

**VII SEMESTER B.TECH. (PRINT AND MEDIA TECHNOLOGY)****END SEMESTER EXAMINATIONS, DECEMBER 2020****SUBJECT: SMART PACKAGING [PMT 4004]- PE-V****REVISED CREDIT SYSTEM****(30/12/2020)**

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitably assumed.

1A. Differentiate between design and working principles of Active and Passive RFID tags.

1B. Explain the role and working of a carbon dioxide scavenger/ emitter in food packaging.

1C. Discuss the following factors and their effects on shelf life of a packaged product.

- a) Water activity
- b) Temperature
- c) Oxidation
- d) pH

[03 + 03 + 04]

2A. Write in detail, the working principle and manufacturing of Ethylene scavenging film for packaging of non-meat food products.

2B. Explain the effect of moisture on meat and poultry product. What are the techniques used to remove moisture in such food products?

2C. Differentiate between following oxygen-scavenging techniques used in packaging of meat and poultry products:

- a) Iron powder oxidation and Ascorbic acid oxidation
- b) Photosensitive dye oxidation and Unsaturated fatty acids

[03 + 03 + 04]

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- 3A.** Define “Active polymer packaging”. What are the desired properties of an oxygen scavenging film for active polymer packaging applications?
- 3B.** Explain the meaning and importance of smart packaging technology with two suitable examples from the market.
- 3C.** Explain the following packaging integrity testing methods along with their merits and demerits:
- Noninvasive moisture and oxygen analysis
 - Microbial challenge tests
 - Liquid tracer tests
 - High-voltage leak detection (HVLD)

[03 + 03 + 04]

- 4A.** Explain the following Colorimetric indicators.
- Hemoglobin based Oxygen-binding complexes
 - Myoglobin based Oxygen-binding complexes
 - Synthetic oxygen-binding metal complexes
- 4B.** Explain in detail the six major differences between Barcode and QR codes.
- 4C.** Differentiate between the following types of barcode scanners in terms of their working and design with neat diagrams.
- Pen type readers and CCD readers
 - Camera based readers and Laser scanners

[03 + 03 + 04]

- 5A.** Explain in detail the working principle of two freshness indicators available in the market.
- 5B.** Define “Laser surface authentication”. Explain the basic requirements to apply this technique.
- 5C.** Compare the merits and demerits of the following printing processes for barcode printing:
- Inkjet Printing
 - Thermal transfer printing

[03 + 03 + 04]