Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023

Semester : Semester VI - 2020
Course Code : CIV2019
Course Name : Sem VI - CIV2019 - Advanced Concrete Technology
Program : CIV

Date : 13-APR-2023
Time : 11:30AM - 1:00PM
Max Marks : 60
Weightage : 30%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(5 X 2 = 10M)**

1. The Bogue's compound responsible for flash set of cement is (CO1) [Knowledge]
a) C_2S
b) C_3S
c) C_3A
d) C_4AF

2. The type of cement used in concrete floors of food processing plants is (CO1) [Knowledge]
a) High Alumina Cement
b) Colored Portland cement
c) Hydrophobic Cement
d) Anti bacterial Portland Cement

3. Which among the following statements is false? (CO1) [Knowledge]
a) Concrete with good gradation will be more economical
b) Concrete with good gradation will have aggregates of similar size
c) Concrete with good gradation will have fewer voids for water to permeate
d) Concrete with good gradation will have fewer voids to be filled with cement paste

4. Common Salt (NaCl) is used as a (CO1) [Knowledge]
a) Retarder
b) Accelerators
c) Plasticizer
d) Shrinkage reducing admixture

5. The shrinkage which occurs due to withdrawal of water from capillary / gel pores for hydration of unhydrated cement

a) Plastic shrinkage (CO2) [Knowledge]

b) Thermal Shrinkage

c) Autogenous Shrinkage

d) Drying Shrinkage

PART B

ANSWER ALL THE QUESTIONS (5 X 6 = 30M)

6. Hydration of cement is an exothermic reaction. The heat of hydration is the heat generated when water and Portland cement react. Heat evolution during cement hydration can be represented in two ways - i) Rate at which heat is getting evolved J/s or Watt and ii) Overall heat that is evolved in the process of cement hydration J/g.
It is the rate of reaction which is more important, because the rate is governing the speed of the reaction. The rate of heat evolution is actually an indicator of the speed at which the cement is hydrating with water.
In this context, explain in brief any four stages during the hydration of cement.

(CO1) [Comprehension]

7. It is possible to manufacture different types of cement by changing the percentages of their raw materials. The change in the percentage of raw materials also bring a change in the oxide composition or the proportion of various Bogue's compounds. The variation in the proportion of various Bogue's compounds in turn alters the properties of the concrete made with it. The properties of cement during hydration vary according to their Chemical composition. Section 2 of IS 456:2000 under Clause 5.1 lists out 10 types of Cement based on their composition, properties and intended use. With reference to the same, identify the type of cement which has the least amount of C_3A. Bring out the major changes in the property of this cement obtained by reducing C_3A content. Also, list of the applications or uses of this type cement.

(CO1) [Comprehension]

8. 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.

(CO1) [Comprehension]

9. Concreting is to be done for the new dam proposed under the Upper Bhadra Project. Propose a suitable type of cement for concreting and justify your answer. Also, discuss the properties of the cement proposed along with its composition.

(CO1) [Comprehension]

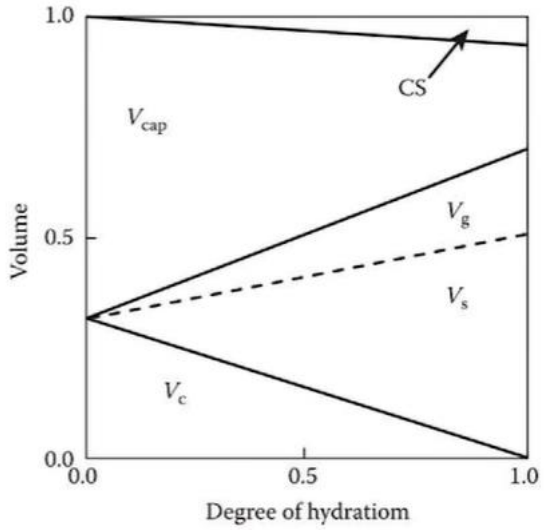
10. Movement of water within or out of the concrete causes volumetric defamations which could be creep or shrinkage. Shrinkage happens when water is lost from the system while Creep
happens when water is forced to move by stress. Shrinkage leads to the reduction in volume of concrete and is a cause of dimensional instability. When a restraint to the volumetric contraction is present, cracking occurs in the concrete. Although shrinkage cracks are not a structural concern, they can affect the long-term durability. It is critical to use the right type of ingredients in correct proportion to control shrinkage. In this context, discuss the influence of water-cement ratio, aggregates and admixtures on shrinkage.

(CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 10 = 20M)**

11. a) Define Autogenous Shrinkage and Carbonation Shrinkage [03 Marks[
b) Interpret and explain the below graph which represents the mechanism of chemical shrinkage along with volume changes during hydration [07 Marks]



(CO1) [Application]

12. a) List and Discuss about the factors affecting Modulus of Elasticity [07 Marks]
b) Write short notes on Dynamic Modulus of Concrete [03 Marks]

(CO2) [Application]