UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2014/2015

COURSE NAME   : CIVIL ENGINEERING MATERIALS

COURSE CODE   : DAB 10202

CO-HORT   : 1 DAB

EXAMINATION DATE   : DECEMBER 2014/ JANUARY 2015

DURATION   : 2 HOURS

INSTRUCTION   : ANSWER ANY **FIVE (5)** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

Q1(a)   Complete the following table on the chemical composition limit of Ordinary Portland Cement (OPC)

Table 1: Chemical composition limit of Portland cement

Name of Raw Material	Chemical Composition	Percentage Limit
Lime	CaO	....
....	SiO_2	$17 - 25$
Alumina	Al_2O_3	....
Iron Oxide	Fe_2O_3	$0.5 - 6$
....	MgO	$0.1 - 4$
Alkalis (Soda and or/ potash)	Na_2O, K_2O	$0.2 - 1.3$
Sulphur Trioxide	SO_3	$1 - 3$

(4 marks)

(b)   Describe the properties of low heat portland cement.

(4 marks)

(c)   Explain the formation of silica fume and its characteristics.

(4 marks)

(d)   Sketch and analyze the transmission of tensile and compressive characteristics of aggregates.

(8 marks)

Q2 (a) Calculate the porosity of coarse aggregates if the water absorption is 5.5% and the specific gravity of the aggregate is 2.80.

(3 marks)

(b) Calculate the void content when the value of aggregates specific gravity is 1.95, density of water is 1000kg/m^3 and the bulk density of aggregates taken as 1685 kg/m^3.

(3 marks)

(c) A sample of coarse aggregates in moist condition was found to be 10.05 kg (with tray) and the dry weight after 24 hours in oven was 9.80 kg (with tray). The weight of the tray is 1.5 kg.Determine the moisture content of the sample.

(4 marks)

(d) **Table 1** 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)

Table 1 : The result of sieve analysis for aggregate

Sieve (mm)	Mass Retained (g)	% Retained	% Passing
25	135		
19	312		
12.5	1310		
9.5	1955		
4.75	1407		
2.3	255		
1.18	62		
Pan	49		
Total	5485		

Q3 (a) Define the mobility of fresh concrete

(2 marks)

(b) Ilustrate permeable and impermeable voids and moisture absorption of aggregates.

(5 marks)

(c) Several factors influence the strength of concrete. List **two (2)** methods that depending on testing method and **two (2)** methods that independent on testing method.

(4 marks)

(d) Calculate the void content if the value of aggregates specific gravity is 2.75, density of water is 1000kg/m3 and the bulk density of aggregates taken as 1745 kg/m3.

(3 marks)

(e) Calculate the amount of aggregate needed if the following parameters are given:

Water content	$= 40 \text{ kg/m}^3$
w/c ratio	$= 0.5$
Unit weight of concrete, γ_c	$= 3250 \text{ kg/m}^3$
Unit weight of water, γ_a	$= 1000 \text{ kg/m}^3$
Unit weight of aggregate, γ_a	$= 2600 \text{ kg/m}^3$

(6 marks)

Q4 (a) Sketch and explain the deformation under load curve for hardened concrete with the major axes of deformation versus time.

(9 marks)

(b) The following are several types of concrete. Choose **one (1)** type of concrete and describe briefly.

(i) Reinforced Cement Concrete
(ii) Prestressed Concrete
(iii) Polymer Concrete

(5 marks)

(c) Describe in detail about facing brick

(2 marks)

(d) Sketch Flemmish bond for **five (5)** layers of bricks. Show the location of Headers.

(4 marks)

Q5   (a)   Define the compressive strength of a clay brick unit and the factors that influence the strength.

(4 marks)

(b)   Sketch struck and raked joints.

(4 marks)

(c)   A dry brick weighs 9.02 kg was submerged for 24 hrs and weighs 10.48 kg after it was submerged. Calculate the percent absorption of the brick.

(2 marks)

(d)   List **three (3)** propertiesof Hardwood. Give **one (1)** example from each temperate and tropical species

(4 marks)

(e)   Describe the factors that affect the strength of timber.

(6 marks)

Q6   (a)   Define 'ladle' in the production of steel.

(1 mark)

(b)   List **two (2)** advantages of <u>basic</u> oxygen steelmaking or LD-converter.

(4 marks)

(c)   The following are the usage of steel in construction. Choose **one (1)** and discuss with appropriate sketches.

    (i)   Framed structure

    (ii)   Shell-type structure

    (iii)   Suspension-type structure

(6 marks)

(d)   Sketch and label the gypsum board used as partition wall.

(6 marks)

(e)   Given a brick with dimension of thickness of 62.5mm, 100mm width and 200mm long acted on by the load of 15 kN at the middle of the span. The span length is 180 mm. Determine the modulus of rupture of the brick.

(3 marks)

END OF QUESTION

FINAL EXAMINATION

<u>LIST OF FORMULA</u> :

$$Porosity = \frac{100 \times W \times G_s}{(100 + W)} \; ; \quad Voidcontent = \frac{SGW - B}{SG \times W} \times 100 \quad MC = \frac{weight\,of\,moisture}{oven\,dry\,weight} \times 100\%$$

$$f_t = \frac{2W}{\pi DL} \; ;$$

$$Cementcontent = \frac{w}{w/c}$$

$$V_a = 1 - \frac{cementcontent}{\gamma_c} - \frac{watercontent}{\gamma_w}$$

$$Aggregatecontent = \gamma_a \times V_a$$

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