



University Of Technology
Building and Construction Eng. Dept.
Final Exam – 1st Attempt – 2010/2011



Subject :Quality Control

Class: 3rd

Branch :Building Eng. & Projects management

Time : 3 Hours

Examiner : Dr. MAAN S. HASSAN

Date : 8/ 6 / 2011

[اجب عن اربعة اسئلة فقط على ان يكون الرابع من ضمنها] [Answer 4 questions only including No. 4]

Q1 (A): According to the ISO 9001, what are the important issues that should be ensure before submission of tender or acceptance of a contract?

15%

Q1 (B): Discuss the following sentence:-

“Basic variability is a property of production process, while change points are related to the control system”

10%

Q2: The following chemical and physical test results have been reported from the construction laboratory ordinary Portland cement sample (Type I). Evaluate the results and:

A. Calculate the main compounds (C_3S , C_2S , C_3A , C_4AF)?

B. Are the results complying with the ASTM specification C150? & Iraqi specification?

Chemical analysis					
Oxide	Abbreviation	Cement No. 1	ASTM specification C150	Iraqi specification	Notes
SiO ₂ (%)	S	21.1			
Al ₂ O ₃ (%)	A	4.2			
Fe ₂ O ₃ (%)	F	4.9			
CaO (%)	C	65			
SO ₃ (%)	S	2.0			
MgO (%)		2.5			
Na ₂ O (%)		0.21			
K ₂ O (%)		0.3			
Insoluble residual (%)	I.R	0.2			
Loss on ignition (%)	L.O.I	2.4			

Physical results

Test	Results	C150	Iraqi specification	Notes
Fineness (Blaine method) m ² /kg	270			
Autoclave expansion (%)	0.32			
Compressive strength N/mm ²				
3 days	18			
7 days	23			
28 days	30.3			
Time of setting				
Initial set	1:30 hr			
Final set	8 hr			

25%

Q3: According to ISO 9001, what are the quality control requirements for the

- Design Control stage.
- Purchasing stage.

25%

Q4: The following results are the 7 and 28 days concrete strength for the previous and current months.

- Draw Cusum control chart and indicate the change point (if any) for each age?
- Discuss the results. Is there any correlation between them?
- What is your conclusion about the source of variation (i.e due to properties of concrete or due to testing methods)?

	Previous month (N/mm ²)										Current month (N/mm ²)									
7-day age Strength	22	23	20	24	23	25	21	22	23	23	21	20	23	22	20	21	19	20	19	20
28-day age Strength	34	35	32	33	35	37	33	32	35	34	33	32	33	34	32	33	31	32	31	30
Sample No.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

Q5 (A): What are the required steps that should be taken by the quality control engineer in case of inadequate strength?

15%

Q5 (B): Determine the minimum number of test cylinders that must be cast to satisfy the code minimum sampling frequency for strength tests? Concrete is to be placed in a 40m × 60m × 0.2m slab, and transported by 7.5 m³ truck mixers. Required strength is 30 MPa, and cylinder size is 150*300 mm.

10%

BOGUE EQUATIONS:

$$\%C_3S = 4.071C - 7.6S - 6.718A - 1.43F - 2.85S$$

$$\%C_2S = 2.867S - 0.7544C_3S$$

$$\%C_3A = 2.650A - 1.692F$$

$$\%C_4AF = 3.043F$$