

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : CIVIL ENGINEERING MATERIALS
COURSE CODE : DAC 10402
PROGRAMME : DAA
EXAMINATION DATE : DECEMBER 2017/ JANUARY 2018
DURATION : 2 HOURS AND 30 MINUTES
INSTRUCTION : ANSWER ANY **FIVE (5)**
QUESTIONS

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

- Q1** (a) Describe the **TWO (2)** basic raw ingredients for manufactured cement.
(4 marks)
- (b) Describe the properties of low heat cement portland cement.
(4 marks)
- (c) Given the data from a vicat test as in Table 1. Estimate the cement initial set time.
(6 marks)
- (d) Sketch and explain the transmission of tensile and compressive characteristics of aggregates.
(6 marks)

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- Q2** (a) Calculate the porosity of the coarse aggregates if the water absorption is 4.5% and the specific gravity of the aggregates is 2.92.
(3 marks)
- (b) Calculate the void content if given the value of aggregates specific gravity is 2.75, density of water is 1000kg/m^3 and the bulk density of aggregates taken as 1745 kg/m^3 .
(3 marks)
- (c) Determine the moisture content of the sample of coarse aggregates if their weight in moist condition found to be 8.65 kg (with tray) and the dry weight after 24 hours in oven was 8.16 kg (with tray). Given the weight of the tray is 1.5 kg.
(4 marks)
- (d) Table 2 shows the result of sieve analysis on a sample of aggregates.
(i) Calculate the percent retain
(ii) Calculate the percent passing
(iii) Plot the size distribution curve.
(10 marks)

- Q3** (a) Strength of concrete is commonly considered as its most valuable property, other than durability and impermeability. Define strength of concrete.
(2 marks)
- (b) There are two categories of the factors that influencing the strength of concrete. Give **FOUR (4)** factors influencing the strength of concrete depending on testing method
(4 marks)
- (c) Sketch the following types of slump.
(i) Zero slump
(ii) True slump
(iii) Collapsed slump
(iv) Shear slump
(8 marks)
- (d) Describe **TWO (2)** reasons of why testing hardened concrete is important.
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(4 marks)
- (e) Calculate the target mean strength for the concrete mix grade 30 with assumption of 2.5% defectives and 6 N/mm² standard deviation.
(2 marks)

- Q4** (a) List **THREE (3)** types of bricks according of their uses. (3 marks)
- (b) Describe **THREE (3)** types of building brick grades. (6 marks)
- (c) A dry brick weighing 8.75 kg was soaked for 24 hrs. Weight of the brick after immersion is 9.12 kg. Calculate percent absorption of the brick. (2 marks)
- (d) Given a brick with dimension of 65 mm thickness, 122.5 mm width and 220 mm long acted on by the load of 20 kN at the middle of the span. The span length is 200 mm.
- (i) Sketch the diagram of the brick with the load (4 marks)
- (ii) Calculate the modulus of rupture of the brick (3 marks)
- (e) State **TWO (2)** functions of mortar in masonry works. (2 marks)

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- Q5** (a) One of the properties of X category of wood is faster in growth rate. X can be found in temperate zone, while Y can be found in tropical region.
- (i) Name X and Y.
(2 marks)
- (ii) Compare X and Y in term of strength, durability and workability.
(6 marks)
- (b) The Y timbers are classified into 3 classes. Figure **Q5(b)** shows the range value of a parameter for each classes. Describe A, B, and C in term of the mentioned parameter.
(6 marks)
- (c) One of the factors affecting strength of timber is defect. Illustrate **TWO (2)** types of timber defect that normally occurs around the growth rings of a timber.
(2 marks)
- (d) In the hot and cold treatment, two baths are used to treat the timbers. Explain the process during both baths.
(4 marks)

- Q6** (a) Explain the effect of carbon content in steel in term of strength and workability.
(2 marks)
- (b) Explain the basic method in making steel.
(4 marks)
- (c) Illustrate the converter used in basic method mentioned in **Q6(b)**.
(4 marks)
- (d) Lintz and Donawitz process is one of the latest steelmaking processes. Describe **TWO (2)** advantages of this process.
(4 marks)
- (e) An alloy is a mixture of metals or a mixture of a metal and another element. Alloys are defined by a metallic bonding character. Briefly describe the type of metal used to produce and the usage of the following alloys:
- (i) Bronze
 - (ii) Pewter
 - (iii) Precipitation-Hardening.
- (6 marks)

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END OF QUESTION

FINAL EXAMINATION

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LIST OF TABLE, FIGURE AND FORMULA :

Table 1: Time (min) vs penetration (mm)

Time (minutes)	15	30	45	60	75
Penetration (mm)	44	36	28	20	12

Table 2 : The result of sieve analysis for aggregate

Sieve Size (mm)	Mass of Retained (kg)	% Retained	% Passing
5	110		
19	327		
12.5	1321		
9.5	1970		
4.75	1422		
2.3	270		
1.18	76		
Pan	64		
Total	5560		

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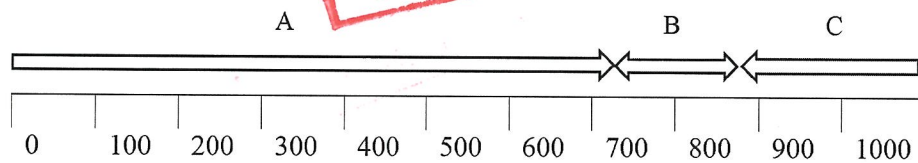


Figure Q5(b)

Values of K (constant):

- K for 10% defectives = 1.28
- K for 5% defectives = 1.64
- K for 2.5% defectives = 1.96
- K for 1% defectives = 2.33

$$\text{Voidcontent} = \frac{SGW - B}{SG \times W} \times 100$$

$$\text{MOR} = \frac{1.5Pl}{Bt^2}$$

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