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**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2014/2015**

COURSE NAME : PACKAGING WITH GLASS AND METAL  
COURSE CODE : BNK 30203  
PROGRAM : BNK  
EXAMINATION DATE : DECEMBER 2014/JANUARY 2015  
DURATION : 2 HOURS 30 MINUTES  
INSTRUCTION : ANSWER **FOUR (4)** QUESTIONS ONLY.

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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- Q1**
- (a) State the definition of glass and list **THREE (3)** types of glass composition. (6 marks)
  - (b) Explain **THREE (3)** specific advantages of using glass. (3 marks)
  - (c) Explain briefly **FOUR (4)** types of glass composition. (8 marks)
  - (d) Glass package has several characteristic of advantages. Discuss the term Microwaveable and Environmental benefits. (8 marks)
- Q2**
- (a) List **THREE (3)** types of glass bottle manufacturing method. (3 marks)
  - (b) The glass product strength and mechanical performance can be assess through design specifications of initial design, trial and production of new products, product modifications or when seeking performance improvements. Analyze a Pendulum Impact, Vertical Load Resistance, and Thermal Shock testing of the glass product. (12 marks)
  - (c) Figure **Q2 (c)** shows the glass bottle construction. Suggest the manufacturing process and heat treatment involve. (10 marks)

- Q3** (a) The product specification and the filling line requirements is essential at the concept design stage. Describe **FIVE (5)** informations required including basic categories of distribution depending on the packaging function and product requirements. (5 marks)
- (b) Closures for glass packaging containers are usually metal or plastic, though cork is still widely used for drinking water. Identify the selection of closure. (5 marks)
- (c) Draw a glass making diagram process, from raw material up to packaging stage. Analyze each stage of the process. (15 marks)
- Q4** (a) Explain briefly **TWO (2)** the selected main raw materials for the making of can. (5 marks)
- (b) Suggest manufacturing processes of the two types of metal below. Draw a schematic diagram to support your answer:
- (i) Aluminum
  - (ii) Steel or Iron. (20 marks)
- Q5** (a) Figure **Q5 (a)** shows the main measured parameters in a double seam. List all parameters alphabet from **a** to **i**. (9 marks)
- (b) Show how to protect the can steel from corrosion and explains why a relatively thin layer of tin is able to provide good corrosion protection. Illustrate the corrosion processes. (16 marks)

**Q6** (a) List **FOUR (4)** advantages and **FOUR (4)** disadvantages for metal as packaging material.

(8 marks)

(b) Figure **Q6 (b)** shows a graph of a tin acidic food. Refer on graph,

(i) Analyze three phases of curve towards storage time (days), and

(ii) discuss **SIX (6)** factors that influence the rate of tin concentration and factors are well established.

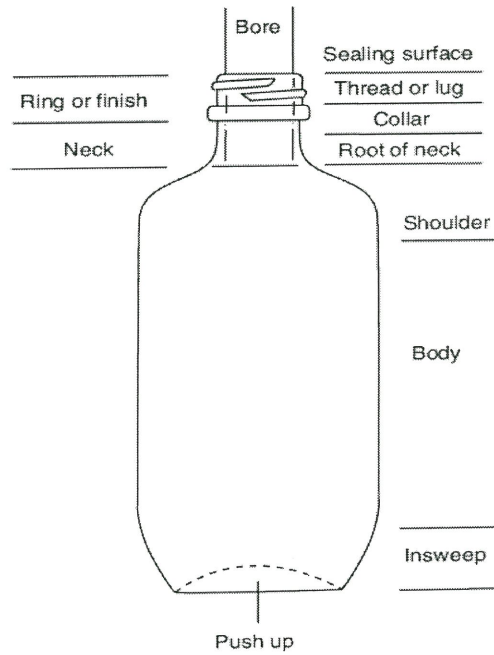
(17 marks)

- END OF QUESTION -

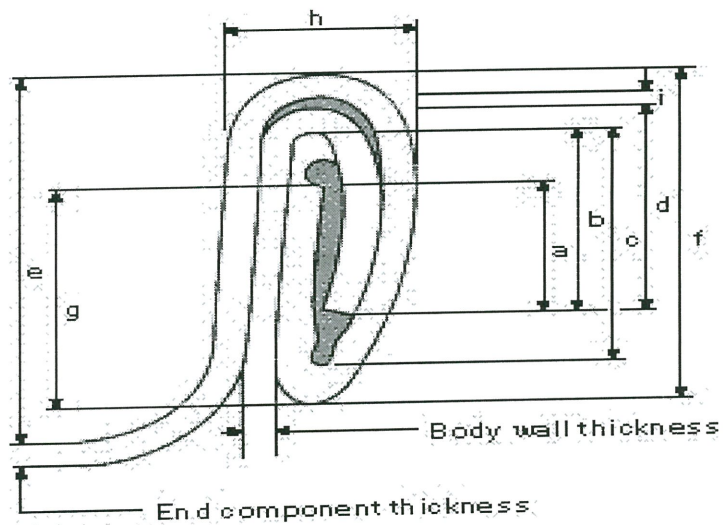
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**FIGURE Q2 (c)**

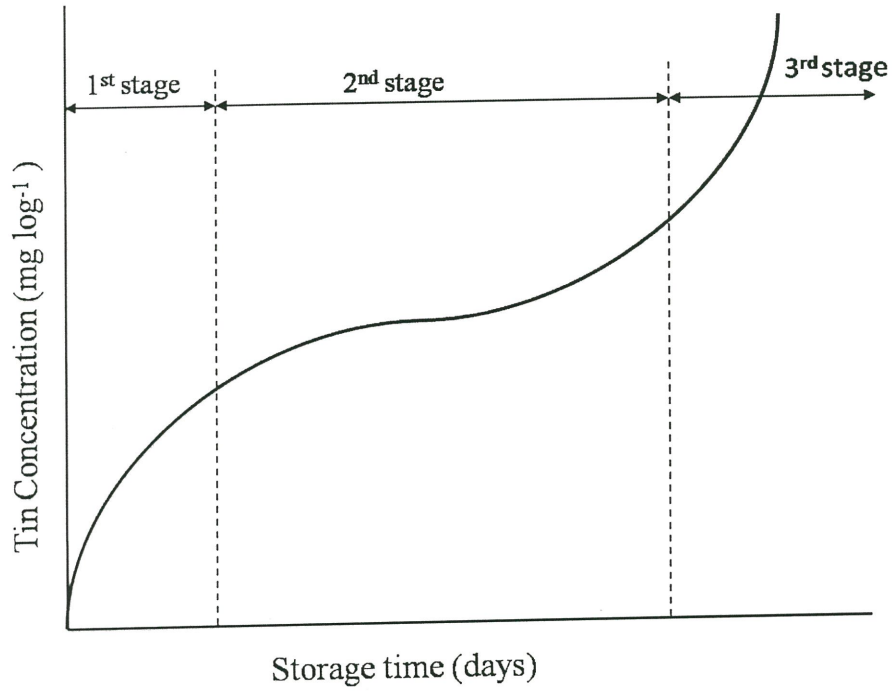


**FIGURE Q5 (a)**

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**FIGURE Q6 (b)**