

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

MTech - II Semester (CM)

COURSE CODE(CREDITS): 10M11CE215 (3)

MAX. MARKS: 25

COURSE NAME: Sustainable Design and Construction

COURSE INSTRUCTORS: Saurabh Rawat

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1) Using the stoichiometry, prove that the maximum silica content consumed is less than 15% during CH formation. Also find the corresponding amount of fly ash that will be consumed, if used in the same cement? CO3, CO4 [3+2 = 5]

Q2) Explain the phenomenon of cement strength development governed by the factors:

- a) Pore filling effect
- b) Pore refinement effect

For each effect, state ONE cementitious material and prove the strength development variation.

CO3, CO4 [2+2 = 4]

Q3) As per IS: 16415: 2015, what is meant by 'Composite Cement'? Give the composition of various materials (proportion % by weight) as given in IS code. Explain how 'Composite Cement' contributes to sustainability. CO3, CO4 [1+1 +1 = 3]

Q4) Giving reasons, justify that 'High belite cement' provides a more sustainable solution to cement industry than OPC. Also explain the control ratio that govern the composition of 'Belite cement'. Explain the variation in properties with the variation of these control ratios.

CO3, CO4 [2+2 +1 = 5]

Q5) Using the stoichiometry, calculate the CO₂ emissions from 1t of cement in OPC and in Ca-sulpho-aluminate cement (CSA). Also explain the other factors of CSA cement that contributes to reduced CO₂ emissions. CO3, CO4 [3+2 = 5]

Q6) Giving examples of each, distinguish between TYPE – I and TYPE – II alkali activated cements. Give the composition of LC3 cement and state the reason for its development.

CO3, CO4 [2+1 = 3]