B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING
THIRD YEAR SECOND SEMESTER EXAM 2024

FOOD PACKAGING TECHNOLOGY

Time: 3 hrs. **(50 Marks for each Part)** Full Marks : 100

Part – I

[Answer any four questions, 12.5 x 4 = 50)]

Use separate answer script for each Part

1. How would you differentiate 'package', 'packing' and 'packaging' ? With proper example , explain 'primary packaging' and 'secondary packaging'. Mention eight principal characteristics of 'ideal packaging'. Mention the significance of using (i) 'best before' and (ii) 'use by' dates for different food items. What symbol should be used for differentiating 'veg' and 'non-veg' food products.? [CO1] 3+2.5+3+2+2

2. Write the advantages and disadvantages of glass as packaging material . What are the raw materials for glass manufacturing? What is 'cullet'? How would you impart red and purple color to glass ? What is 'gob' ? Using a flow chart , show glass bottle manufacturing process. [CO1+CO2] 3+2+1.5+2+1+3

3. Mention symbol. Acronym, full name and uses for three different types of plastics. Plastic-food interaction is a major source of concern-explain. Give example of use of (i) thermosets and (ii) elastomers . Give example of plastics products manufactured by (i) injection moulding and (ii) extrusion. Write short note on : thermoforming. [CO1+CO2] 4.5+2+2+2+2

4. Write the advantages of 'aseptic packaging technology' . What is the basic 'methodology' involved in aseptic processing ? Show the composition of Tetrapak Aseptic Carton and justify the use of different layers in it. What chemical sterilant may be used for sterilizing packaging material in aseptic processing? Why a 'deaerator' is used during 'filling' of food material in aseptic processing. [CO2+CO3] 3+2.5+4+2+1

5. What do you mean by 'OTR'? How can you correlate shelf life of a packaged food material and 'permeability' of the packaging material at a specified condition?

   Calculate the permeability of a PET film to O_2 at 25^0C . Given that the OTR through a $2.5x10^{-3}$cm thick PET film with air on one side and inert gas on the other is $8.5x10^{-9}$mL/cm-s

   A food powder with a density of 1 is to be packaged in a plastic film that has a WVTR of 2.2g/m-day at 25^0C 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 450g of powder and will be exposed to an external environment at 25^0C and 75%RH, calculate the shelf life if the shape of the pack is cubical. Assume that WVT remains constant and there is no moisture gradient in powder. Data: Surface are for the shape is $353cm^2$. [CO3] 2+2+3.5+5

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PART- II (50 MARKS)

Use separate answer script for each Part

Answer Q1 and any Two from the rest

Q1. I. Describe the following (any 1): **2 × 2.5 = 5**

a) Retorting as an advancement of sous-vide technology
b) Outstanding properties of BOPP film
c) Uses of LDPE 'singly', 'as part of a laminate' and as 'composite'

II. Define the following: **5 × 1 = 5**

a) UHT processing
b) Oxygen permeability
c) Flavorlock
d) Commercially aseptic packaged food
e) Green Pack

Q2. Differentiate between (any 4): **4 × 5 = 20**

a) Counter pressure method *vs*. Differential pressure method of retorting
b) Active packaging *vs*. Smart Packaging
c) Bottle of vegetable oil *vs*. Pouch pack of vegetable oil
d) Packaging of Cured meat vs. packaging of Fresh meat
e) Packaging of Regular milk vs. packaging of Long life milk

Q3. Diagrammatically illustrate the following (any 2): **2 × 10 = 20**

a) Tray packaging of whole fish for extended shelf life
b) Retorting of tomato sauce
c) FFS machine to obtain a pouch pack of potato crisps

Q4. Choose appropriate packaging materials to form laminates and mention the relevant packaging technology including the machinery that would be employed in designing the packaged food product **(any 4):** **4 × 5 = 20**

a) Cheese cubes; b) Orange juice; c) Strawberries; d) Slice cakes; e) Noodles with taste maker