

POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

MECHANICAL ENGINEERING DEPARTMENT

FINAL EXAMINATION

DIS 2011 SESSION

J4287: PACKAGING MATERIAL

DATE : 24 APRIL 2012 (TUESDAY)

DURATION : 2 HOURS (08:30 AM – 10:30 AM)

This paper consists of **FOUR (4)** pages including the front page.
Essay (6 questions – answer 4 questions)

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THE CHIEF INVIGILATOR

QUESTION 1

- a) Define the usage of the following cushion materials:
- i. Foam structures (3 marks)
 - ii. Mold pulp (3 marks)
 - iii. Bubble wrap (3 marks)
 - iv. Loose fill (3 marks)
- b) State **FIVE (5)** criteria that may consider in selecting cushioning material. (5 marks)
- c) State the purposes of cushioning during shipping process. (8 marks)

QUESTION 2

- a) State the following adhesive solidification methods:
- i. Waterborne (3 marks)
 - ii. Solvent based (3 marks)
 - iii. Hot melts (3 marks)
- b) List **FOUR (4)** common classes of packaging adhesive. (4 marks)
- c) Describe the following theories of adhesion:
- i. Mechanical theory (6 marks)
 - ii. Specific theory (6 marks)

QUESTION 3

- a) Describe the common types of lamination process:
- i. Wet bonding (3 marks)
 - ii. Dry bonding (3 marks)
 - iii. Holt melts (3 marks)
- b) State the materials used to form retort pouch:
- i. 2-ply laminate (2 marks)
 - ii. 3-ply laminate (3 marks)
 - iii. 4-ply laminate (4 marks)
- c) Identify the main reasons of using laminated material. (7 marks)

QUESTION 4

- (a) State the factors that propellant may evaporate to form bubbles in the product (creating a foam). (4 marks)
- (b) Identify the proper steps of aerosol (2-phase) filling process. (9 marks)
- (c) Explain the **THREE (3)** major parts of an aerosol spray tin. (12 marks)

QUESTION 5

- (a) State the packaging end uses of aluminium foil:
- i. Semi rigid foil containers (2 marks)
 - ii. Caps, cap-liners and packaging closures (2 marks)
 - iii. Composite cans and canisters (2 marks)
 - iv. Flexible packaging end uses (2 marks)

- (b) Identify the benefits of aluminum foil as a packaging material. (5 marks)
- (c) Describe the chemical characteristics of aluminium foil. (12 marks)

QUESTION 6

- (a) Identify the benefits of using aluminium beverage can:
- i. Durability and sustainability (2 marks)
 - ii. Weight (2 marks)
 - iii. Malleability (2 marks)
 - iv. High thermal conductivity (2 marks)
 - v. Recyclability (2 marks)
- (b) State the **SEVEN (7)** steps of can cleaning for the purpose of decoration and inside coating. (7 marks)
- (c) Describe the main characteristics of 2-piece can lid. (8 marks)