

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

MECHANICAL ENGINEERING DEPARTMENT

FINAL EXAMINATION
JUNE 2012 SESSION

JP304: PACKAGING MATERIAL
(BAHAN PEMBUNGKUSAN)

DATE : 22 NOVEMBER 2012
DURATION : 2 HOURS (8:30 AM – 10:30 AM)

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

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JP304: Packaging Material

This section consists of **SIX (6)** structured questions. Answer **FOUR (4)** questions only.

QUESTION 1

- (a) The types of packaging paper available differ in size, protective properties, strength and durability. Identify the following types of packaging paper: CLO 1 : C3
- i. Wet strength paper (4 marks)
 - ii. Parchment paper (4 marks)
 - iii. Kraft paper (4 marks)
- (b) Pulp is the generic term for a wide range of products resulting from the manufacturing processes that involve the chemical and/or mechanical treatment of various types of plant material. List the **FIVE (5)** stages of pulp processing. CLO 2 : C2
(5 marks)
- (c) Paper and boards are made from wood pulp and additives are mixed into the pulp to give particular properties to the packaging. Explain the advantages of using paper or paperboard in food packaging. CLO 3 : C4
(8 marks)

QUESTION 2

- (a) Plastics, depending on their physical properties, may be classified as thermoplastic or thermosetting materials. Identify the characteristics of: CLO 2 : C3
- i. Thermoplastic material (5 marks)

- ii. Thermoset material (5 marks)
- (b) Plastics have been divided into various types by the plastic industry. State **FIVE (5)** common types of plastic packaging. CLO 1 : C2 (5 marks)
- (c) Plastic materials are the fastest growing group and already represent the majority of packaging. Explain the benefits of using plastic packaging. CLO 3 : C4 (10 marks)

QUESTION 3

- (a) Metals are solids at ordinary temperatures. Some metals are found in the pure state, but most of them are not. Define the metal of: CLO 1 : C3
- i. Pure metal (3 marks)
- ii. Alloy (3 marks)
- (b) The main reasons which make aluminium a valuable and attractive material are its unique combination of properties. Identify the properties of aluminium: CLO2 : C2
- i. Impermeable and odourless (4 marks)
- ii. Heat and Electrical conductivity (4 marks)
- iii. Recyclable (4 marks)
- (c) In packaging, aluminium via its unique properties contributes to the efficient fabrication, storage, distribution, retailing and usage of many products. Explain the advantages of using aluminium packaging in beverage industries. CLO3 : C4 (7 marks)

QUESTION 4

- (a) Glass containers are made from abundant raw materials. List **FOUR (4)** main types of the materials. CLO 1 : C1 (4 marks)
- (b) Glass is a unique material with the molecular structure of a liquid and the physical characteristics of a solid. Identify the properties of glass containers: CLO 2 : C2
- i. Clarity (4 marks)
- ii. Rigidity (4 marks)
- iii. Heat resistance (4 marks)
- (c) Glass is made from all-natural raw materials. It is the preferred packaging for consumer health and the environment. Explain the benefits of using glass packaging. CLO 3 : C4 (9 marks)

QUESTION 5

- (a) Correct selection and sizing of the cushioning material thus ensure that the package content suffers no damage. State the characteristics of cushioning materials: CLO 2 : C3
- i. Recovery (3 marks)
- ii. insensitive to climatic conditions (3 marks)
- iii. not promote corrosion (3 marks)
- (b) Proper performance of cushioning is dependent on its proper design and use. Identify the usage of following types of cushioning: CLO 3 : C4

- i. Loose fill (4 marks)
- ii. Foam structures (4 marks)
- iii. Bubble wrap (4 marks)
- iv. Molded pulp (4 marks)

QUESTION 6

- (a) The use of a single material may not satisfy all of the properties demanded of the product. In these cases, a composite consisting of two or more layers of material may provide the desired performance. State the properties of laminating materials. CLO 2 : C2
- i. Sealability (2 marks)
 - ii. Mechanical properties (2 marks)
 - iii. Machinability (2 marks)
 - iv. Barrier properties (2 marks)
 - v. Graphics quality (2 marks)

- (b) Lamination is bonding of two or more thin layers with each other either by heat or adhesive. Describe the most commonly used techniques for laminating: CLO 1 : C4
- i. Adhesive lamination (5 marks)
 - ii. Hot melt lamination (5 marks)
 - iii. Extrusion coating (5 marks)