



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2013/2014**

COURSE NAME : CONCRETE TECHNOLOGY  
COURSE CODE : BFS40603  
PROGRAMME : 4 BFF  
EXAMINATION DATE : JUNE 2014  
DURATION : 3 HOURS  
INSTRUCTIONS : ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

- Q1**
- (a) Explain briefly the **three (3)** conditions for alkali silica reaction to happen. (5 marks)
  - (b) Sketch graphs on the effect of pozzolanic materials under different curing conditions on the strength development and permeability of concrete. (10 marks)
  - (c) Illustrate the principles and practice of design for concrete durability with a proposed mix proportion for grade 60 self-compacting concrete. (10 marks)
- Q2**
- (a) Sketch and label a bioreactor for the synthesis of biomass aggregate. (5 marks)
  - (b) Describe the tests for carbonation and water permeability of an existing reinforced concrete structure. (10 marks)
  - (c) Outline a project to develop a method and identify a concrete durability test site to study the long term effect of alternative aggregates in concrete. (10 marks)
- Q3**
- (a) Sketch graphs and explain the effect of void ratio on strength development and permeability of pervious concrete. (5 marks)
  - (b) Illustrate with appropriate figures the effect of additives on the workability and strength of pervious concrete. (10 marks)
  - (c) Explain the design and use of pervious concrete in a garden pavement. (10 marks)

- Q4** (a) Describe briefly the design and production of 600 m<sup>3</sup> of foamed concrete within 10 hours in a tunnel project. (5 marks)
- (b) Explain briefly the development of a dynamic probe test apparatus to assess the surface hardness of foamed concrete with a sketch of the calibration chart. (10 marks)
- (c) Describe briefly the design and application of foamed concrete as a sustainable material for carbon sequestration. (10 marks)
- Q5** (a) Explain briefly the development of a self-compacting grade 50 concrete for the foundation of the Shanghai Tower. (5 marks)
- (b) Estimate the design load of a prestressed grade 60 concrete pile of size 200 mm x 200 mm if the characteristic strength of prestressed tendon of diameter 7 mm is 1700 N/mm<sup>2</sup>. (10 marks)
- (c) Propose a test method to determine the ultimate load of the prestressed concrete pile as stated in **Q5(b)** if the length is 6m. (10 marks)
- Q6** (a) Explain the technical, environmental and economical advantages of geopolymer concrete for the precast concrete industry. (5 marks)
- (b) Explain with a sample calculation a novel method hybrid subbase system to enhance the slope stability of an embankment on soft soil with a comprising a combination of precast concrete components and cast-in-situ concrete. (10 marks)
- (c) Design a pontoon with geopolymer concrete reinforced with glass fibre reinforced polymer for the sustainable development of a marina in a resort campus. (10 marks)

- END OF QUESTION -

