High Performance Concrete Engineering

Total 100 marks

(a) In supplementary cementitious materials, list two cementitious materials [10 marks]

(b) What is the pozzolanic reaction? List three reasons why we can achieve higher strength at later age when OPC is replaced with pozzolanic materials [20 marks]

(c) Explain the mechanism how air-entraining admixture can enhance workability of concrete. [10 marks]

(d) Calculate the porosity of cement paste with w/c = 0.6 and degree of hydration (α) = 0.4. A specific gravity of cement is 3.14 [20 marks]

(e) Explain how set-accelerating admixture can reduce the risk of gas leaking in oil well cementing application. [20 marks]

(f) Calculate the Fineness Modulus (FM) of below two aggregates. [20 marks]

Aggregate #1 & Aggregate #2

Sieve type	Weight retained (aggregate #1)	Weight retained (aggregate #2)
75 mm	15	
37.5 mm	30	
19 mm	330	

9.5 mm	350	
4.75 mm	170	3
2.36 mm	80	8
1.18 mm	25	39
900 μm	5	300
600 μm		100
300 μm		50
150 μm		