UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2008/09

SUBJECT NAME	:	CIVIL ENGINEERING MATERIALS
SUBJECT CODE	:	BFC 1032
COURSE	:	1 BFF
DATE OF TEST	:	APRIL 2009
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER ANY **FOUR** QUESTIONS

THIS PAPER CONSISTS OF 5 PAGES ONLY

Q1 Cement is an important material for concrete construction. Understanding of its properties will promote good concrete practice.

(a) State the chemical composition of cement.

(2 marks)

(b) State the chemical reaction related to cement hydration.

(3 marks)

(c) Explain the effect of biomass silica on the microstructure of cement matrix.

(5 marks)

(d) Sketch and label the opposed jet mill to produce blended cement.

(5 marks)

(e) Sketch and label the apparatus and a graph with typical results to determine the standard consistence of cement.

(5 marks)

(f) Propose a group project to study the impact of cement production on the environment.

(5 marks)

Q2 Aggregate properties such as shape, size, surface texture, hardness, abrasion resistance and water absorption will affect the quality of construction.

(a) Explain the effect of particle shape on the properties of concrete.

(2 marks)

(b) Explain alkali-aggregate reaction.

(3 marks)

(c) Explain with the aid of sketches the concept of free water on aggregate and saturated surface-dry aggregate.

(5 marks)

(d) Determine the free water content of aggregate based on the following data:

Mass of moist sand = 100 g
Mass of saturated surface-dry sand = 98 g

(5 marks)

(e) Write short notes on the bulk handling and sampling of aggregate.

(5 marks)

(f) Propose a research project on foamed aggregate.

(5 marks)

Q3 Grade 60 concrete is proposed for precast reinforced concrete pile. Based on the British DOE method with reference to design charts, determine the followings based on the use of crushed granite of size 20 mm. Make realistic assumptions on workability of concrete and properties of materials used.

    (a)   Margin.

(2 marks)

    (b)   Target mean strength.

(3 marks)

    (c)   Water/cement ratio.

(5 marks)

    (d)   Aggregate/cement ratio

(5 marks)

    (e)   Mix proportion based on weight

(5 marks)

    (f)   Cement content based on absolute volume method.

(5 marks)

Q4 Tensile strength of steel is used to overcome the weakness of concrete in tension.

    (a)   Sketch the stress-strain curve of mild steel.

(2 marks)

    (b)   Sketch and label the test equipment used for the tensile test of steel rod.

(3 marks)

    (c)   Determine the tensile force required to break a steel rod of 12 mm diameter if its tensile strength is 250 N/mm^2.

(5 marks)

    (d)   Determine the elongation of the steel rod of length 500 mm before it breaks if the Modulus of Elasticity is 200 kN/mm^2.

(5 marks)

    (e)   Write short notes on the effect of steel corrosion on the performance of reinforced concrete structure

(5 marks)

    (f)   Propose a research project on steel reinforcement.

(5 marks)

Q5 Structural use of timber involves consideration of cost, quality and sustainability.

(a) Based on Malaysian Standard (MS544), name two (2) naturally durable hardwood, one from strength group 1 and the other from strength group 2.

(5 marks)

(b) Sketch and label common defects of timber.

(5 marks)

(c) Write short notes on the seasoning and preservation of timber.

(5 marks)

(d) Show a sample calculation on the deflection of timber beam based on the following values:

Uniformly distributed load, q   = 4.75 kN/m
Span, L = 4 m
Modulus of Elasticity, E   = 9650 N/mm^2
Moment of Inertia, I   = 140 x 10^6 mm^4

(5 marks)

(e) Propose a research project on structural use of timber.

(5 marks)

Q6 Building construction poses challenges of cost, durability and sustainablity.

(a) State the principle adopted and materials used to provide a durable building construction in the tropics.

(2 marks)

(b) Propose a method statement with appropriate sketches of masonry system.

(3 marks)

(c) Explain with the aid of sketches the production and use of foamed masonry to enhance productivity and quality of construction.

(5 marks)

(d) Determine the density and compressive strength of foamed masonry based on the following data:

Dimension of foamed masonry block = 100 mm x 200 mm 600mm
Weight of foamed masonry block = 10.5 kg
Maximum force recorded during the test of foamed masonry block = 120 kN

(5 marks)

(e)   Write an abstract on the use of foamed masonry block as industrialised building system.

(5 marks)

(f)   Propose a research project on foamed masonry block .

(5 marks)