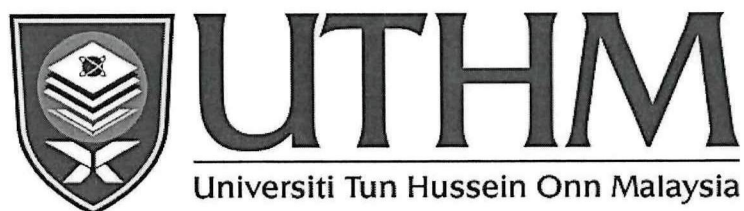


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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : FOOD PACKAGING TECHNOLOGY
COURSE CODE : BWD 30303
PROGRAMME CODE : BWD
EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020
DURATION : 3 HOURS
INSTRUCTION : ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1** (a) Explain **FIVE (5)** types of flexible packaging. (5 marks)
- (b) The most commonly used plastic material for pouches of milk products is polyethylene (PE). Having said that, the current application of green packaging material has raised a huge public concern of impact on the environment. Compare and contrast the package type and design consideration of PE and **ONE (1)** type of green packaging material without losing the product quality. (10 marks)
- (c) Transportation of moisture or water usually happened on frozen food products either during transportation or storage. Discuss this phenomena and propose **FOUR (4)** solutions to avoid this problem. (10 marks)
- Q2** (a) Tear strength is an important property of packaging films. Discuss the tear strength test method of packaging materials such as Polyvinyl Chloride (PVC) and polyolefin films. (7 marks)
- (b) A food powder is to be packed in a plastic film that has a water vapor transmission rate (WVTR) of $2.1 \text{ gm}^{-2}\text{day}^{-1}$ at 25°C and 75% RH. The initial moisture content of the powder is 3%, and the critical moisture content is 7%. Assuming that each pack will contain 450 g of powder and will be exposed to an external environment at 25°C and 75% RH, calculate the shelf life if the shapes of the packs are the same as those listed in **Table Q2(b)**.
(Assume that the driving force for water vapor transmission (WVT) remains constant and that there are no moisture gradients in the powder). (10 marks)
- (c) A tomato product processed under typical conditions and packaged in a three-piece can with a plain tinplate body and enameled electrolytically chromium-coated steel (ECCS) ends. Over a storage period of 24 months at ambient temperature, several degradative reactions occur. Suggest other packaging material and storage conditions for better shelf life of this tomato product. (8 marks)
- Q3** (a) Traditional packaging is very passive when it comes to protecting food. It forms a barrier to the outside world without any further intervention and indicates only the expiry date. Since the nineties, however, refined packaging technique namely active packaging has been emerging.
- (i) Describe briefly active packaging and passive packaging. (3 marks)

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- (ii) Propose **ONE (1)** classification of active packaging system that helps to extend shelf life, monitor freshness, display information on quality, improve safety, and improve convenience of food product. Describe each type of the active packaging system. (12 marks)
- (b) Modified Atmosphere Packaging (MAP) is an active packaging system that uses of an active pad containing an additive to produce a gas to extend freshness of meat, poultry and fish. Name **THREE (3)** gases and elaborate how each of the gases ables to maintain the colour, texture and smell using the packaging system. (10 marks)
- Q4** (a) The variation in colors produced during the storage of fruit juices can be related to the deterioration of the nutritional and organoleptic properties of the product. In response to this problem, identify the suitable packaging technology for these fruit juices. (10 marks)
- (b) Fish products have attracted considerable attentions as a source of protein, vitamins, minerals and fats. As fish is highly perishable, proper processing and packaging help in maintaining the quality of fish-based food products and most importantly increase its economic value. Compare and contrast the importance of using high pressure and vacuum processes in fish packaging industries. (10 marks)
- (c) A simple snack cake does not require refrigeration and it can last for 4 to 5 days at room temperature. However, cakes such as birthday cake has icing and the icing is made of either butter, whipped cream, or cream cheese. Predict the quality of a carrot-apple spice cake with browned butter glaze that is stored at room temperature. (5 marks)

- END OF QUESTIONS -

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Table Q2(b) Surface Areas of Different Package Shapes, All with a Volume of ~450 mL

Shape	Dimensions cm	Surface Area		Increase %	Surface Area Volume Ratio
		cm ²	m ²		
Sphere	Diameter 9.52	285	0.0285	0	0.63
Cylinder	Diameter 7.3 Height 10.8	331	0.0331	16	0.73
Cube	Sides 7.67	353	0.0353	24	0.78
Tetrahedron	Sides 15.65	424	0.0424	49	0.94
Rectangular pack	Height 3 Length 15 Width 10	450	0.0450	58	1.0
Thin rectangular pack	Height 1 Length 20 Width 22.5	985	0.0985	246	2.18

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