

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

POLITEKNIK

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FINAL EXAMINATION  
DEC 2011 SESSION

**JP304: PACKAGING MATERIAL**

**DATE : 2.30PM - 4.30PM**  
**DURATION : 26 APRIL 2012 (THURSDAY)**

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This paper consist of Five (5) pages including the front page.  
Section A: Essay (6 questions – **answer 4** questions)

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**QUESTION 1**

- (a) Paper and boards are made from wood pulp and additives are mixed into the pulp to give particular properties to the packaging. State the following properties of paper:
- i. Formation (2 marks)
  - ii. Opacity (2 marks)
  - iii. Stiffness (2 marks)
- (b) Numerous different types of paper are used in packaging applications, some of which have very different properties. Describe the types of packaging paper:
- i. Asphalt paper (4 marks)
  - ii. Wet strength paper (4 marks)
  - iii. Parchment paper (4 marks)
- (c) Paperboard is a term that includes boxboard, chipboard and corrugated or solid fibreboards. Describe the structure/layers of paperboard. (7 marks)

**QUESTION 2**

- (a) Plastics have been divided into various types by the plastic industry. Determine the following types of plastic packaging:
- i. Polyethylene Terephthalate (PETE) (2 marks)
  - ii. High Density Polyethylene (HDPE) (2 marks)
  - iii. Polyvinyl Chloride (PVC) (2 marks)
  - iv. Polypropylene (PP) (2 marks)
  - v. Polystyrene (PS) (2 marks)
- (b) Plastic materials are the fastest growing group and already represent the majority of packaging (plastic packages 50% of all goods). State **FIVE (5)** common advantages of plastic.

(5 marks)

- (c) Plastic materials are divided into two basic groups: thermoplastics and thermosets. Differentiate the characteristics between thermoplastics and thermosets.

(10 marks)

**QUESTION 3**

- (a) In packaging, aluminium via its unique properties contributes to the efficient fabrication, storage, distribution, retailing and usage of many products. State the definition of physical aluminium properties:

i. Melting and Boiling Point

(3 marks)

ii. Strength and Weight

(3 marks)

iii. Heat and Electrical conductivity

(3 marks)

- (b) With the exception of mercury, all metals are solids at ordinary temperatures. Some metals are found in the pure state, but most of them are found in combination with other elements. Describe the metal in state of:

i. Pure metal

(5 marks)

ii. Alloy

(5 marks)

- (c) Metal packaging consists mainly of steel, aluminium and tin and is mainly used for preserved and semi preserved food, soft drinks and certain dry products. Describe the advantages of using metal packaging.

(6 marks)

**QUESTION 4**

- (a) Glass containers are made in a 2-step process. Firstly a parison/pre-form is made, then put into a mould and blown so that it is pushed against the surface of the mould to form the finished shape. Describe the processes of making glass containers:

i. Press and blow

(4 marks)

ii. Blow and blow

(4 marks)

- (b) Glass is made from all-natural, sustainable raw materials. It is the preferred packaging for consumer health and the environment. State the reasons of choosing glass material.

(6 marks)

- (c) There are many different types of glass with different chemical and physical properties. Each can be made by a suitable adjustment to chemical compositions, but the main types of glass are borosilicate glass, commercial glass, glass fibre and lead glass. Explain the main **PROPERTIES** and **CHEMICAL COMPOSITIONS** of commercial glass.

(12 marks)

### QUESTION 5

- (a) Packaging cushioning systems covers the techniques and materials for protecting goods from the effects of impacts and vibration. State the **THREE (3)** cushioning systems.

(3 marks)

- (b) Cushioning material is used to protect package contents during shipment. It is usually inside a packaging container such as a corrugated box. Define the common uses of cushion materials:

i. Foam structures

(3 marks)

ii. Molded pulp

(3 marks)

iii. Bubble wrap

(3 marks)

iv. Loose fill

(3 marks)

- (c) Correct selection and sizing of the cushioning material can ensure that the package content suffers no damage. Explain the main requirements of materials characteristics that may consider in selecting cushioning material.

(10 marks)

**QUESTION 6**

- (a) Lamination is used to produce a film structure consisting of two or more layers of materials (films, foils, paper, etc.) by adhesive bonding. Describe the common types of laminating processes:
- i. Wet lamination (4 marks)
  - ii. Dry lamination (4 marks)
  - iii. Hot melt lamination (4 marks)
- (b) Laminated packaging materials are utilized as materials for the packaging of pharmaceutical products, medical supplies, electronic parts products, foodstuffs, and daily necessities. Identify the usage of following laminated materials:
- i. Amorphous film (PET) laminated with polythene (PE) (4 marks)
  - ii. Oriented PET film laminated with polythene (PE) (4 marks)
- (c) Laminated packaging material comprises of multiple layers of different materials that are joined together to form a single sheet that combines the best properties of each film into a single packaging structure. State the benefits of using laminated material. (5 marks)