

DEPARTMENT OF CIVIL ENGINEERING: IIT DELHI

CVL 771: ADVANCED CONCRETE TECHNOLOGY. MINOR TEST-I

DURATION: 1.0 Hour FIRST SEMESTER-2017-2018 Max. marks:=20

DATE:- 29/08/2017 TIME:- 4.00 P.M. - 5.00 P M Venue: LH 308

1. Consider a single particle of cement, assume it to be spherical, of volume V . What would be the diameter of the un-hydrated cement after 48% degree of hydration? If the specific gravity of inner product is assumed to be 2.5 and that of clinker is 3.15, what would the volume of inner product and outer product respectively? Assume sufficient water is available for hydration. Draw diagrams to explain the process of hydration of OPC clinker considering this single particle and assuming expanding cluster model. 6
2. Illustrate through chemical equations the reaction products of C_2S , C_3S and C_3A . A cement has following major compound composition: $C_2S=17\%$, $C_3S=55\%$, $C_3A=12\%$ and $C_4AF=10\%$. What is the amount of Calcium Hydroxide liberated after complete hydration of the cement? Given that 100gm of C_2S and C_3S produces 22 and 49gm of Calcium Hydroxide respectively after complete hydration? 4
3. Void ratio of aggregate size ranging from 10-20mm is 0.57 and that of 2.36mm-4.75 mm is 0.5. Assume both the aggregates are similar. Neglecting particle interference, what is the proportion of coarser fraction in a mixture having minimum void ratio? Explain with diagram the loosening effect and wall effect. What is the proportion of coarser fraction in a mixture having minimum void ratio, when wall effect coefficient are accounted for considering their size ratio? 6
4. Explain and compare the mechanism of action of Sulphonated Naphthalene Formaldehyde condensates (SNF) and poly-carboxylic ether (PC) in their role as admixture in fresh concrete 4
