Q1: Explain in detailed the following (answer two branches)
1. The effects of air entraining agents, plasticizers and super-plasticizers admixtures on the properties of fresh concrete.
2. What is meant by “Bleeding”? What are the adverse effect of bleeding and how can be minimized?
3. The production processes of slag and its applications as a cementitious material.

Q2: Justify the following (answer 5 only)
1. The workability of concrete mixes increase with decreasing the aggregate/cement ratio.
2. The heat of hydration begins to rise again at the third stage of the concrete setting.
3. The presence of C3A in a large amount in cement is undesirable.
4. For a given mass, the moist sand occupies larger volume than the same mass of dry sand.
5. The aggregate sample should be dried in air before performing the sieve analysis.
6. Insufficiently mixed concrete with excess water content is unfavorable.

Q3: Answer by drawing the following relationships (answer 5 only)
1. Types of slumps of concrete mixes.
2. Effect of degree of compaction on the strength of concrete.
3. Effect of moisture content on the bulking of sand.
5. Size distribution of typical Portland cement, fly ash, and silica fume.
6. Moisture conditions of aggregates and the relationships between them.

Q4: Determine the required material quantities for casting reinforced concrete foundation exposed to sulfates attack with area of 200 m², 0.45 m in thick and having steel reinforcement of Ø 16 @250 mm c/c. The other related information are as follow:

1. The required slump is 0.15 m.
2. The design compressive strength at 28 days is 21 MPa.
3. The value of the margin to get the characteristic compressive strength is 4 Mpa.
4. The type of the used cement is Type V (resistance to sulfates attack).
5. Specific gravity of the dry used cement is 3.15.
6. The properties of the used gravel are: total specific gravity = 2.7, absorption= 0.5%, the density of the rodded compacted= 1700 kg/ m³ and total moisture= 2%.
7. The properties of the used sand are: total specific gravity = 2.7, absorption= 0.6%, the total moisture= 2% and the sieve analysis of the sand sample is shown in the below table.
<table>
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<th>Seive</th>
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Good Luck

Head of Department
Dr. Muhaned Allawi Shallal

Examiner
Dr. Adnan Flayih Hassan