

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (PRINT AND MEDIA TECHNOLOGY)

END SEMESTER EXAMINATIONS, NOVEMBER 2018

SUBJECT: SMART PACKAGING [PMT 4004] [PE-V]

REVISED CREDIT SYSTEM (29/11/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- **1A.** Explain the importance of setting regulations for smart packaging. Explain the EFSA guidelines for
 - a) Releasing Materials b) Intelligent Materials
- **1B.** Explain the following mechanism of Flavor release packaging with neat diagrams.
 - a) Indirect contact between package and food
 - b) Direct contact between package and food
- **1C.** Explain working principle, merits and demerits of the following printing processes for barcode printing.
 - a) Inkjet Printing b) Thermal transfer printing

[03+03+04]

- **2A.** Discuss the technology involved in ethanol emitter based packging. Compare its working with ethylene scavenging active polymer technology.
- **2B.** Explain the following indicators used in smart packaging
 - a) Colorimetric indicators based on Redox dye
 - b) Synthetic oxygen-binding metal complexes
- **2C.** Explain the following factors and their effect on shelf life of a packaged product.
 - a) Water activity c) Gas atmosphere
 - b) Temperature d) Relative humidity

[03 + 03+ 04]

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- **3A.** Describe "Laser surface authentication" and its applications in detail.
- **3B.** M/s Big Cake, a leader in supplying bread and bakery products in the coastal area of Karnataka, recently introduced a special wheat bread to market and faced a number of complaints about the low shelf life of the product being packed in polyethylene bags. The owner Mr. Achar decided to consult a packaging expert for providing a value added solution to extend the shelf life. As a packaging consultant suggest two different types of smart packaging technologies to the company to extend the shelf life of the wheat bread. Explain the working, merits and demerits of these techniques to the company owner.
- **3C.** Differentiate between the followings with neat diagrams
 - a) Pen type and CCD type 2D barcode readers
 - **b)** Laser scanners and Camera based 2D barcode reader

[03 + 03+ 04]

- **4A.** Describe the design and working of any two active polymer smart packging technologies for packging fish products.
- **4B.** With a neat diagram explain the structure of a oxygen absorbing active polymer film used for packaging of beverages. What are the merits and demerits of it in comparison with sachet type oxygen absorbing packaging?
- **4C.** Explain the following Colorimetric oxygen indicators based on Oxygen binding complexes.
 - a) Redox dye based c) Hemoglobin based
 - b) Myoglobin based d) Luminescence based

[03+03+04]

- **5A.** With a schematic diagram explain the technology behind "self- heating can" and "Self chilling can" used for beverage packaging.
- **5B.** What is meant by NFC Tag? Explain the importance of NFC tags in packaging of food with suitable two examples.
- **5C.** Explain the following packaging integrity testing methods along with their merits and demerits.
 - a) Noninvasive moisture & oxygen analysis c)Vacuum/pressure decay
 - b) High-voltage leak detection (HVLD) d) Ultrasonic imaging

[03+03+04]