Low permeability of concrete
(c) High compressive strength
(d) All of these

5. What is the use of Alumina in Cement?
(C.O.NO.1)[Knowledge]

(a) It imparts binding nature
(b) It gives strength
(c) It lowers clinker temperature
(d) It causes setting of cement

6. Arrange the following in the order of heat of hydration? (C.O.NO.1)[Knowledge]

(a) C3A>C3S>C4AF>C2S (b) C3S>C3A>C4AF>C2S

(c) C3A>C4AF>C3S>C2S (d) C2S>C3A>C4AF>C3S

7. Consider the design stage of a commercial reinforced concrete building to be located near a flyover in a tropical city. Consider yourself as an engineer to protect it from carbonation. What would you recommend to increase the resistance against carbonation and prevent the corrosion? (C.O.NO.2)[Knowledge]

(a) Use of SCMs and larger cover depth (b) Use of SCMs and galvanized steel

(c) Use of anti-carbonation coatings (d) All of these

8. There are two major peaks seen in the hydration curve (heat flow vs time curve), the first major peak is _____ peak and second peak is _____ peak? (C.O.NO.1)[Knowledge]

(a) Silicate, Aluminate (b) Aluminate, Silicate

(c) Aluminate, Ferrite (d) Silicate, Ferrite

9. For a tunnel liner shotcreting (sprayed concrete) has been recommended with 3.5% air content. Recommend the required admixtures for the mix? (C.O.NO.2)[Knowledge]

(a) Viscosity Modifying Admixture (b) Water Reducer

(c) Air Entraining Agent (d) Both A and C

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 10 marks. (2Qx10M=20M)

10. Concrete is the world's most consumed construction material. In fact it is the second most consumed material in the world, only next to water. According to Industry analysts about 30 billion metric tons of concrete is used globally every year. Reflect and enumerate the reasons which make concrete as the first choice among building materials for all construction activities? (C.O.NO.1) [Comprehension]

11. Aggregate gradation also known as Particle Size Distribution of Aggregates is determined by carrying out Sieve Analysis as per IS 2386 (Part1). Briefly discuss the benefits of good aggregate gradation in concrete? (C.O.NO.2) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 12 marks. (1Qx12M=12M)

12. (a) Due to the calcination of the limestone and fuel combustion, the manufacture of 1 ton of cement releases approximately 1 ton CO_2. Its manufacturing is currently responsible for 8–9% of the global CO_2 emission and 2–3% of energy use. Projections suggest that a 50% increase in annual production of cement should be expected by 2050.The global cement consumption volume is expected to reach 4.42 billion ton in 2021.

Based on what you have studied in the course so far, suggest a puzzolanic material for partial replacement of cement in concrete. Justify how the material selected would make concrete both eco-friendly and economical. Also, briefly discuss the properties of the material selected with reference to its influence on concrete properties.

(C.O.No. 2) [Comprehension]

(b) A cold joint is a plane of weakness in concrete caused by an interruption or delay in the concreting operations. It occurs when the first batch of concrete has begun to set before the next batch is added. Cold joints are commonly seen in large pours of concrete for deep mat foundations where there is a possibility of first layer setting before the second layer is poured. Which admixture would you suggest to prevent the formation of cold joints in the above scenario? Explain the mechanism of the admixture and how it changes the properties of the concrete. (C.O.No. 2) [Comprehension]