

**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **14FP2018 / 18FP2021 / 17FP2021** | **Duration** | **3hrs** |
| **Course Name** | **FOOD SAFETY REGULATIONS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Explain the purpose behind the establishment of Food Safety Appellate Tribunal. | | CO4 | U | 1 |
| 2. | Define Six sigma. | | CO5 | R | 1 |
| 3. | Name the pathogen commonly found in intestinal tract of animals. | | CO4 | R | 1 |
| 4. | Differentiate between “purified” and “mineral” water. | | CO3 | An | 1 |
| 5. | Explain Defects Per Million Opportunities (DPMO) with an example. | | CO4 | A | 1 |
| 6. | List ANY TWO principles of HACCP. | | CO6 | R | 1 |
| 7. | Describe the aims of LACOTS. | | CO3 | U | 1 |
| 8. | Generalize the functions of IPCC in protection of plants. | | CO1 | E | 1 |
| 9. | Define “Absolute advantage” in relation to trade. | | CO3 | R | 1 |
| 10. | List any TWO dimensions of quality. | | CO3 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Define Viscosity, Fracturability and Gumminess in relation to Texture Profile Analysis. | | CO5 | R | 3 |
| 12. | Examine the transparency obligations (along with the respective timelines) by which provisional measures of TBT become permanent standards. | | CO3 | A | 3 |
| 13. | Write the responsibilities of food business operators. | | CO5 | A | 3 |
| 14. | List the benefits of Six Sigma. | | CO5 | R | 3 |
| 15. | Compare the CCPs of HACCP and ISO 22000 for plant on refrigerated chicken salad. | | CO6 | U | 3 |
| 16. | Write the core functions of National Codex Committee. | | CO5 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Disintegrate the members and composition of Food Authority. | CO5 | An | 6 |
|  | b. | Enumerate the functions of Chief Executive Officer. | CO5 | R | 6 |
|  |  |  |  |  |  |
| 18. | a. | Describe the types of sensory tests. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Enumerate the principles at the core of WTO TBT Agreement. | CO5 | R | 6 |
|  | b. | Settling disputes is the responsibility of the Dispute Settlement Body (the General Council in another guise), which consists of all WTO members. Enumerate the steps in settling a dispute. | CO5 | R | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the Sanitary & Phytosanitary Agreements and Technical Barriers to Trade Agreements under WTO. | CO5 | An | 6 |
|  | b. | Write the functions of WTO. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | There is anxiety about the risks of transferring toxins from one life form to another, of creating new toxins or of transferring allergenic compounds from one species to another, which could result in unexpected allergic reactions. In this regard list the developed principles and guidelines the Codex that has been developed to conduct food safety assessments of genetically modified foods. | CO5 | R | 6 |
|  | b. | Discuss the EU rules on nutritional labeling. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Identify the CPs and CCPs in the above HACCP program applied in the production of yogurt. | CO6 | R | 6 |
|  | b. | Describe the biological hazards in food. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the various steps in the implementation of Six Sigma | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the FDA regulation for packaged drinking water. | CO6 | E | 6 |
|  | b. | Describe the various types of drinking water. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Understand the regulations followed in various food industries. |
| **CO2** | Define the food labeling patterns. |
| **CO3** | Apply the knowledge in food industries. |
| **CO4** | Analyze the safety operations involved in food systems. |
| **CO5** | Evaluate the steps involved in the process operations in food industries. |
| **CO6** | Prepare HACCP standards for food industries. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** |  |  |  |  | 1 |  | 1 |
| **CO2** |  | 6 |  |  |  |  | 6 |
| **CO3** | 2 | 13 | 3 | 1 |  |  | 19 |
| **CO4** | 1 | 7 | 1 |  |  |  | 9 |
| **CO5** | 31 |  | 24 | 12 |  |  | 67 |
| **CO6** | 7 | 9 |  |  | 6 |  | 22 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18FP2017** | **Duration** | **3hrs** |
| **Course Name** | **REFRIGERATION, AIR CONDITIONING AND COLD STORAGE CONSTRUCTION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | State the law of thermodynamics on which refrigeration is based on. | | CO1 | R | 1 |
| 2. | Give one example for primary and secondary refrigerants. | | CO1 | U | 1 |
| 3. | State the optimum storage temperature and humidity for apple. | | CO2 | R | 1 |
| 4. | Write the other name for refrigerated truck. | | CO2 | A | 1 |
| 5. | Name any two purposes of the air conditioning system. | | CO3 | R | 1 |
| 6. | Recall and write any two collegative properties. | | CO3 | R | 1 |
| 7. | Write the unit for specific humidity. | | CO4 | A | 1 |
| 8. | Identify any two psychrophilic microorganisms present in the frozen meat. | | CO4 | R | 1 |
| 9. | Name any three main components of supply chain management. | | CO5 | R | 1 |
| 10. | Write two parameters to be monitored during the transit of food commodities. | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Define one Ton of Refrigeration. | | CO1 | R | 3 |
| 12. | Describe the type of freezing injury that is more common in the cold storage of fruits. | | CO2 | U | 3 |
| 13. | Differentiate specific humidity and percentage humidity. | | CO3 | U | 3 |
| 14. | Correlate freezing rate and the size of the ice crystals formed. | | CO4 | An | 3 |
| 15. | State the advantages of evaporative cooling. | | CO5 | R | 3 |
| 16. | Explain the reason for keeping the freezer box in the home refrigerator at the top. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe Vapour compression refrigeration cycle using T-s and P-V diagram. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate various steps involved in the heat load calculation. | CO2 | A | 6 |
| b. | Summarize optimum storage conditions of different food products. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Compare and contrast winter, summer and all year air conditioning systems. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain various stages of the freezing curve with a neat sketch. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | Discuss in detail various chilling equipment used in liquid food storage. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain the working principle of a practical vapor absorption refrigeration system with a neat sketch. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Discuss in detail various psychrometric processes adopted in air conditioning systems. | CO3 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Demonstrate the protocols to be followed for the domestic, air and sea transport of perishable food products. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Understand refrigeration of food and its operational components. |
| **CO2** | Gain knowledge on various forms of food refrigeration in plants, stores and logistics. |
| **CO3** | Learn advanced food freezing concepts and techniques. |
| **CO4** | Study food safety aspects of chilled foods and frozen foods. |
| **CO5** | Comprehend cold chain management in the food distribution sector. |
| **CO6** | Evaluate the cold storage and packaging of frozen perishable products. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 25 | --- | --- | --- | --- | 29 |
| **CO2** | 1 | 9 | 7 | --- | --- | --- | 17 |
| **CO3** | 2 | 15 | --- | 12 | --- | --- | 29 |
| **CO4** | 1 | --- | 1 | 15 | --- | --- | 17 |
| **CO5** | 4 | 12 | --- | --- | --- | --- | 16 |
| **CO6** | --- | --- | 13 | 3 | --- | --- | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18FP2019** | **Duration** | **3hrs** |
| **Course Name** | **CEREALS AND PULSES PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | |
| 1. | Explain deodorization process in rice bran oil refining. | CO3 | An | 1 |
| 2. | Mention the disadvantages of parboiling. | CO2 | R | 1 |
| 3. | List the objectives of milling. | CO2 | An | 1 |
| 4. | Define the term head and broken rice. | CO3 | R | 1 |
| 5. | During parboiling the temperature of wheat grain should not exceed 47ºC.Why? | CO4 | R | 1 |
| 6. | Identify the ingredients of self rising flour. | CO4 | A | 1 |
| 7. | List the components of feed made from byproducts of corn milling. | CO6 | R | 1 |
| 8. | Name the various products of refined corn starch. | CO4 | R | 1 |
| 9. | High Fructose Corn Syrup is sweeter than sucrose. Explain. | CO6 | U | 1 |
| 10. | Justify the role of Carbon dioxide as a super critical fluid. | CO4 | E | 1 |

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| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | |
| 11. | Construct the flow chart of rice processing in a modern rice mill. | CO2 | A | 3 |
| 12. | Explain the construction and working of under runner disc sheller. | CO2 | An | 3 |
| 13. | Outline the lye peeling method of bulgur production. | CO4 | U | 3 |
| 14. | Describe the structure and composition of maize with a diagram. | CO1 | R | 3 |
| 15. | Mention the different methods of tortilla manufacturing and explain any one method. | CO6 | R | 3 |
| 16. | Interpret the CIAE method of pulse milling. | CO5 | U | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Categorize the different methods of paddy parboiling. | CO2 | An | 5 |
| b. | Recommend the various steps involved in refining of rice bran oil. | CO3 | U | 7 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the working of the vertical whitening cone. | CO2 | An | 9 |
| b. | Describe the term glazing. | CO3 | R | 3 |
|  |  |  |  |  |  |
| 19. | a. | Outline the various steps involved in wheat milling operation. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Elaborate the corn wet milling process with a neat flow chart and list the products of wet milling. | CO6 | C | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain the process for the manufacture of HFCS and list its application in food industries. | CO6 | E | 8 |
| b. | Construct the process flow diagram for the aqueous enzymatic oil extraction process. | CO4 | C | 4 |
|  |  |  |  |  |  |
| 22. | a. | Discuss the various changes taking place during paddy parboiling. | CO3 | A | 7 |
| b. | Demonstrate the working of rotating reel grader. | CO2 | U | 5 |
|  |  |  |  |  |  |
| 23. | a. | Write the process flow chart for the production of various nixtamalized corn products. | CO6 | A | 6 |
| b. | In pigeon pea milling experiment with concentric cylinder abrasive mill the following observations were made  Amount of unhulled grain – 2.5%  Recovery of whole split kernel after milling – 71.4%  Amount of crushed kernels – 3.6%  Amount of powder generated – 11%  Amount of husk removed – 11.5%  The cotyledon to grain ratio of the grain was 86.5. Calculate the milling efficiency of the system. | CO5 | E | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Express the important unit operations of pulse milling. | CO5 | C | 7 |
| b. | Explain the CFTRI method of pulse milling. | CO5 | A | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge about the basic composition and structural parts of food grains. |
| CO2 | Know about paddy processing and rice milling equipment which will help them for developing entrepreneurial skills. |
| CO3 | Apply the knowledge to process food grains into value added products |
| CO4 | Acquire the skills of processing wheat, maize and corn. |
| CO5 | Develop skills needed in the milling of pulses. |
| CO6 | Study the processing and milling of maize which will promote gainful employment. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | -- | -- | -- | -- | -- | 3 |
| CO2 | 1 | 5 | 3 | 18 | -- | -- | 27 |
| CO3 | 4 | 7 | 7 | 1 | -- | -- | 19 |
| CO4 | 2 | 15 | 1 | -- | 1 | 4 | 23 |
| CO5 | -- | 3 | 5 | -- | 6 | 7 | 21 |
| CO6 | 4 | 1 | 6 | -- | 8 | 12 | 31 |
|  | | | | | | | 124 |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18FP2020** | **Duration** | **3hrs** |
| **Course Name** | **BAKERY, BEVERAGES AND CONFECITONERY TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The Hagberg Falling number permitted for a cake flour should be? | | CO2 | R | 1 |
| 2. | Name the device used for checking the resistance of a bread dough to repeated disruptions | | CO1 | R | 1 |
| 3. | Expand - SSL | | CO1 | R | 1 |
| 4. | Name the composition of a double acting baking powder. | | CO4 | R | 1 |
| 5. | Recall - **TCH** | | CO5 | R | 1 |
| 6. | Expand ICUMSA | | CO4 | R | 1 |
| 7. | A fruit mix contains 30% w/v of sugar after chaptalisation. Calculate the maximum alcohol content possible after complete fermentation. | | CO5 | A | 1 |
| 8. | Define the standards for water to be used for carbonated beverages. | | CO3 | U | 1 |
| 9. | Explain the term ***– Doctoring.*** | | CO4 | R | 1 |
| 10. | Type of pectin used for diabetic jellies? | | CO5 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Enlist the significance of p/L ratio of a bread dough. | | CO2 | A | 3 |
| 12. | What is ***oven spring*** in bread? | | CO4 | U | 3 |
| 13. | What is the importance of imbibition? | | CO5 | U | 3 |
| 14. | Briefly explain the process of port wine production. | | CO5 | A | 3 |
| 15. | Illustrate the classification of distilled beverages. | | CO2 | U | 3 |
| 16. | Hard boiled candies stick to the cover and become messy during the summer. Examine the reason and suggest a suitable solution | | CO4 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Discuss in detail on the method of manufacture of wheat semolina. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Discuss in detail on the steps involved in the manufacture of a centre-filled biscuits. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Discuss in detail on the methods of defecation of sugarcane juice | CO4 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Illustrate briefly the process involved in the manufacture of ale beer. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | With the help of a neat flow diagram, discuss in detail on the technology involved in the manufacture of a carbonated beverage. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Describe in detail the process of manufacturing of dark chocolates. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Mr. A seeks your guidance in setting up a company manufacturing *Egg less cakes.* Explain the process for the same. | CO6 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Discuss the steps involved in the manufacture of soft toffees, highlighting the importance of each step. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | To gain knowledge on the ingredients, process and machinery involved in bakery and confectionery and beverage technology. |
| **CO2** | To understand the importance and effect of quality of raw materials on the final products |
| **CO3** | To apply the knowledge gained in formulating new types of products |
| **CO4** | To critically analyze the process for maintaining and improving the quality of the final product |
| **CO5** | To evaluate the steps involved in the process and improve existing technologies or develop newer technologies |
| **CO6** | To design and create newer process and products that are better economically, nutritionally or technologically |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 3 |  | 12 |  |  |  | 14 |
| **CO2** | 1 | 3 | 15 |  |  |  | 19 |
| **CO3** |  | 1 |  | 12 |  |  | 13 |
| **CO4** | 3 | 3 | 12 | 3 |  |  | 21 |
| **CO5** | 1 | 3 | 29 |  |  |  | 33 |
| **CO6** |  |  | 12 | 12 |  |  | 24 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18FP2027** | **Duration** | **3hrs** |
| **Course Name** | **FOOD PROCESS EQUIPMENT DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Application of Cr in steel. | | CO1 | A | 1 |
| 2. | Deduce an equation for tensile stress. | | CO1 | R | 1 |
| 3. | Suggest support type for large horizontal pressure vessel. | | CO2 | R | 1 |
| 4. | Identify the head type, which is suitable for high pressure. | | CO2 | R | 1 |
| 5. | Suggest the type of arrangement needed, if the reaction vessel cover is to be opened frequently. | | CO3 | U | 1 |
| 6. | Explain the situation, if the vessel is considered as an autoclave. | | CO3 | R | 1 |
| 7. | Application of heat exchangers. | | CO4 | U | 1 |
| 8. | The equipment consists of a number of parallel tubes enclosed in a relatively close-fitting cylindrical shell is known as \_\_\_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | Evaporators are used for \_\_\_\_\_\_\_\_\_ liquids. | | CO5 | U | 1 |
| 10. | Suggest the turbine agitator for maximum power economy. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Design and selection considerations for food processing equipment. | | CO1 | An | 3 |
| 12. | A thin cylinder is subjected to internal pressure of 10 MPa, internal cylinder diameter is 1000 mm and wall thickness is 10 mm. Determine circumferential stress, axial stress and radial stress. | | CO2 | E | 3 |
| 13. | Distinguish between flat heads and formed heads. | | CO3 | An | 3 |
| 14. | Draw neat diagram of different coil and channel welded to shell for reaction vessel. | | CO4 | U | 3 |
| 15. | Discuss about plate type heat exchanger. | | CO5 | An | 3 |
| 16. | Discuss the baffles size and disposition for efficient mixing. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Analyze stress – strain curve for ductile material. | CO1 | An | 4 |
|  | b. | Analyze the stress developed in thin pressure vessel. | CO1 | An | 8 |
|  |  |  |  |  |  |
| 18. | a. | Summarize the corrosion of food processing equipment. | CO2 | An | 4 |
|  | b. | Discuss the materials used for construction of food processing equipments. | CO2 | U | 8 |
|  |  |  |  |  |  |
| 19. | a. | Explain types of joints used for design of storage vessels. | CO3 | U | 2 |
|  | b. | A thick cylinder has 250 mm inner diameter and 350 mm outer diameter. The internal pressure is 30MPa and external pressure is 10MPa. Find the longitudinal stress, maximum and minimum hoop stress. And also verify σc – σr = constant. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 20. | a. | Explain design of rectangular tank for storage of liquids. | CO4 | An | 6 |
|  | b. | Explain hortospheres or spherical vessels for storage of gases. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain jackets and coils used in heating system for reaction vessels with neat diagram. | CO5 | U | 6 |
|  | b. | Explain agitation system for reaction vessels. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 22. | a. | Design a reaction vessel shell with half coil. | CO5 | E | 8 |
|  | b. | Explain about heating system used in reaction vessel. | CO5 | U | 4 |
|  |  |  |  |  |  |
| 23. | a. | Briefly explain long tube vertical evaporator with neat sketch. | CO6 | A | 4 |
|  | b. | Briefly explain horizontal tube evaporator with neat sketch. | CO6 | A | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain in detail about tray dryer with neat sketch. | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Identify the factors that will affect the design of equipments |
| **CO2** | Classify the variables based on various properties |
| **CO3** | Interpret the relation between various process variables |
| **CO4** | Select the critical variables for the design of equipments |
| **CO5** | Develop a conceptual design model |
| **CO6** | Assess the validity of the conceptual model |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | - | 1 | 15 | - | - | 17 |
| **CO2** | 2 | 8 | - | 7 | - | - | 17 |
| **CO3** | 1 | 3 | - | 3 | 10 | - | 17 |
| **CO4** | 1 | 4 | 6 | 6 | - | - | 17 |
| **CO5** | - | 11 | 6 | 3 | 8 | - | 28 |
| **CO6** | - | 4 | 12 | 12 | - | - | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18FP2030** | **Duration** | **3hrs** |
| **Course Name** | **FOOD ADDITIVES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
|  | **PART – A (10 X 1 = 10 MARKS)** | | | | |
| 1. | Define the term ADI. | | CO5 | R | 1 |
| 2. | Identify the additive used when oils have a tendency to go rancid when exposed to the air. | | CO2 | R | 1 |
| 3. | State the definition of preservative according to FSSAI. | | CO1 | R | 1 |
| 4. | Recall the factors that determines physical and chemical characteristics of fats and oils. | | CO1 | R | 1 |
| 5. | Indicate the application of calcium silicate as anticaking agent. | | CO4 | R | 1 |
| 6. | Humectants are hygroscopic in nature – Justify the statement. | | CO4 | E | 1 |
| 7. | List out the types of Flavourants based on its origin and nature of raw materials. | | CO6 | A | 1 |
| 8. | Recall the pigment from animal and insect sources. | | CO6 | R | 1 |
| 9. | Define the term Glycemic index. | | CO6 | R | 1 |
| 10. | List out the application of polyols in oral health and pharmaceutical. | | CO2 | A | 1 |
|  | **PART – B (6 X 3 = 18 MARKS)** | | | | |
| 11. | Write a short note on E numbers. | | CO1 | C | 3 |
| 12. | Discuss the role of Acid synergists. | | CO2 | U | 3 |
| 13. | Appraise the functions and disadvantages of maturing agents. | | CO4 | An | 3 |
| 14. | State the ideal requirement needed for artificial sweeteners. | | CO4 | R | 3 |
| 15. | Differentiate Flavor - dependent and Flavor – independent products with examples. | | CO4 | An | 3 |
| 16. | Summarize the role of nutritional food additives. | | CO1 | E | 3 |
|  | **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23, Q.no 24 is Compulsory)** | | | | |
| 17. | a. | Discuss the need for food additive. | CO1 | U | 6 |
| b. | Write a short note on Determination of ADI. | CO3 | C | 6 |
| 18. | a. | Summarize the Class I and Class II preservatives. | CO6 | E | 12 |
| 19. | a. | Recall the types of humectants and its application. | CO4 | R | 6 |
| b. | Classify dough conditioners based on its composition and function. | CO2 | U | 6 |
| 20. | a. | Explain the Flavonoids from plant sources. | CO4 | An | 6 |
|  | b. | Write a short note on carotenoids. | CO4 | C | 6 |
| 21. | a. | Explain the Carbohydrate based fat replacers. | CO2 | An | 12 |
| 22. | a. | Enumerate the artificial sweeteners approved by FDA. | CO4 | R | 10 |
| b. | Briefly explain the function of polyols in the body. | CO2 | An | 2 |
| 23. | a. | Write the role of acetic acid and diacetate salts as acidulants. | CO6 | C | 9 |
| b. | Discuss the Function of acidulants in food. | CO2 | U | 3 |
|  |  | **Compulsory** | | | |
| 24. | a. | Discuss the type of Non enzymatic browning reaction. | CO1 | U | 6 |
| b. | Paraphrase the anti-browning agents used as alternative to sulfite. | CO6 | U | 6 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recognize the importance of additives in maintaining or improving food quality. |
| CO2 | Understand the applications of food additives. |
| CO3 | Interpret the toxicity of food additives through NOAEl, ADI and LD 50 values. |
| CO4 | Distinguish the characteristics of additives and their specific use in foods. |
| CO5 | Evaluate the dietary intake of individuals consuming foods with food additives. |
| CO6 | Development of various instant premixes by addition of preservatives within the permissible limits. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 12 | - | - | 3 | 3 | 20 |
| CO2 | 1 | 12 | 1 | 14 | - | - | 28 |
| CO3 | - | - | - | - | - | 6 | 6 |
| CO4 | 20 | - | - | 12 | 1 | 6 | 39 |
| CO5 | 1 | - | - | - | - | - | 1 |
| CO6 | 2 | 6 | 1 | - | 12 | 9 | 30 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18FP2031** | **Duration** | **3hrs** |
| **Course Name** | **PLANTATION AND SPICES PRODUCT TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name the commercially grown coffee species. | | CO1 | R | 1 |
| 2. | Define coffee hulling process. | | CO1 | R | 1 |
| 3. | Mention the key indicator to stop the fermentation process in green brick tea. | | CO1 | R | 1 |
| 4. | Give an examples for fermented and non-fermented tea. | | CO1 | U | 1 |
| 5. | Mention the fat content in high fat cocoa cake. | | CO2 | R | 1 |
| 6. | Define panning in chocolate making. | | CO2 | R | 1 |
| 7. | Name the food grade solvents used in solvent extraction process. | | CO5 | R | 1 |
| 8. | Define encapsulation. | | CO5 | R | 1 |
| 9. | Name the component responsible for yellow colour in turmeric. | | CO4 | R | 1 |
| 10. | Mention the method used to measure the pungency in chilli. | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate the flow chart of wet and dry processing of coffee. | | CO1 | U | 3 |
| 12. | Enumerate the changes in tea leaves during withering process. | | CO1 | R | 3 |
| 13. | Illustrate the process flow chart for chocolate manufacturing. | | CO4 | U | 3 |
| 14. | Write the cold press extraction process. | | CO5 | A | 3 |
| 15. | State the principle of supercritical fluid extraction. | | CO5 | R | 3 |
| 16. | Summarize the garlic dehydration process. | | CO3 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the manufacturing process of instant tea with flow chart. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Describe the methods used for decaffeination of coffee. | CO1 | U | 6 |
|  | b. | Analyze the physio-chemical changes in coffee during roasting process. | CO1 | An | 6 |
|  |  |  |  |  |  |
| 19. | a. | Elaborate the maceration process of essential oil extraction. | CO5 | A | 6 |
|  | b. | Explain steam distillation process with a diagram. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Analyze the changes in cocoa beans during fermentation. | CO3 | An | 6 |
|  | b. | Explain the mixing and refining step in chocolate manufacturing. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain the steps involved in production of cinnamon quills. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain the decaffeination methods of soluble tea. | CO1 | U | 6 |
|  | b. | List the functional properties of clove. | CO4 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain in detail about post-harvest processing of turmeric. | CO4 | A | 6 |
|  | b. | Write in detail about production of black pepper, white pepper and ground pepper. | CO4 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the manufacturing process of vanilla extract and list the factors influencing the quality of vanilla extract. | CO2 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Define the different unit operations and its equipments involved in coffee, tea and cocoa processing |
| **CO2** | Gain knowledge in processing of plantation crops and spices and also its value added products. |
| **CO3** | Outline ways in which quality loss can be minimised during preparation and processing |
| **CO4** | Develop value added products from plantation products and spices |
| **CO5** | Demonstrate appropriate technique for the extraction of spice oil and oleoresin with quality standards |
| **CO6** | Acquire a confident to get placement in any kind of cereals and spices industry with minimum post harvest losses and maximum benefit to the industry |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 6 | 28 | - | 6 | - | - | 40 |
| **CO2** | 2 | - | 12 | - | - | - | 14 |
| **CO3** | - | 9 | - | 6 | - | - | 15 |
| **CO4** | 8 | 3 | 24 | - | - | - | 35 |
| **CO5** | 5 | - | 15 | - | - | - | 20 |
| **CO6** | - | - | - | - | - | - | - |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18FP2033** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF MEAT, POULTRY AND FISH** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Indicate the myoglobin content for calf. | | CO1 | U | 1 |
| 2. | Point out the fungus causing green spot in meat. | | CO1 | R | 1 |
| 3. | Recall and write the Gestation period for pigs. | | CO2 | R | 1 |
| 4. | Define the term stunning. | | CO2 | R | 1 |
| 5. | Indicate the permitted level of nitrate in meat products. | | CO3 | U | 1 |
| 6. | Name a machine used for seaming of cans during meat canning operation. | | CO3 | R | 1 |
| 7. | Write the percentage of yolk present in egg. | | CO4 | U | 1 |
| 8. | Point the protein of egg that binds with the biotin and makes the vitamin unavailable. | | CO4 | R | 1 |
| 9. | Define the term finfish. | | CO5 | U | 1 |
| 10. | Indicate the freezer used for small shrimps. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Classify proteins present in meat. | | CO1 | U | 3 |
| 12. | Write measurement techniques for checking quality of meat. | | CO2 | U | 3 |
| 13. | Enlist the criteria for selection of stunning methods. | | CO3 | R | 3 |
| 14. | Comment on preservative action of sodium chloride. | | CO4 | U | 3 |
| 15. | Recall the different chilling methods of fish. | | CO5 | U | 3 |
| 16. | Point out the objectives of ante-mortem inspection. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the muscle composition and its modifiers. | CO1 | R | 12 |
|  |  |  |  |  |  |
| 18. | a. | Explain the post mortem muscle chemistry of meat. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Highlight the operational factors affecting meat quality. | CO3 | R | 6 |
|  | b. | Describe modern abattoirs along with some features. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Evaluate the process of poultry meat processing, considering the sequential steps involved. | CO4 | E | 6 |
|  | b. | Examine the packaging methods used for poultry products. | CO4 | R | 6 |
|  |  |  |  |  |  |
| 21. | a. | Draw and explain the Structure and composition of egg | CO5 | C | 6 |
|  | b. | Analyze the microbiological aspects of poultry products. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Assess the antemortem handling and inspection practices in animal agriculture, considering their impact on animal welfare. | CO4 | E | 12 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 23. | a. | Compare and contrast the composition of meat sourced from various origins. | CO3 | U | 12 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Examine the factors contributing to the spoilage of fish. | CO6 | R | 12 |
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**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL**M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Enumerate the composition and role of microorganisms in meat |
| **CO2** | Understand the slaughtering, carcass processing methods and equipments used for processing meat. |
| **CO3** | Apply the technological ideas in preparation of various types of meat products and design of equipments used for processing meat |
| **CO4** | Understand the HACCP and GMP of meat processing |
| **CO5** | Evaluate the processing of poultry meat, meat products and egg products |
| **CO6** | Predict the role of microorganisms in spoilage, biochemistry, preservation and fishery products |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 13 | 4 | -- | -- | -- | -- | 17 |
| **CO2** | 2 | 15 | -- | -- | -- | -- | 17 |
| **CO3** | 10 | 19 | -- | -- | -- | -- | 29 |
| **CO4** | 07 | 4 | -- | -- | 18 | -- | 29 |
| **CO5** | -- | 4 | -- | 6 | -- | 6 | 16 |
| **CO6** | 12 | 4 | -- | -- | -- | -- | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18FP2037** | **Duration** | **3hrs** |
| **Course Name** | **PROCESS ECONOMICS AND PLANT LAYOUT DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What is the meaning of the "C" in the acronym PIECES? | | CO1 | R | 1 |
| 2. | Explain the concept of "Organizational feasibility." | | CO1 | U | 1 |
| 3. | What is the full form of EHEDG? | | CO2 | R | 1 |
| 4. | Define what "18:8 steel" indicates. | | CO3 | R | 1 |
| 5. | Expand CCP. | | CO2 | R | 1 |
| 6. | Elaborate on the abbreviation "OSHA." | | CO4 | R | 1 |
| 7. | What does the term "break even point" refer to? | | CO5 | R | 1 |
| 8. | State what comprises capital cost. | | CO5 | R | 1 |
| 9. | Define RROI. | | CO5 | R | 1 |
| 10. | Explain the term - “salvage value” in financial contexts. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Summarize the significance of under capitalization. | | CO1 | U | 3 |
| 12. | Calculate the required amount of tomatoes for Mr. Y to manufacture 100 kg/h of "tomato sauce." | | CO2 | R | 3 |
| 13. | List the CCPs for a bakery unit. | | CO3 | U | 3 |
| 14. | Mr. X. want to know the cost of operating supplies and its contribution towards product cost. Can you help him? | | CO4 | U | 3 |
| 15. | Briefly describe the Guthrie’s module cost method. | | CO5 | A | 3 |
| 16. | Mr. Paisawala, a financial analyst, observed that the venture of XX has yielded 25 crores of total returns in 5 years. His initial investment was 1 crore. Can you calculate the Rate of return on investment of his venture? | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Tasty tasty company plans to set up an industry manufacturing 100 kg/h of mango squash. Can you help him on deciding the amount of raw materials required as also the process flow diagram for the same? | CO1 | An | 8 |
|  | b. | Explain the significance of energy and material balance in the food processing industry. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 18. | a. | AA wants to know about the types of plant layout. Can you help her? | CO2 | A | 9 |
|  | b. | Mr. Y wants to set up a wheat milling unit. Can you suggest a suitable choice of place based on your understanding? | CO3 | A | 3 |
|  |  |  |  |  |  |
| 19. | a. | Paisawala and Co. wants your input on the process of deciding the PRPs for a orange squash manufacturing unit. Can you help them? | CO3 | U | 8 |
|  | b. | Highlight the advantages of a process type layout design. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 20. | a. | Iniya sweets wants your suggestions on deciding the technical feasibility of starting a mango processing industry. Can you help them on this? | CO4 | A | 8 |
|  | b. | BB wants your input on the hygienic design of kettles used for jam manufacture. Can you advise him? | CO4 | A | 4 |
|  |  |  |  |  |  |
| 21. | a. | Mr.A wants to set up an industry manufacturing 100kg/h of milk processing unit. He has a plot measuring 1000 sq.m. Can you help him in designing the layout, based on your understanding of Richard Muther’s SSPL? | CO3 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Mr. AA wants to set up a milk powder unit of 500 kg/h capacity. His friend has a similar plant of 250kg/h capacity set up in 2017. Determine the total investment cost. Given – cost of the spray dryer in 2015 of 100 kg / h capacity was 10 Lakhs. Cost of homogenizer of similar capacity – 8 lakhs. Given – CEPCI index for 2021 and 2017 are 708 and 567.5 respectively | CO5 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Mr. YY wants to know the contribution of the following in deciding the product cost. Can you help him?  (i) Labour cost  (ii) Utilities  (iii) Maintenance and repair | CO5 | A | 12 |
|  | | | | | |
| 24. | a. | Mr. Rupaiyaa wants a clear picture on the cash flow diagram. Can you help him? | CO6 | U | 8 |
|  | b. | Mr. BB had bought a car in 2015 for Rs. 3 lakhs. He found that he could resell the same car in September for 2 lakhs. He bought an Apple mobile in 2020 for Rs. 25,000/. But could sell the same this September only for Rs. 2000. Can you explain this phenomenon and the reasons for the same? | CO6 | An | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Gain knowledge on the various factors involved in setting up a Food Processing Industry. |
| **CO2** | Understand the process of food plant layout design. |
| **CO3** | Apply their knowledge to design projects for setting up a Food Processing Industry. |
| **CO4** | Analyze the problems involved in deciding the level of manufacture of a food product. |
| **CO5** | Evaluate the options involved and decide on the right choice based on the economics of the system. |
| **CO6** | Develop own industry or plan turn-key projects based on the request from customers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 8 | - | 8 | - | - | 17 |
| **CO2** | 5 | 4 | 9 | - | - | - | 18 |
| **CO3** | 1 | 11 | 15 | - | - | - | 27 |
| **CO4** | 1 | 3 | 12 | - | - | - | 16 |
| **CO5** | 3 | - | 15 | 12 | - | - | 30 |
| **CO6** | - | 9 | - | 7 | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

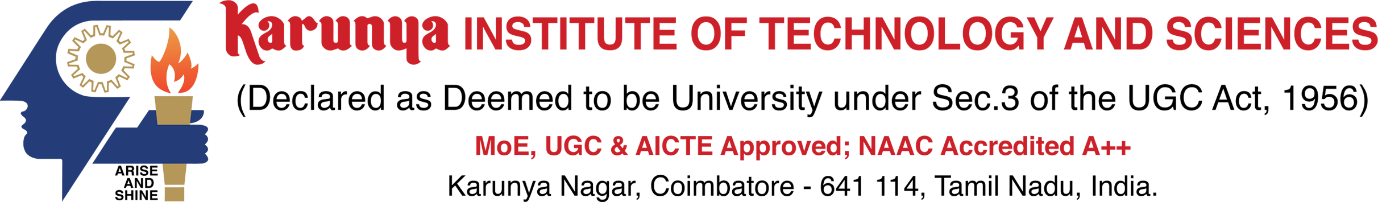
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| --- | --- | --- | --- |
| **Course Code** | **18FP2040** | **Duration** | **3hrs** |
| **Course Name** | **MATERIAL SCIENCE FOR FOOD ENGINEERS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name the force responsible for the formation of water molecule. | | CO1 | R | 1 |
| 2. | Name any two-point defects occurring in solids. | | CO2 | R | 1 |
| 3. | Give one example for ductile fracture. | | CO4 | R | 1 |
| 4. | Classify two types of fracture occurring in metals. | | CO3 | U | 1 |
| 5. | Write a balanced reaction occurring at cathode during corrosion of Iron. | | CO4 | U | 1 |
| 6. | Name the interactive force present in Hcl molecule. | | CO1 | U | 1 |
| 7. | Classify types of solids. | | CO1 | R | 1 |
| 8. | Define stress. | | CO2 | R | 1 |
| 9. | Define Malleability. | | CO2 | R | 1 |
| 10. | List the two types of fractures occurring in metals. | | CO2 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write a short note on Vander Waals Bonding. | | CO1 | U | 3 |
| 12. | Draw a flow chart to classify types of deformation. | | CO2 | U | 3 |
| 13. | List the factors affecting fracture of material. | | CO2 | U | 3 |
| 14. | Explain pitting corrosion and enlist the factors affecting it. | | CO5 | U | 3 |
| 15. | Differentiate between carbon steel and stainless steel. | | CO4 | A | 3 |
| 16. | List the advantages of SEM and TEM. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Distinguish between amorphous and crystalline solids. | CO1 | U | 6 |
|  | b. | List four important bonding types occurring in atoms and explain metallic bonding in detail. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Draw a well labelled diagram from DBTT curve. | CO2 | C | 6 |
|  | b. | Explain brittle fracture in ceramics and list factors influencing brittle fracture. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain Fracture toughness. | CO2 | R | 6 |
|  | b. | Explain mechanism of Fatigue Failure. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Classify the types of stainless steel. | CO4 | U | 6 |
|  | b. | Explain in detail quenching process. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Describe the Mechanism of Corrosion. | CO5 | U | 6 |
|  | b. | Explain in detail: Techniques used to prevent the corrosion. | CO6 | A | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain in detail: types of stress. | CO2 | U | 6 |
|  | b. | Write a short note on Young’s modulus of a composite material. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Enlist types of corrosion and explain in detail any one of them. | CO4 | U | 6 |
|  | b. | Draw a hydrogen embrittlement mechanism diagram. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain in detail: All the methods used for determining particle size. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Enumerate the fundamentals of various bonds. |
| **CO2** | Understand the importance of strength of material. |
| **CO3** | Have a knowledge of the imperfections of metals. |
| **CO4** | Have a knowledge of alloying and its importance in everyday life. |
| **CO5** | Understand the various methods of characterization. |
| **CO6** | Examine the application of various techniques. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 16 | - | - | - | - | 18 |
| **CO2** | 9 | 31 | - | - | - | 6 | 46 |
| **CO3** | - | 1 | - | - | - | - | 1 |
| **CO4** | 1 | 19 | 3 | - | - | - | 23 |
| **CO5** | - | 15 | - | - | - | - | 15 |
| **CO6** | 3 | 12 | 6 | - | - | - | 21 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP1001** | **Duration** | **3hrs** |
| **Course Name** | **BASICS OF MICROBIOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name the scientist who has introduced pasteurization. | | CO1 | R | 1 |
| 2. | Mention a phylogenetic method that is used to identify a bacterial species. | | CO1 | R | 1 |
| 3. | Give an example of a bacterial virus. | | CO2 | U | 1 |
| 4. | Recall and write the sugar derivatives found in Gram positive bacteria. | | CO2 | U | 1 |
| 5. | Identify the polysaccharide found in the cell walls of fungi | | CO3 | R | 1 |
| 6. | Give an example of bread mold. | | CO3 | R | 1 |
| 7. | Name a mesophilic bacteria. | | CO4 | R | 1 |
| 8. | Give an example of selective media. | | CO4 | U | 1 |
| 9. | Name the counting chamber that is used to enumerate prokaryotes. | | CO5 | R | 1 |
| 10. | Give an example of capsulated bacteria. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State the concept of biogenesis theory. | | CO1 | R | 3 |
| 12. | Define prophage with an example. | | CO2 | R | 3 |
| 13. | Define mycelium. | | CO3 | A | 3 |
| 14. | Define enriched media with a suitable example. | | CO4 | R | 3 |
| 15. | Differentiate pour plate and spread plate technique | | CO5 | An | 3 |
| 16. | Write the mode of action of Chlorine. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Define polyphasic taxonomy. Describe the phenotypic classification of bacteria. | CO1 | R | 8 | |
|  | b. | State the five postulates of Robert Koch. | CO1 | R | 4 | |
|  |  |  |  |  |  | |
| 18. | a. | Differentiate lytic and lysogenic cycle of bacteriophage. Elaborate on the lytic cycle of Bacteriophage with a neat diagrammatic representation. | CO2 | U | 12 | |
|  |  |  |  |  |  | |
| 19. | a. | Discuss the methods of sexual reproduction and the spores produced by Rhizopus in detail. | CO3 | U | 12 | |
|  |  |  |  |  |  | |
| 20. | a. | State the factors affecting the growth of bacteria in detail. | CO4 | R | 12 | |
|  |  |  |  |  |  | |
| 21. | a. | Define pure culture. Explain the pure culture techniques that are used to enumerate bacterial growth. | CO5 | A | 8 | |
|  | b. | Write the principle of Negative staining. | CO5 | A | 4 | |
|  |  |  |  |  |  | |
| 22. | a. | With a neat sketch, describe the working principle of a transmission electron microscope. | CO5 | An | 12 | |
|  |  |  |  |  |  | |
| 23. | a. | Categorize the nutritional requirements of bacteria for their growth. | CO4 | An | 12 | |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Define Sterilization. Summarize the physical methods of sterilization that control the growth of bacteria. | CO6 | E | 12 | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the developments in the discipline of Microbiology and the contributions made by prominent scientists in this field. |
| **CO2** | Understand the classification of microorganisms. |
| **CO3** | Identify key components and their functions in prokaryotic and eukaryotic microorganisms. |
| **CO4** | Point out the bacteriological media and nutritional requirements for growth of bacteria. |
| **CO5** | Recommend the methods used for enumeration, identification and preservation of bacteria. |
| **CO6** | Create sterilization protocol for the control of microorganism. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 17 | - | - | - | - | - | 17 |
| **CO2** | 3 | 14 | - | - | - | - | 17 |
| **CO3** | 2 | 12 | 3 | - | - | - | 17 |
| **CO4** | 16 | 1 |  | 12 | - | - | 29 |
| **CO5** | 1 |  | 15 | 12 | - | - | 28 |
| **CO6** | 3 | 1 | - | - | 12 | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2001** | **Duration** | **3hrs** |
| **Course Name** | **FOOD PROCESS CALCULATIONS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | State the SI unit of the film heat transfer coefficient. | | CO1 | R | 1 |
| 2. | Recite the general expression for material balance without chemical reactions. | | CO1 | U | 1 |
| 3. | Calculate the molarity of 10% (w/v) of NaOH solution. | | CO2 | R | 1 |
| 4. | Define mole. | | CO2 | R | 1 |
| 5. | State the SI unit of the film heat transfer coefficient. | | CO3 | R | 1 |
| 6. | Recall NHV and GHV. | | CO3 | R | 1 |
| 7. | Define normality. | | CO4 | R | 1 |
| 8. | Differentiate potential and kinetic energy. | | CO4 | U | 1 |
| 9. | Define isochoric system. | | CO5 | R | 1 |
| 10. | Define dew point temperature. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Distinguish between base and derived units with examples. | | CO1 | U | 3 |
| 12. | Derive an equation for density of gases using ideal gas equation. | | CO2 | An | 3 |
| 13. | A perfect gas at 27C is heated at constant pressure till its volume is doubled. What will be the final temperature of gas? | | CO3 | A | 3 |
| 14. | Interpret the term heat capacity of a system and recite the heat capacity as a quadratic function of temperature. | | CO4 | U | 3 |
| 15. | Calculate the molarity of a solution containing 5g of NaOH in 450mL solution. | | CO5 | E | 3 |
| 16. | Define relative humidity. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | The sugar solution is prepared by dissolving 1kg of sucrose in 9 kg of water. The density of solution is 1040 kg/m3. Calculate  a. Concentration (w/w)  b. Concentration (w/v)  c. Brix  d. Molarity  e. Mole fraction  f. Molality | CO1 | E | 8 |
|  | b. | Criticize the moisture content in both dry and wet basis concepts. | CO1 | An | 4 |
|  | | | | | |
| 18. | a. | In order to overcome flavor loss in concentrated orange juice, a portion of fresh juice is mixed with concentrated juice. If the fresh juice is initially concentrated to 45% solids and the desired final concentration of the product is 40%, find the weight fractions of the fresh juice that is required to be concentrated. The fresh juice contains 10% solids. | CO2 | A | 8 |
|  | b. | Elaborate the Dalton’s law and Amagat’s Law with a neat diagram. | CO2 | U | 4 |
|  | | | | | |
| 19. | a. | Illustrate the gas laws and derive an expression for ideal gas equation. | CO3 | E | 6 |
|  | b. | It is desired to make up 1000 kg of a solution containing 35% by weight of a substance “A”. Two solutions are available one containing 10 weight percent “A” and other containing 50 weight percent of “A”. How many kilograms of each solution will be required? | CO3 | An | 6 |
|  | | | | | |
| 20. | a. | Discuss the heat capacities of solids, liquids and gases. | CO4 | An | 6 |
|  | b. | Interpret the standard heat of reaction, combustion and formation with example. | CO4 | A | 6 |
|  | | | | | |
| 21. | a. | An evaporator is fed with 15,000 kg/hr of a solution containing 10% NaCl, 15% NaOH, and rest water. In the operation, water is evaporated and NaCl is precipitated as crystals. The thick liquor leaving the evaporator contains 45% NaOH, 2% NaCl, and the rest water.  Calculate   1. kg/hr water evaporated 2. kg/hr salt precipitated 3. kg/hr thick liquor | CO5 | A | 10 |
|  | b. | Water flows into a process through a 2-cm inner diameter pipe at 2.00 m3/h. Calculate the kinetic energy for the system in J/s. | CO5 | E | 2 |
|  | | | | | |
| 22. | a. | Wet solids containing 50% water and 50% solids are to be dried to get solids with 5% water by weight. Fresh air contains 0.010 kg water vapour per kg dry air and the air leaving the dryer contains 0.05 kg water vapour per kg dry air. If 100 kg of dry air enters the dryer for every kg of dry solids, calculate the quantity of fresh air and the fraction of air recirculated and recycle ratio. | CO3 | E | 8 |
|  | b. | How much weight reduction would result when a material is dried from 80 % moisture to 50% moisture? | CO3 | An | 4 |
|  | | | | | |
| 23. | a. | Elaborate on the Hess’s Law of Constant Heat Summation. | CO4 | U | 6 |
|  | b. | Summarize the kinetic theory of Gases. | CO2 | E | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Atmospheric air at 760mm of Hg has 45ºC dry bulb temperature and 30 ºC wet bulb temperature. Solve the following using psychrometric chart. a) Relative humidity b)Humidity Ratio c)Dew Point Temperature d)Enthalpy e)Specific Volume of Air. | CO6 | C | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the compositions of mixtures and solutions. |
| CO2 | Compare the properties of ideal and real gases. |
| CO3 | Calculate material balance for various unit operations. |
| CO4 | Analyze energy balance for unit operations. |
| CO5 | Estimate GHV, NHV and composition of fuels. |
| CO6 | Integrate the properties of air water system. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 4 | - | 4 | 8 | - | 17 |
| CO2 | 2 | 4 | 8 | 3 | 6 | - | 23 |
| CO3 | 2 | 3 | 3 | 10 | 14 | - | 32 |
| CO4 | 1 | 9 | 6 | 6 | - | - | 22 |
| CO5 | 1 | - | 10 | - | 5 | - | 15 |
| CO6 | 1 | 3 | - | - | - | 12 | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2002** | **Duration** | **3hrs** |
| **Course Name** | **FOOD CHEMISTRY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Recall the H-O-H angle in water. | | CO1 | R | 1 |
| 2. | Give an example for oil – in – water food system. | | CO1 | R | 1 |
| 3. | Which is the disaccharide present in cane sugar? | | CO1 | U | 1 |
| 4. | List the components of invert sugar. | | CO1 | R | 1 |
| 5. | Which of the fatty acid is groundnut oil rich in? | | CO1 | R | 1 |
| 6. | Expand DHA. | | CO1 | R | 1 |
| 7. | Recall an example for an amino acid with a side chain -COOH group. | | CO1 | R | 1 |
| 8. | Recall the function of CGTase. | | CO1 | R | 1 |
| 9. | Tomatoes are rich in which of the natural colorants? | | CO1 | U | 1 |
| 10. | Lemon is rich in which of the water-soluble vitamins? | | CO1 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Outline briefly the mechanism of caramelisation | | CO3 | U | 3 |
| 12. | Give reasons for potatoes getting soft during cooking with the mechanism of the reaction. | | CO2 | U | 3 |
| 13. | What is peroxide value? What is its significance? | | CO2 | A | 3 |
| 14. | Classify the proteins based on their solubility. | | CO4 | U | 3 |
| 15. | Illustrate the enzymes used for the following – a. Glucose removal in egg. B. Lactose removal in milk | | CO5 | An | 3 |
| 16. | Illustrate on the oxidation reaction of Vitamin C | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss briefly on the structure of water and ice | CO4 | U | 6 |
|  | b. | Summarise the contribution of a. vander Waals forces and b. steric hindrance towards stabilization of emulsions. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Summarise the characteristic features of a. Coalescence and b Sedimentation. | CO4 | U | 6 |
|  | b. | Outline the mechanism of gel formation with LMP | CO4 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | Mr. XX analyses a squash sample and reports the following readings – Reading obtained for Reducing sugar – 18 mL; Reading obtained for total sugars – 22 mL; Reading obtained for standardization of Fehling’s solution – 20 mL. Express the reducing sugar content, sucrose content and total sugar content of the jam sample and comment on the same. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Discuss in detail on the method of manufacture of HFCS. | CO2 | U | 9 |
|  | b. | Outline the steps involved in the Maillard reaction. | CO3 | A | 3 |
|  |  |  |  |  |  |
| 21. | a. | Discuss briefly on the following-   1. Helical structure of proteins 2. Factors stabilizing protein structure | CO4 | An | 2x6 = 12 |
|  |  |  |  |  |  |
| 22. | a. | Outline the steps involved in the manufacture of edible oil from groundnut seeds, highlighting the importance of each step. . | CO2 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain the reasons for the addition of –   1. Proteases to beer 2. Cellulases to high fiber bread 3. Xylanases to multigrain bread 4. Pectinases to mango pulp | CO6 | A | 4X3 = 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Give reasons for the following –   1. Anthocyanins turn blue under alkaline conditions. 2. Loss of ascorbic acid when agitated for a long time. 3. Loss of Riboflavin during washing of cut vegetables. 4. Addition of CaCl2 to vegetables during blanching | CO5 | An | 4X3 = 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Name and describe the general chemical structures of major components of foods (water, proteins, carbohydrates, and lipids) and selected minor components (vitamins and minerals). |
| CO2 | Understand, plan, perform and analyse a range of chemical investigations with emphasis on food analysis. |
| CO3 | Relate the chemical composition of foods to their functional properties |
| CO4 | Examine a molecular rationalization for the observed physical properties and reactivity of major food components |
| CO5 | Predict how changes in overall composition are likely to change the reactivity of individual food components. |
| CO6 | Evaluate and determine the approaches that may be used to control the reactivity of those food components that are likely to impact the overall quality of finished products. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 7 | 3 |  |  |  |  | 10 |
| CO2 |  | 3+9 | 3+12 |  |  |  | 27 |
| CO3 |  | 3 | 6+12+3 |  |  |  | 24 |
| CO4 |  | 3+6+6 | 6 | 12 |  |  | 33 |
| CO5 |  |  |  | 3+12 |  |  | 15 |
| CO6 |  | 3 | 12 |  |  |  | 15 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2004** | **Duration** | **3hrs** |
| **Course Name** | **FLUID MECHANICS FOR FOOD PROCESSING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What is weight density? | | CO1 | R | 1 |
| 2. | Define specific volume. | | CO1 | R | 1 |
| 3. | Define rotational and irrotational flow. | | CO4 | R | 1 |
| 4. | What is center of buoyancy? | | CO4 | R | 1 |
| 5. | Write a practical application of Bernoullis equation. | | CO5 | A | 1 |
| 6. | List the parts of venturimeter. | | CO5 | R | 1 |
| 7. | Type of flow can be identified based on \_\_\_\_\_\_\_\_\_\_ number. | | CO4 | R | 1 |
| 8. | Flow between laminar flow and turbulent flow is called \_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | Write few applications of siphon. | | CO5 | A | 1 |
| 10. | Define water hammering. | | CO3 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Distinguish absolute pressure, gauge pressure and vacuum pressure. | | CO2 | An | 3 |
| 12. | State the application of dimensional analysis. | | CO6 | A | 3 |
| 13. | Write the difference between pitot tube and pitot static tube. | | CO5 | U | 3 |
| 14. | Distinguish between laminar flow and turbulent flow. | | CO4 | E | 3 |
| 15. | Classify the loss of energy, when fluid is flowing through a pipe. | | CO1 | U | 3 |
| 16. | Compare orifices and mouthpieces. | | CO5 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23)** | | | | | |
| 17. | a. | Explain U-tube differential manometers and inverted U-tube differential manometers. | CO2 | U | 7 |
| b. | Explain the classification of fluids. | CO1 | U | 5 |
|  |  |  |  |  |  |
| 18. | a. | Figure shows a tank full of water. Find :  (i) Total pressure on the bottom of tank  (ii) Weight of water in the tank  (iii) Hydrostatic paradox between the results of (i) and (ii). Width of the tank is 2m. | CO2 | E | 8 |
| b. | Derive an expression for the force exerted on a sub-merged horizontal plane surface by the static liquid. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 19. | a. | Derive Bernoulli’s equation for the flow of an incompressible frictionless fluid from consideration of moment. | CO3 | An | 8 |
| b. | Discuss the relative merits and demerits venturimeter with respect to orifice meter. | CO5 | C | 4 |
|  |  |  |  |  |  |
| 20. | a. | Prove the ratio of maximum velocity to average velocity is equal to 2, when flow of viscous fluid through circular pipe. | CO4 | E | 6 |
| b. | Analyze the drop of pressure head for a given length of pipe | CO4 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3m/s using (i) Darcy formula and (ii) Chezy’s formula for which C=60. Take v for water = 0.01 stoke. | CO3 | E | 6 |
| b. | Analyze the water hammering, when the valve provided at the end of the pipe is gradually closing. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Derive an equation for loss of head due to friction in viscous flow. | CO4 | E | 6 |
| b. | Demonstrate capillary tube method for measuring coefficient of viscosity. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Derive Burnoulli’s equation from Euler’s equation. | CO1 | An | 6 |
| b. | Develop an expression for continuity equation for a three-dimensional flow. | CO6 | A | 6 |
|  |  | **Compulsory** | | | |
| 24. | a. | Explain the experimental determination of hydraulic coefficients  (Cd, Cv & Cc). | CO4 | A | 8 |
| b. | Elaborate the classifications of orifices. | CO5 | U | 4 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recognize the various properties of fluids. |
| CO2 | Identify the various methods of pressure measurement. |
| CO3 | Calculate the forces acting on bodies submerged in different positions in liquids. |
| CO4 | Point out the type of flow of fluid and quantify the fluid flow through pipes. |
| CO5 | Measure the quantity of fluid flow. |
| CO6 | Create solutions for problems in dimensional analysis. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 8 | - | 6 | - | - | 16 |
| CO2 | - | 7 | - | 3 | 8 | - | 18 |
| CO3 | 1 | 4 | - | 8 | 6 | - | 19 |
| CO4 | 4 | - | 8 | 6 | 15 | - | 33 |
| CO5 | 1 | 16 | 2 | 6 | - | 4 | 29 |
| CO6 | - | - | 9 | - | - | - | 9 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2006** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED FOOD MICROBIOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Name an endospore producing bacteria. | | CO1 | R | 1 |
| 2. | Give an example of bread mold. | | CO1 | U | 1 |
| 3. | Name the beneficial bacteria that synthesize B vitamins in the gut. | | CO2 | R | 1 |
| 4. | Mention an adjunct culture added to cheese production. | | CO2 | R | 1 |
| 5. | Name a facultative anaerobic pathogen found in cooked meat. | | CO3 | R | 1 |
| 6. | Recall and write the sulphide stinker spoilage causing bacteria. | | CO3 | R | 1 |
| 7. | Name the toxin produced by *Bacillus cereus.* | | CO4 | U | 1 |
| 8. | Write any method used for the identification of Staphylococcal enterotoxin. | | CO4 | U | 1 |
| 9. | Give an example of bacteriocin. | | CO5 | U | 1 |
| 10. | Identify an enzyme that cuts the DNA at specific sites. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Define aflatoxin with a suitable example. | | CO1 | R | 3 |
| 12. | List any three characteristics of starter culture. | | CO2 | R | 3 |
| 13. | State any three types of spoilage of fermented beverages and their causative agents. | | CO3 | R | 3 |
| 14. | Write the mechanism of action of botulinum toxin. | | CO4 | U | 3 |
| 15. | Differentiate between the D value and the Z value. | | CO5 | U | 3 |
| 16. | Write the principle of DNA fingerprinting. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the characteristics and importance of any four molds used in food industries. | CO1 | U | 8 |
|  | b. | Write the role of any two important yeast species used in food processing. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the industrial production of cheese with a special reference to the Microbiology of cheese. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Explain the role of microorganisms in the spoilage of the following food commodities :   1. Meat B) Fruits | CO3 | A | 6 (3+3) |
|  | b. | State the intrinsic factors affecting the growth of bacteria in food. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 20. | a. | Differentiate between exotoxin and endotoxin. Describe the significance of aflatoxin and Staphylococcal enterotoxin in food industries. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Sketch a neat flow diagram of the canning of fruits. Mention the types of spoilage of canned foods. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Prioritize the requirements of wine fermentation with a special mention about the Microbiology and spoilage effects. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Deduce the quality of high-pressure processed foods and their applications. | CO5 | An | 8 |
|  | b. | Summarize the role of biopreservatives in food. | CO5 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Define PCR. Draw a process flow chart of polymerase chain reaction to detect the pathogen from a person infected with foodborne illness. | CO6 | A | 8 |
|  | b. | Write any four applications of Biosensors. | CO6 | A | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the characteristics, sources and significance of predominant food microorganisms. |
| CO2 | Understand food spoilage by microorganisms and the strategies implemented to prevent spoilage. |
| CO3 | Relate beneficial microorganisms to their role in the fermentation of foods. |
| CO4 | Distinguish thermal and non-thermal modes of preservation of foods. |
| CO5 | Evaluate the food borne pathogens associated with intoxication and infections |
| CO6 | Create food safety protocols. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 13 | - | - | - | - | 17 |
| CO2 | 5 | 12 | - | 12 | - | - | 29 |
| CO3 | 11 | - | 6 | - | - | - | 17 |
| CO4 | - | 17 | - | - | - | - | 17 |
| CO5 | 1 | 8 | 12 | 8 | - | - | 29 |
| CO6 | - | 3 | 12 | - | - | - | 15 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2008** | **Duration** | **3hrs** |
| **Course Name** | **METABOLISM AND NUTRITION** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Mention the enzyme that catalyzes the conversion of glucose to glucose-6-phosphate. | | CO1 | R | 1 |
| 2. | Name the hormone which inhibits gluconeogenesis. | | CO1 | R | 1 |
| 3. | Name the power house of the cell. | | CO1 | R | 1 |
| 4. | Define health as per W.H.O | | CO2 | R | 1 |
| 5. | Define anti-nutritional factors. | | CO4 | R | 1 |
| 6. | Signify optimal nutrition. | | CO2 | U | 1 |
| 7. | List the energy values of macronutrients and its measurements. | | CO2 | R | 1 |
| 8. | Mention the disorders related to the liver. | | CO5 | R | 1 |
| 9. | Write about the purine degradation end product. | | CO4 | U | 1 |
| 10. | Define pediatric nutrition. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Name any two aliphatic, basic and aromatic amino acids. | | CO2 | U | 3 |
| 12. | Explain BMI and calculate your BMI based on your height and weight. | | CO2 | U | 3 |
| 13. | Define malnutrition and write about PEM. | | CO5 | R | 3 |
| 14. | Discuss about the role of the electron transport chain in ATP synthesis. | | CO3 | R | 3 |
| 15. | Compare the structure and functions of phytoalexins and phytates. | | CO5 | U | 3 |
| 16. | Elaborate all the five types of space foods. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Describe the key steps and significance of glycolysis (EMP) in energy production. How does it contribute to cellular respiration? | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Discuss the absorption of carbohydrates and proteins in the digestive system. | CO4 | R | 6 |
|  | b. | Explain the beta oxidation of fatty acids. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the methods and techniques used in the assessment of nutritional status in individuals. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Analyze the genetic factors that can lead to newborn syndromes due to carbohydrate metabolism, and discuss how early diagnosis and dietary interventions can improve the quality of life for affected individuals. | CO4 | An | 6 |
|  | b. | Discuss the relationship between nutrition and disorders associated with kidney, with a focus on acute renal failure. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explore the use of nutrient supplementation and fortification in addressing nutritional deficiencies. Provide examples and their impact on public health. | CO3 | A | 6 |
|  | b. | Write about the recommended dietary intake (RDI) and acceptable dietary intake (ADI), and how are they determined for different nutrients? | CO5 | R | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explore the challenges and considerations in geriatric nutrition, including the nutritional needs of the elderly population. | CO6 | U | 6 |
|  | b. | Analyze the role of nutrition in sports performance and recovery. How does sports nutrition differ from standard dietary guidelines? | CO6 | An | 6 |
|  |  |  |  |  |  |
| 23. | a. | Discuss the role of cyanogen and lectins in food and its potential health risks. How can individuals mitigate these risks? | CO2 | U | 6 |
|  | b. | Explain the concept of micronutrient defects and their link to osteoporosis. What are the key micronutrients involved, and how can osteoporosis be prevented or managed through nutrition? | CO2 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the specific nutritional recommendations for individuals during pregnancy and the impact of maternal nutrition on fetal development. | CO5 | U | 6 |
|  | b. | Analyze the use of nutrition in the treatment and prevention of age-related disorders such as diabetes. | CO6 | An | 6 |

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|  | **COURSE OUTCOMES** |
| **CO1** | Identify the structure of ATP and the major class of macromolecules to which ATP belongs. |
| **CO2** | Describe the biochemistry process, basic concept of human nutrition and the relationship of the consumption of foods to nutritional status and health |
| **CO3** | Apply their knowledge in food biochemistry and nutrition in designing new range of products with improved nutritional characteristics (Nutraceuticals and functional foods). |
| **CO4** | Analyze the stages in catabolism of food molecules and describe what occurs during each stage. |
| **CO5** | Evaluate the biological functions of foods for health in addition to nutritional values |
| **CO6** | Formulate specialized nutrition for pediatric, geriatric and sport’s needs. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 3 | 12 | - | - | - | - | 15 |
| **CO2** | 2 | 19 | - | - | - | - | 21 |
| **CO3** | 3 | 12 | 6 | - | - | - | 21 |
| **CO4** | 7 | 13 | - | 6 | - | - | 26 |
| **CO5** | 10 | 9 | - | - | - | - | 19 |
| **CO6** | 1 | 9 | 12 | - | - | - | 22 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2010** | **Duration** | **3hrs** |
| **Course Name** | **PROCESS ENGINEERING THERMODYNAMICS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Write the mathematical expression for an isolated system. | | CO1 | U | 1 |
| 2. | Name the property which depends on the amount of the substance. | | CO1 | R | 1 |
| 3. | Define efficiency of a heat engine. | | CO2 | A | 1 |
| 4. | Express COP for a refrigerator. | | CO2 | A | 1 |
| 5. | Write the unit for specific heat capacity. | | CO3 | U | 1 |
| 6. | State two assumptions made in kinetic theory of gasses. | | CO3 | U | 1 |
| 7. | Define chemical potential. | | CO4 | A | 1 |
| 8. | Recall and write the conditions for ideal solutions. | | CO4 | R | 1 |
| 9. | Define specific volume. | | CO5 | R | 1 |
| 10. | State the composition of air by mass. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State Zeroth law of thermodynamics. | | CO1 | R | 3 |
| 12. | Compare the performance of the heat pump and heat engine. | | CO2 | U | 3 |
| 13. | Define Helmholtz free energy. | | CO3 | An | 3 |
| 14. | State Raoult’s law. | | CO4 | R | 3 |
| 15. | Differentiate saturated liquid from saturated vapor. | | CO5 | U | 3 |
| 16. | Define relative humidity. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23, Qn.No 24 is Compulsory)** | | | | | |
| 17. | a. | One mole of an ideal gas is expanded isothermally and reversibly at 27℃ from a volume of 2.28 m3 to 4.56 m3. Calculate q, w, ∆H, ∆E. | CO1 | A | 4 |
| b. | Demonstrate Joule Thompson porous plug experiment with neat sketch. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 18. | a. | Derive the general form of Steady Flow Energy Equation and get the expression for the final velocity for the nozzle. | CO2 | A | 8 |
| b. | Explain Kelvin Plank’s statement of the second law of thermodynamics with a neat sketch. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 19. | a. | Deduce Maxwell’s thermodynamic relations based on internal energy and enthalpy. | CO3 | U | 10 |
| b. | State any two limiting conditions for the equation of states. | CO3 | A | 2 |
|  |  |  |  |  |  |
| 20. | a. | Describe in detail partial molar properties and properties of solutions. | CO4 | U | 10 |
| b. | Differentiate the properties of ideal and non-ideal solutions. | CO4 | U | 2 |
|  |  |  |  |  |  |
| 21. | a. | Explain with the neat sketch the construction and operation of Lancashire boiler. | CO5 | U | 8 |
| b. | Define dryness fraction of steam and specific volume of steam. | CO5 | R | 4 |
|  |  |  |  |  |  |
| 22. | a. | Interpret state and path function and give one example for each. | CO1 | A | 6 |
| b. | One kg of gas expands at constant pressure from 0.085m3 to 0.13 m3. If the initial temperature of the gas is 225°C, find the final temperature, net heat transfer, change in internal energy and the pressure of the gas. | CO1 | E | 6 |
|  |  |  |  |  |  |
| 23. | a. | 50 kg/min of air enters the control volume in a steady flow system at 2 bar and 100°C and at an elevation of 100m above the datum. The same mass leaves the control volume at 150m elevation with the pressure of 10 bar and temperature of 300°C. The entrance velocity is 2400 m/min and the exit velocity is 1200 m/min. During the process, 50000 kJ/hr of heat is transferred to the control volume and the rise in enthalpy is 8kJ/kg. Calculate the power developed. | CO2 | C | 6 |
| b. | One mole of an ideal gas is allowed to expand against a piston that supports 0.4 atm pressure. The gas expands suddenly from the initial pressure of 10 atm to a final pressure of 0.4 atm. The temperature is kept at 0℃. Calculate q, w, ∆H, ∆E. | CO2 | E | 6 |
| **Compulsory:** | | | | | |
| 24. | a. | Indicate the significance of various lines present in the psychometric chart with neat sketch. | CO6 | U | 6 |
| b. | Dry bulb and wet bulb temperatures of 1 atmospheric air stream are 40°C and 30°C respectively. Determine i) Humidity ratio ii) Relative humidity iii) Specific enthalpy using Psychometric chart. | CO6 | E | 6 |

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|  | **COURSE OUTCOMES** |
| CO1 | Examine thermodynamic quantities for various systems. |
| CO2 | Explain various laws of thermodynamics related to food processing. |
| CO3 | Calculate the properties of pure fluids. |
| CO4 | Differentiate the properties of a component in a mixture. |
| CO5 | Choose the properties of steam generated for food application. |
| CO6 | Integrate the properties of air and water vapor systems for food processing. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 9 | 10 | --- | 6 | --- | 29 |
| CO2 | --- | 3 | 10 | 4 | 6 | 6 | 29 |
| CO3 |  | 12 | 2 | 3 | --- | --- | 17 |
| CO4 | 4 | 12 | 1 | --- | --- | --- | 17 |
| CO5 | 5 | 11 | --- | --- | --- | --- | 16 |
| CO6 | --- | 10 | --- | --- | 6 | --- | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2011** | **Duration** | **3hrs** |
| **Course Name** | **DAIRY PROCESS ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Milk sugar is also called \_\_\_\_\_\_\_\_\_.  a. Lactose b. Sucrose c. Maltose d. None | | CO1 | U | 1 |
| 2. | The yellow color in cow milk is due to the presence of \_\_\_\_.  a. Fat b. Carotene c. Protein d. None | | CO1 | U | 1 |
| 3. | Expand CIP. | | CO2 | R | 1 |
| 4. | What is the Time-Temperature combination for HTST method of pasteurization of milk? | | CO2 | R | 1 |
| 5. | \_\_\_\_\_\_\_\_\_ is the fat percentage in skim milk.  a. less than 3 % b. less than 2 % c. less than 1 % d. less than 0.5% | | CO3 | R | 1 |
| 6. | The size of fat globules after homogenization is \_\_\_\_  a. less than 2µm b. less than 2mm c. less than 4µm d. less than 4mm | | CO3 | U | 1 |
| 7. | Butter is \_\_\_\_\_\_\_ type of emulsion.  a. Oil in water b. Water in oil c. None d. Both a and b | | CO4 | U | 1 |
| 8. | \_\_\_\_\_ starters are used in cheese-making.  a. Thermophilic b. Psychrophilic c. Mesophilic d. Psychrotrophic | | CO4 | R | 1 |
| 9. | Soft ice cream contains\_\_\_\_\_\_than hard ice cream.  a. less sugar b. More sugar c. less fat d. More fat | | CO5 | U | 1 |
| 10. | RO membranes are made of \_\_\_\_\_  a. Cellulose acetate b. Chitosan c. Polyamide d. All the above | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Outline the three physical properties of milk. | | CO1 | An | 3 |
| 12. | Differentiate pasteurization and sterilization. | | CO2 | An | 3 |
| 13. | Explain the merits and demerits of homogenization. | | CO3 | U | 3 |
| 14. | Explain the four types of butter-making process. | | CO4 | U | 3 |
| 15. | Differentiate hard and soft ice creams. | | CO5 | An | 3 |
| 16. | Discuss Ultrafiltration process. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Illustrate the design features of a vertical milk storage tank with a suitable sketch. | CO1 | An | 6 |
|  | b. | Demonstrate the working of the can washer. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. |  | Demonstrate the working of a Plate heat exchanger and its components. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Show the operations, maintenance, and precautionary measures to be followed during the homogenization process. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Illustrate the Cheese manufacturing process with a flow diagram. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Demonstrate the working of the spray drier with a suitable sketch. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain the principle and operation of a clarifier. | CO3 | U | 6 |
|  | b. | Explain bactofugation and its application in the dairy industry. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 23. |  | Illustrate the butter manufacturing process with a flow diagram. | CO4 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Summarize the application of membrane technology in the dairy industry. | CO6 | E | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Gain knowledge on the physio-chemical properties of milk and milk constituents. |
| **CO2** | Understand the various milk processing methods and technologies. |
| **CO3** | Apply the knowledge of engineering principles involved in different unit operations in the formulation and processing of milk and milk products. |
| **CO4** | Analyze the engineering and technological problems in dairy processing lines reaching substantiated solution or conclusion. |
| **CO5** | Evaluate the working of dairy equipment used in the dairy plant. |
| **CO6** | Design operations and equipment for dairy processing. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | 2 | 6 | 9 | - | - | 17 |
| **CO2** | 2 | - | 12 | 3 | - | - | 17 |
| **CO3** | 1 | 16 | - | 12 | - | - | 29 |
| **CO4** | 1 | 28 | - | - | - | - | 29 |
| **CO5** | - | 1 | 12 | 3 | - | - | 16 |
| **CO6** | 1 | 3 | - | - | 12 | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2012** | **Duration** | **3hrs** |
| **Course Name** | **UNIT OPERATIONS IN FOOD PROCESSING - I** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Write any one purpose of screen motion. | | CO2 | A | 1 |
| 2. | Define Scalping. | | CO1 | R | 1 |
| 3. | List any two direct methods of moisture measurement. | | CO3 | R | 1 |
| 4. | Express the relationship between wet and dry basis moisture content. | | CO3 | U | 1 |
| 5. | Recall and write the formula for finding crushing efficiency. | | CO4 | R | 1 |
| 6. | Write the principle of colloidal mill. | | CO4 | A | 1 |
| 7. | Mention any two applications of filtration in food processing. | | CO2 | R | 1 |
| 8. | Differentiate centrifugation process from sedimentation process. | | CO1 | An | 1 |
| 9. | Define ‘g’ number in centrifugation. | | CO5 | R | 1 |
| 10. | State the purpose of agitation. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Sketch the types of fluid beds formed in a fluidization separation process. | | CO1 | A | 3 |
| 12. | In a drying operation 500 kg of wheat grain at 22% moisture content (wb) is dried to 14% moisture content (wb) on wet basis for milling. Calculate the amount of moisture removed in drying. | | CO3 | An | 3 |
| 13. | List the different types of size reduction with examples. | | CO2 | R | 3 |
| 14. | An emulsion of oil in water has oil droplets in the form of spheres of average diameter of 10µ. The specific gravity of oil is 0.95. Find the raised velocity of oil droplets. | | CO4 | E | 3 |
| 15. | A centrifuge is used for separation of a coagulated protein from a solution fed at the rate of 30 lpm. The solids have an average particle size of 100µ and their density is 1010 kg/m3, while the density of the mother liquor is 1000 kg/m3 and the viscosity is 1 x 10-3 pa.s. Find the Ʃ of the centrifuge. | | CO5 | An | 3 |
| 16. | Identify the factors affecting power requirement of a liquid mixing process. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the construction and working of single and double drum rotary screen cleaner with a diagram. | CO1 | U | 8 |
|  | b. | Air carrying particles of density 1200 kg/m3 and an average diameter of 25 µ enters a cyclone of 600 mm diameter at linear velocity of 20 m/s. Calculate the centrifugal force acting radially in the cyclone and the separation factor of the cyclone. | CO1 | An | 4 |
|  |  |  |  |  |  |
| 18. | a. | Determine the values of c and n from the Henderson’s equation for the following data obtained from thin layer paddy drying studies:  RH = 30 % t = 50°C Me = 10.5 %  RH = 55 % t = 50°C Me = 15.5 % | CO3 | A | 6 |
|  | b. | Explain the construction and working of fluidized bed dryer with a neat sketch. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | In a wheat milling experiment it was found that to grind 4.33mm sized grains to IS sieve 35 (0.351 mm opening), the power requirement was 8 KW. Calculate the power requirement for milling of wheat by the same mill to IS sieve 15 (0.157 mm opening) using (1) Rittinger’s law (2) Kick’s law and the feed rate of milling is 200 kg/hr. | CO2 | E | 7 |
|  | b. | Categorize the various applications of size reduction in food industries. | CO2 | An | 5 |
|  |  |  |  |  |  |
| 20. | a. | Derive an expression for finding terminal velocity of a settling particle in a sedimentation process. | CO4 | C | 5 |
|  | b. | Describe the working of rotary drum vacuum filter press with a diagram and mention its advantages. | CO1 | R | 7 |
|  |  |  |  |  |  |
| 21. | a. | Analyze the suitability of tubular bowl and basket type centrifuges in terms of products and working. | CO4 | An | 7 |
|  | b. | A centrifuge is used for separation of an oil emulsion in water. The oil is dispersed in water in the form of fine globules of average diameter 50μ, and the oil has a density of 900 kg/m3. The centrifuge rotates at 2000 rpm. The effective radius at which the separation takes place is 40 mm. Calculate the velocity of oil globules in the water medium. Take viscosity of water as 11 x 10-3 pa.s. If the flow rate of the feed is 100 lpm, find the Ʃ factor of the centrifuge. | CO5 | E | 5 |
|  |  |  |  |  |  |
| 22. | a. | Explain the construction and working of a cabinet tray dryer with a neat sketch. | CO3 | U | 6 |
|  | b. | Derive an expression for finding constant rate filtration. | CO1 | C | 6 |
|  |  |  |  |  |  |
| 23. | a. | Pearl millet was milled in to powder and the values retained on each sieve are given below. Determine the and average particle size (Dp).   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | IS Sieve No. | 100 | 70 | 50 | 40 | 30 | 20 | 15 | pan | | Material retained(g) | 0.0 | 1.4 | 16.7 | 36.7 | 82.2 | 96.0 | 8.0 | 8.7 | | CO2 | A | 6 |
|  | b. | Describe the working of attrition mill and hammer mill. | CO2 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | A fortified high protein dough is being made by adding 20% soya flour to the maida flour. The two dry flours are mixed in a ribbon mixer to make the dough. After certain time, say 10 minutes, 6 samples were collected and analysed for soya flour, the following are the fractional compositions:  0.2195, 0.22, 0.19, 0.185, 0.205, 0.191  Calculate mixing index and standard deviations. Find how much time it needs to be mixed for getting a variance of 1 x 10-4. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the applications of mechanical separation in food materials. |
| CO2 | Understand the various unit operations performed in food processing. |
| CO3 | Analyze the principle and operation of different types of dryers and understanding the drying of principles. |
| CO4 | Apply knowledge of unit operations into choice of equipment’s for processing. |
| CO5 | Evaluate the efficiency of equipment’s used in unit operations of foods. |
| CO6 | Design equipment’s for screening, grading, drying, size reduction, mechanical separation and mixing of foods. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 8 | 8 | 3 | 5 | - | 6 | 30 |
| **CO2** | 10 | - | 7 | 5 | 7 | - | 29 |
| **CO3** | 1 | 13 | 6 | 3 | - | - | 23 |
| **CO4** | 1 | - | 1 | 7 | 3 | 5 | 17 |
| **CO5** | 1 | - | 3 | - | 5 | - | 9 |
| **CO6** | 1 | 3 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

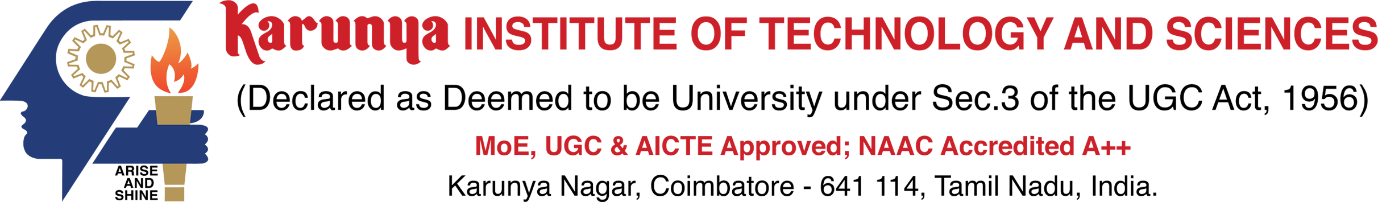
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| **Course Code** | **20FP2014** | **Duration** | **3hrs** |
| **Course Name** | **FRUIT AND VEGETABLE PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define Maturity indices for agricultural produces. | | CO1 | R | 1 |
| 2. | Mention the calcium/phosphorous ratio in adults for calcium fixation. | | CO1 | U | 1 |
| 3. | Name the Fungi responsible for Downy mildew. | | CO2 | R | 1 |
| 4. | Define the term lye peeling. | | CO3 | R | 1 |
| 5. | Mention the device used to determine the TSS in juice. | | CO4 | U | 1 |
| 6. | Recall the amount of carbon dioxide present in carbonated Beverages. | | CO4 | R | 1 |
| 7. | Define the term Xerophilic. | | CO6 | R | 1 |
| 8. | Recall the Moisture content in IMF. | | CO5 | R | 1 |
| 9. | Define the term homeostasis in hurdle technology. | | CO5 | R | 1 |
| 10. | Define the term codex standards. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Examine the statement “Internal cork formation” in apple. | | CO1 | A | 3 |
| 12. | Differentiate between Sanitization and disinfection. | | CO2 | U | 3 |
| 13. | State the theory behind using sugar as preservative. | | CO3 | An | 3 |
| 14. | List the FSSAI specification for jelly. | | CO4 | R | 3 |
| 15. | Write short notes on common gases used in MAP. | | CO5 | A | 3 |
| 16. | Differentiate Critical point and critical control point. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Summarize the causes of post-harvest losses in fruits and vegetables. | CO1 | U | 8 |
|  | b. | Recall and write Ethylene biosynthesis process. | CO1 | A | 4 |
|  |  |  |  |  |  |
| 18. |  | Explain the wet cleaning methods used in fruit industry. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Illustrate the canning process in fruit industry. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain Intermediate moisture foods along with its advantages and disadvantages. | CO4 | A | 6 |
|  | b. | Summarize the problems in pickle processing. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | State the principle of MAP in fruits and vegetables. | CO5 | R | 6 |
|  | b. | Appraise the advantages and disadvantages of MAP. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Write a short note on problems associated with jelly processing. | CO4 | A | 6 |
|  | b. | Explain the different layers in Tetra Pak. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the advantages of Exhausting in canning. | CO3 | A | 6 |
|  | b. | Summarize the importance of Blanching in canning process. | CO3 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the HACCP plan for fruit juice. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Observe the production status and post-harvest handling methods of fruits and vegetables. |
| **CO2** | Understand the methods of processing and preservation of freshly harvested and cut fruits and vegetables. |
| **CO3** | Apply their knowledge of unit operations to pick specific heat treatment for processing and preservation of fruits and vegetables. |
| **CO4** | Analyze the various production and preservation methods of fruit juices. |
| **CO5** | Evaluate the dehydration methods and aseptic technologies used in fruit and vegetable processing. |
| **CO6** | Design of driers used for drying fruit and vegetables. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 9 | 7 | - | - | - | 17 |
| **CO2** | 1 | 15 | - | - | - | - | 16 |
| **CO3** | 1 | 24 | 9 | - | - | - | 34 |
| **CO4** | 1 | 1 | 15 | - | - | - | 17 |
| **CO5** | 8 | 6 | 3 | 6 | - | - | 23 |
| **CO6** | 2 | 3 | - | 12 | - | - | 17 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP2015** | **Duration** | **3hrs** |
| **Course Name** | **FOOD ADDITIVES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name an emulsifying agent that is naturally found in egg yolk. | | CO1 | R | 1 |
| 2. | Expand DATEM. | | CO3 | U | 1 |
| 3. | Give an example of an acidulant that is added to powdered products. | | CO2 | U | 1 |
| 4. | Mention the antioxidants found in vegetable oils. | | CO1 | R | 1 |
| 5. | Name a slow acting oxidant used in bakery products. | | CO4 | R | 1 |
| 6. | Give an example of a humectant found in surimi. | | CO4 | U | 1 |
| 7. | Recall and write a colorant that intensifies the color of the wine. | | CO2 | R | 1 |
| 8. | Name a flavor that is obtained from lemongrass. | | CO2 | R | 1 |
| 9. | Identify a fat replacer that is similar to cocoa butter. | | CO5 | U | 1 |
| 10. | Mention a sequestrant that prevents the struvite in canned fish. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate between LD50 and LC50. | | CO3 | U | 3 |
| 12. | Write any three importance of gum arabic. | | CO4 | U | 3 |
| 13. | Recall and write the role of flour improvers. | | CO2 | U | 3 |
| 14. | Record any three functions of flavorants. | | CO4 | A | 3 |
| 15. | Define fat replacers with a suitable example. | | CO2 | R | 3 |
| 16. | Briefly write the role of PFA. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify food additives. State the role of additives found in various food products with suitable examples. | CO1 | U | 8 |
|  | b. | Describe the methods of estimating dietary intake of food additives. | CO1 | R | 4 |
|  |  |  |  |  |  |
| 18. | a. | Tabulate the chemical properties, applications, and toxicological specifications of any three bio preservatives. | CO4 | R | 6 |
|  | b. | Summarize the role of any three important gums in food products and their toxicological considerations. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Define flour improvers. Mention the three functions that take place during storage. | CO2 | R | 6 |
|  | b. | Briefly explain about humectants and their applications in various foods. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Classify flavouring substances. Appraise the role of flavor enhancers and the types of flavor process creation in detail. | CO4 | An | 8 |
|  | b. | Write any two applications of synthetic food colorants. | CO3 | A | 4 |
|  |  |  |  |  |  |
| 21. | a. | Identify the role of fat based fat replacers. | CO4 | U | 4 |
|  | b. | Describe any four nutritive sweeteners their source, role, ADI and health risks of sweeteners in human. | CO5 | U | 8 |
|  |  |  |  |  |  |
| 22. | a. | Distinguish between natural and synthetic antioxidants. Summarize the applications of any four synthetic antioxidants. | CO4 | An | 8 |
|  | b. | Write any four factors that are dependent on emulsifiers in the stabilization of the emulsion. | CO5 | A | 4 |
|  |  |  |  |  |  |
| 23. | a. | Define the following terms:   1. Reference Dose 2. Maximal permissible intake per day. 3. Maximal Permissible level in food 4. Estimated Daily Intake 5. NOAEL 6. ADI | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the source, chemical properties, applications and health consequences of nutritional additives in humans. | CO4 | An | 6 |
|  | b. | Define Sequestrants. Describe the role of chelating agents in food systems. | CO6 | An | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the importance of additives in maintaining or improving food quality. |
| **CO2** | Understand the applications of food additives |
| **CO3** | Interpret the toxicity of food additives through NOAEl, ADI and LD 50 values. |
| **CO4** | Distinguish the characteristics of additives and their specific use in foods. |
| **CO5** | Evaluate the dietary intake of individuals consuming foods with food additives. |
| **CO6** | Development of various instant premixes by addition of preservatives within the permissible limits. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 6 | 8 | - | - | - | - | 14 |
| **CO2** | 11 | 10 | - | - | - | - | 21 |
| **CO3** |  | 4 | 4 | - | - | - | 8 |
| **CO4** | 7 | 14 | 3 | 22 | - | - | 46 |
| **CO5** |  | 21 | 4 | - | - | - | 25 |
| **CO6** | 1 | 3 | - | 6 | - | - | 10 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2017** | **Duration** | **3hrs** |
| **Course Name** | **MATERIAL SCIENCE FOR FOOD ENGINEERS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Distinguish between ductility and malleability. | | CO2 | U | 1 |
| 2. | Give an example for a material which contain covalent bond. | | CO1 | U | 1 |
| 3. | Identify any two major engineering applications of abrasive ceramics. | | CO6 | U | 1 |
| 4. | Give two examples for cross linked polymers. | | CO6 | U | 1 |
| 5. | Indicate any two machine components which are prone to fatigue. | | CO2 | U | 1 |
| 6. | Articulate the metallic crystal structures which become brittle at low temperatures and fail by cleavage. | | CO1 | An | 1 |
| 7. | Write the effect of grain size of materials on creep strength. | | CO2 | A | 1 |
| 8. | Give an example for a material which has high creep-resistance. | | CO2 | U | 1 |
| 9. | Write the crystal structure formed during martensitic transformation. | | CO6 | A | 1 |
| 10. | Distinguish between Hypoeutectoid steels and Hypereutectoid based on Carbon percentage. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | FCC metals more ductile than HCP and BCC. Justify. | | CO1 | E | 3 |
| 12. | Sketch the stress-strain graph of a brittle material. | | CO2 | A | 3 |
| 13. | Relate the effect of surface finish with fatigue life of materials. | | CO2 | A | 3 |
| 14. | Compare wet corrosion with dry corrosion. | | CO3 | An | 3 |
| 15. | Distinguish between normalizing and annealing. | | CO6 | An | 3 |
| 16. | Write the purpose of NMR spectroscopy | | CO5 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify point defects and explain their effects on the behavior of Engineering materials. | CO4 | An | 6 |
|  | b. | Explain the two important types of van der Waals Forces. Also describe the important properties associated with Van der Waals forces. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain with neat sketch the stress-strain diagram for ductile materials. | CO2 | A | 6 |
|  | b. | Explain the factors affecting ductility of materials. | CO2 | An | 6 |
|  |  |  |  |  |  |
| 19. | a. | Illustrate the different stages of fatigue with a neat sketch. | CO2 | A | 6 |
|  | b. | Explain the of crack propagation mechanism through ductile tearing. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 20. | a. | Illustrate the different stages of creep with a neat sketch. | CO2 | A | 6 |
|  | b. | Write about the different methods of preventing corrosion. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain the stages involved in tempering of steel. Also explain the effect of tempering on mechanical properties of steel. | CO6 | A | 6 |
|  | b. | Explain the characteristics of different phases of steel in Iron - Iron carbide phase diagram. | CO6 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the formation of ionic bond in a chemical compound with a suitable example. | CO1 | A | 6 |
|  | b. | Illustrate the important properties attributed by metallic bonding. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Illustrate the purpose of alloying. Also highlight the benefits achieved by adding different alloying elements in pure metals. | CO3 | A | 6 |
|  | b. | Explain any two important types of stainless steels highlighting their composition and industrial applications. | CO3 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the principle, working and applications of X-ray Diffractometer in material characterization. | CO5 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the fundamentals of various bonds in materials. |
| CO2 | Understand the importance of strength of material in choice of material of construction. |
| CO3 | Apply knowledge of alloying and developing alloyed material for food systems. |
| CO4 | Analyze materials to check for imperfections of metals |
| CO5 | Evaluate and characterize metals. |
| CO6 | Design material manufacture techniques to develop materials for specific purposes. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 1 | 12 | 1 | 3 | - | 17 |
| CO2 | - | 3 | 31 | 6 | - | - | 40 |
| CO3 | - | - | 18 | 3 | - | - | 21 |
| CO4 | - | - | - | 12 | - | - | 12 |
| CO5 | - | - | 15 | - | - | - | 15 |
| CO6 | - | 3 | 7 | 9 | - | - | 19 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP2018** | **Duration** | **3hrs** |
| **Course Name** | **HEAT AND MASS TRANSFER** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Write the unit for conductive resistance. | | CO1 | A | 1 |
| 2. | Name the metal with highest thermal conductivity. | | CO1 | R | 1 |
| 3. | State the reason for convective current set in natural convection. | | CO2 | R | 1 |
| 4. | Give an example for ideal plastic fluid. | | CO3 | U | 1 |
| 5. | Define absorptivity. | | CO4 | R | 1 |
| 6. | Give an example for black body. | | CO4 | U | 1 |
| 7. | Identify the type of flow where the angle between the direction of hot and cold fluid flow is 90 degree. | | CO5 | U | 1 |
| 8. | State two types of pitch used in the tube sheets. | | CO5 | R | 1 |
| 9. | Express the unit for diffusivity in mass transfer. | | CO6 | U | 1 |
| 10. | Identify the driving force for mass transfer. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | An insulating material has a thermal conductivity of 0.03 W/mK. If 60 mm of this material is applied as insulation on a heat transfer surface, find the resistance offered by the insulating material for the heat transfer. | | CO1 | A | 3 |
| 12. | Define momentum thickness in boundary layer formation. | | CO2 | R | 3 |
| 13. | State the physical significance of Nusselt number. | | CO3 | R | 3 |
| 14. | A 2.5 m long pipe is insulated at both ends. It has ID and OD as 50mm and 56 mm respectively. Find log mean heat transfer area in m2. | | CO3 | An | 3 |
| 15. | Compare parallel and counter flow used in double pipe heat exchangers. | | CO5 | An | 3 |
| 16. | State Fick’s law of diffusion and write the unit of various terms involved. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | A furnace is constructed with 225 mm thick fire brick, 120 mm of insulating brick, and 225 mm of building brick. The inside temperature is 1200 K (927°C) and the outside temperature is 330 K (57 °C). Find the heat loss per unit area and the temperature at the junction of the fire brick and insulating brick.  **Data :** k for fire brick = 1.4 W/(m·K), k for insulating brick = 0.2 W/(m·K), k for building brick = 0.7 W/(m·K) | CO1 | A | 6 |
|  | b. | Deduce the expression for steady state heat transfer through composite walls connected in series. | CO1 | An | 6 |
|  |  |  |  |  |  |
| 18. |  | Differentiate laminar and turbulent flow and derive the expression for momentum and displacement thickness for hydrodynamic boundary layer. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Show that the Nusselt number is the function of Grashoff number and Prandtl number for natural convection using dimensional analysis. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Heat is transferred by radiation to a loaf of bread in an oven at a uniform temperature of 177°C. The total surface area and temperature of the loaf are 0.0645 m2 and 100°C respectively. The surface emissivity of the loaf is 0.85 and the value of Stefan-Boltzmann constant is 5.67 x 10-8 W/m2K4. Find the net heat transfer in W. | CO4 | A | 6 |
|  | b. | Water flows through a tube of diameter 25 mm at an average velocity of 0.1 m/s. The properties of water ρ = 1000 kg/m3, µ = 7.25 x 10-4 N.s/m2, k = 0.625 W/m K, Pr = 4.85. Using Nu = 0.023 Re0.8 Pr0.4 find the convective heat transfer coefficient. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Crude oil flows at the rate of 1000 kg/hr through the inside pipe of a double pipe heat exchanger and is heated from 30°C to 90°C. The heat is supplied by kerosene initially at 200°C flowing through the annular space. If the temperature of approach (minimum temperature difference) is 10°C, determine the heat transfer area for co-current flow and the kerosene flow rate. Cp for crude oil = 0.5 kcal/kg°C and for kerosene = 0.6 kcal/kg°C and Uo = 400 kcal/hr.m2°C | CO5 | E | 6 |
|  | b. | Water enters a two-fluid heat exchanger at 55°C and leaves at 85°C. Hot gasses enter at 305°C and leave at 160°C. If the total heat transfer area is 500m2 and the overall heat transfer coefficient is 600 kcal/hrm2°C, determine the total heat transferred per hour for i. parallel flow and ii. Counter flow of the two fluids. | CO5 | E | 6 |
|  |  |  |  |  |  |
| 22. |  | Demonstrate the construction and operation of shell and tube heat exchanger with neat sketch. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | A steam pipeline, 150/160 mm in diameter, is covered with a layer of insulating material of a thickness of 50 mm. The temperature inside the pipeline is 393 K (120°C) and that of the outside surface of the insulation is 313 K (40°C). Calculate the rate of heat loss per 1 m length of the pipeline. **Data:** k for pipe is 50 W/(m·K) and k for insulating material is 0.08 W/(m·K). | CO5 | A | 9 |
|  | b. | Differentiate black body and gray body. | CO4 | U | 3 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Deduce an expression for steady state counter diffusion of gasses A and B | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Calculate heat transfer rate by conduction through given geometry. |
| CO2 | Evaluate the convective heat transfer coefficient for various flows. |
| CO3 | Understand the role of radiation in heat transfer. |
| CO4 | Assess the overall heat transfer rate in a heat exchanger. |
| CO5 | Apply the principle of evaporation in food processing. |
| CO6 | Relate to the concept of mass transfer in food processing |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | --- | 10 | 6 | --- | --- | 17 |
| CO2 | 4 | 12 | --- | --- | --- | --- | 16 |
| CO3 | 3 | 13 | --- | 3 | --- | --- | 19 |
| CO4 | 1 | 4 | 12 | --- | --- | --- | 17 |
| CO5 | 1 | 1 | 21 | 3 | 12 | --- | 38 |
| CO6 | --- | 17 | --- | --- | --- | --- | 17 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2019** | **Duration** | **3hrs** |
| **Course Name** | **UNIT OPERATIONS IN FOOD PROCESSING - II** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define evaporation. | | CO1 | R | 1 |
| 2. | The steam economy of multiple effect evaporators is higher than the single effect evaporators. Justify the statement. | | CO5 | E | 1 |
| 3. | Define reflex ratio. | | CO4 | R | 1 |
| 4. | Define relative volatility. | | CO4 | R | 1 |
| 5. | Mention the critical temperature and critical pressure of CO2. | | CO1 | R | 1 |
| 6. | Give an example for liquid-solid extraction. | | CO3 | A | 1 |
| 7. | Give an example for absorption process. | | CO3 | U | 1 |
| 8. | Define adsorption equilibrium. | | CO2 | R | 1 |
| 9. | Mention the sequence of crystallization process. | | CO2 | U | 1 |
| 10. | Give examples for crystallization process. | | CO3 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Multiple effect evaporators have capacity to process 400 kg of orange juice per hour when it is concentrating from 10% to 25% solids. Find the water evaporated in kg per hour. | | CO5 | E | 3 |
| 12. | Analyze the boiling point concentration with a diagram. | | CO4 | An | 3 |
| 13. | State the advantages of CO2 used as solvent in super critical fluid extraction. | | CO1 | U | 3 |
| 14. | List the applications of adsorption process. | | CO3 | A | 3 |
| 15. | Write the applications of crystallization in food processing. | | CO3 | A | 3 |
| 16. | Classify the extruder used in food industry. | | CO2 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the short tube evaporators with a neat sketch. | CO3 | U | 8 |
|  | b. | Elaborate the types of feeding mechanism in multiple effect evaporators. | CO6 | A | 4 |
|  |  |  |  |  |  |
| 18. | a. | Derive the equations for relative volatility. | CO4 | E | 6 |
|  | b. | Describe steam distillation with a neat sketch. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain the working principle of single stage batch extraction unit with neat sketch. | CO6 | A | 6 |
|  | b. | Explain super critical fluid extraction process with neat sketch. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Summarize the properties consider for designing packed tower. | CO6 | U | 8 |
|  | b. | Discuss the selection factors for packing materials used in packed tower. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 21. | a. | Describe a batch crystallizer with a neat diagram and explain its applications in food processing. | CO3 | A | 8 |
|  | b. | Estimate the magnesium chloride crystallized out if the saturated concentration is only 54.5 kg/100 kg of water at 20⁰C. The solution contains 40 percent magnesium chloride solution in water at 20⁰C. | CO5 | E | 4 |
|  |  |  |  |  |  |
| 22. | a. | It is desired to concentrate a 20% salt solution (20 kg of salt in 100 kg solution) to a 30% salt solution in an evaporator. Consider a feed of 300 kg/min at 30C. The boiling point of the solution is 100C and latent heat is 2100 kJ/kg, and the specific heat of solution is 4 kJ/kg-K. Find out the rate at which heat has to be supplied (in kJ/min) to the evaporator. | CO5 | E | 7 |
|  | b. | Derive the mass and energy balance equation for single effect evaporator. | CO2 | E | 5 |
|  |  |  |  |  |  |
| 23. | a. | A continuous rectification column with striping is used to distil a 1000 kg mixture of acetic acid and water which contains 40 per cent acetic acid (molar). The feed is a saturated vapour at its boiling point. The reflex ratio used is 2.6. It is desired to purify acetic acid upto 90 percent concentration (molar) in the bottom product and the top product containing 10 per cent acetic acid (molar). Determine the number of ideal plates and the location of feed plate. The equilibrium data for acetic acid-water systems is given in the table.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **X** | 0 | 0.19 | 0.31 | 0.45 | 0.52 | 0.58 | 0.68 | 0.73 | 0.86 | 0.88 | 0.91 | 0.96 | 1 | | **Y** | 0 | 0.31 | 0.45 | 0.60 | 0.66 | 0.71 | 0.78 | 0.82 | 0.90 | 0.92 | 0.94 | 0.97 | 1 | | CO5 | E | 9 |
|  | b. | Explain the material balance for distillation of two component system. | CO2 | An | 3 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Discuss the working principle of single screw extruder with a neat sketch. | CO2 | U | 7 |
|  | b. | List the factors affecting extrusion cooking. | CO1 | U | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the properties of liquids and the unit operations related to them. |
| CO2 | Understand the principles of various unit operations used in food industries. |
| CO3 | Apply the knowledge of unit operations in mechanization of equipments for food industries. |
| CO4 | Analyze the requirements for successful operation of evaporators, extractors, extrusion, crystallization and distillatory units. |
| CO5 | Evaluate the efficiency of evaporators, extractors, extrusion, absorption, crystallization and distillatory units. |
| CO6 | Design and analyze evaporators, extractors, extrusion, absorption, crystallization and distillatory units for the food industries. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 8 | 6 | - | - | - | 16 |
| CO2 | 1 | 17 | - | 3 | 5 | - | 26 |
| CO3 | - | 10 | 15 | - | - | - | 25 |
| CO4 | 2 | 4 | - | 3 | 6 | - | 15 |
| CO5 | - | - | - | - | 24 | - | 24 |
| CO6 | - | 8 | 10 | - | - | - | 18 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2020** | **Duration** | **3hrs** |
| **Course Name** | **MILLING TECHNOLOGY OF CEREALS, PULSES AND OIL SEEDS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State the purpose of parboiling. | | CO1 | R | 1 |
| 2. | Mention the principal mechanism of dehulling in Engle berg huller and centrifugal dehusker. | | CO2 | R | 1 |
| 3. | Define Bulgar. | | CO3 | R | 1 |
| 4. | Name any two products of wheat milling. | | CO3 | R | 1 |
| 5. | List any two problems of pulse milling industries. | | CO2 | An | 1 |
| 6. | Express the name of the chemical used in conditioning of pulses. | | CO5 | C | 1 |
| 7. | Rewrite the composition of the corn kernel. | | CO1 | U | 1 |
| 8. | Identify the types of endosperms present in corn structure. | | CO1 | U | 1 |
| 9. | Name the minor millets grown in India. | | CO4 | R | 1 |
| 10. | Which country is the largest producer of millet in the world? | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Draw the flow chart showing layout of modern rice milling industry. | | CO6 | U | 3 |
| 12. | Construct the process flowchart for making homemade bulgar. | | CO3 | C | 3 |
| 13. | Classify the factors affecting pulse milling efficiency and list them. | | CO5 | U | 3 |
| 14. | Compare the different methods of oil extraction. | | CO5 | An | 3 |
| 15. | Describe groundnut oil extraction process using flow chart. | | CO6 | R | 3 |
| 16. | Interpret the role of heat treatment in pearl millet processing. | | CO4 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the traditional and modern methods of parboiling. | CO1 | U | 6 |
|  | b. | Elaborate the working of rubber roll sheller. | CO2 | An | 6 |
|  |  |  |  |  |  |
| 18. | a. | Write about the principle of parboiling of wheat. | CO1 | A | 4 |
|  | b. | Describe the Wheat flour milling flow process. | CO5 | R | 8 |
|  |  |  |  |  |  |
| 19. | a. | Examine the different unit operations in pulse milling. | CO1 | A | 6 |
|  | b. | Describe the process of Soya milk extraction with a flowchart | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the dry milling method of the corn. | CO3 | A | 6 |
|  | b. | Illustrate the principle, construction and working of Super Critical Fluid Extraction method of oil extraction. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Draw and explain the methods of coconut oil extraction from dried and fresh coconut kernel. | CO5 | A | 6 |
|  | b. | Design a layout for a continuous solvent extraction plant for Soybean oil. | CO6 | C | 6 |
|  |  |  |  |  |  |
| 22. | a. | Elaborate the principle, construction and working of bran removal or whitening process. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Describe the working of IIPR and IARI pulse milling machineries. | CO2 | U | 6 |
|  | b. | Explain the working of LSU dryer with a neat sketch. | CO2 | An | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the value added products of millets. | CO4 | E | 12 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge about the structure, composition and pre milling operations in processing of cereals, pulses and oil seeds. |
| CO2 | Understand about paddy processing and rice milling equipment which will help them for developing entrepreneurial skills. |
| CO3 | Apply the knowledge to process food grains into value added products. |
| CO4 | Analyze the suitable technique for milling of various millets. |
| CO5 | Evaluate the types of mills used for milling of cereals, pulses and oilseeds. |
| CO6 | Design layout for milling plants. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 8 | 10 | - | - | - | 19 |
| CO2 | 1 | 18 | - | 13 | - | - | 32 |
| CO3 | 2 | 6 | 6 | - | - | 3 | 17 |
| CO4 | 2 | 3 | - | - | 12 | - | 17 |
| CO5 | 8 | 3 | 6 | 9 | - | 1 | 27 |
| CO6 | 3 | 3 | - | - | - | 6 | 12 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2021** | **Duration** | **3hrs** |
| **Course Name** | **FOOD STANDARDS AND REGULATIONS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State how cleaning chemical should be stored in food industries. | | CO2 | R | 1 |
| 2. | Define the term “due diligence” w.r.t manufacturers rights. | | CO3 | R | 1 |
| 3. | Identify the *ex-officio* Chairperson of the Central Advisory Committee. | | CO1 | R | 1 |
| 4. | State the 3 recognized categories of food safety hazards. | | CO2 | R | 1 |
| 5. | Define the process of “Remineralization”. | | CO2 | U | 1 |
| 6. | State the disadvantage of a generic HACCP Plan. | | CO5 | U | 1 |
| 7. | Indicate the technical specification that was published explaining certification requirements applicable when third-party certification is used under ISO 22000. | | CO5 | R | 1 |
| 8. | State the basic principle on which all agreements on services are established under WTO. | | CO1 | R | 1 |
| 9. | Define the term “zoonosis” w.r.t sanitary and phytosanitary agreements. | | CO3 | R | 1 |
| 10. | Identify the third type of subsidiary body under Codex Alimentarius Commission. | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | State the difference between the role of Scientific Panel and Scientific Committee of Food Safety and Standards Authority of India. | | CO1 | U | 3 |
| 12. | Differentiate between manufacturer based and value based quality with examples. | | CO2 | U | 3 |
| 13. | List any 3 points to be kept in mind while constructing wash basins in food plants. | | CO3 | R | 3 |
| 14. | Draw a timeline indicating the transparency in TBT measures right from “drafting of a measure” to the “implementation of the measure”. | | CO1 | U | 3 |
| 15. | List the 6 regional offices of WHO. | | CO1 | R | 3 |
| 16. | Differentiate between horizontal and vertical committees of Codex Alimentarius. | | CO5 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Summarise the 8 dimensions of quality to link consumer requirements to engineering design as per David A Gavin. | CO2 | U | 6 |
|  | b. | Indicate how one can ensure good hygienic operations in a food plant. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Summarise the licensing and registration process to be followed by FBOs under the Food Safety and Standards Authority of India. | CO4 | U | 6 |
|  | b. | During an FSSAI surveillance visit to the premises of M/s. Dragon Starch & Food Pvt. Ltd, a corn starch manufacturing unit, it was noticed that there were sacks of fine tapioca powder in their storage unit. On further investigations, the Shift-Incharge explained that the sacks in question were held in the storage unit on behalf of one of their co-packing company. M M/s. Dragon Starch & Food Pvt. Ltd was penalized by FSSAI and an order was given by the food safety officer to CEO of M/s. Dragon Starch & Food Pvt. Ltd to clear the sacks from the storage unit within 15 working days. The CEO did not comply, further he continued manufacturing in the unit until a public litigation was filled against the company by a member of the public who allegedly that use of starch produced by M/s. Dragon Starch & Food Pvt. Ltd caused constipation due to its adulteration with tapioca starch. FSSAI levied several charges against the company based on the above mentioned violations. Compile the list of possible contravention that FSSAI could have charge sheeted and their corresponding penalties. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the organizational structure of FSSAI and its subsidiary bodies. | CO1 | U | 6 |
|  | b. | Outline the preparation & planning stage of any HACCP system. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Recognize the reasons for adulteration of foods. State the types of adulterants detected in different food items including milk powder, spices, coffee, tea and edible oils. | CO2 | U | 6 |
|  | b. | Paraphrase the legislators’ perspectives of food labelling. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Examine the sketch given above. In the cheese manufacturing process given above and use a tried and trusted methodology to identify at least 2 CCPs and 1 CP in the system. (Use imaginary values where necessary) | CO3 | An | 6 |
|  | b. | Summaries the US standards for bottle drinking water. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Design a label for a tetra packaged soya milk. Mention the list the mandatory and voluntary parts of the label design. | CO3 | A | 6 |
|  | b. | Summarize the objectives and functions of WTO. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Apply ISO22000 principles towards manufacture of bovine fatling. | CO6 | A | 6 |
|  | b. | Explain the functioning of the 3 tier system of WHO along with its mandates. | CO1 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the format used while drafting commodity standards as per Codex Alimentarius. | CO6 | U | 6 |
|  | b. | Summarise the function of Codex India and the role of National Codex Contact Point. | CO1 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the various national and international regulatory bodies working to ensure food safety in the food industries. |
| CO2 | Understand the safety aspects in food industries with special emphasis on GMO and irradiated foods, water, meat and dairy products. |
| CO3 | Apply their knowledge of regulations to develop manuals and protocols for food systems based on existing standards both national & international. |
| CO4 | Analyze and point out the various offences of Food Business Operators based on their knowledge of food regulations. |
| CO5 | Evaluate the various food hazards in a food system based on HACCP and ISO 22000:2018 standards. |
| CO6 | Create new food safety management systems or innovative norms for safety of foods. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 12 | 24 | - | - | - | - | 36 |
| CO2 | 2 | 28 | - | - | - | - | 30 |
| CO3 | 5 | 6 | 6 | 6 | - | - | 23 |
| CO4 | - | 6 | 6 | - | - | - | 12 |
| CO5 | 1 | 10 | - | - | - | - | 11 |
| CO6 | - | 6 | 6 | - | - | - | 12 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP2025** | **Duration** | **3hrs** |
| **Course Name** | **ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Differentiate between solid (Vs) and apparent volume (Vapp) of a food material. | | CO1 | U | 1 |
| 2. | State Archimedes principle of a body immersed in a fluid. | | CO1 | R | 1 |
| 3. | Identify the effect of temperature on viscosity of liquids. | | CO2 | R | 1 |
| 4. | Examine the Weissenberg effect of a viscoelastic fluid. | | CO2 | R | 1 |
| 5. | Distinguish between sensible and latent heat. | | CO3 | U | 1 |
| 6. | Define thermal diffusivity and state its SI unit. | | CO3 | R | 1 |
| 7. | State Young’s equation to measure contact angle of a liquid droplet. | | CO4 | U | 1 |
| 8. | Recognize the property used for choosing the emulsifiers for food applications. | | CO4 | R | 1 |
| 9. | Compare dielectric constant and dielectric loss factor. | | CO5 | U | 1 |
| 10. | Indicate the application of refractive index in food analysis. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Calculate the true density of spinach at 20◦C having the composition given in the following Table.  Table. Composition of spinach   |  |  |  | | --- | --- | --- | | Component | Composition (%) | Density (kg/m3) | | Water | 91.57 | 995.74 | | Protein | 2.86 | 1319.63 | | Fat | 0.35 | 917.24 | | Carbohydrate | 1.72 | 1592.89 | | Ash | 3.50 | 2418.19 | | | CO1 | An | 3 |
| 12. | Explain the working principle of rotational viscometer. | | CO2 | U | 3 |
| 13. | Define enthalpy and deduce an expression for the moist material. | | CO3 | An | 3 |
| 14. | Extend on the direct method of measuring settling velocity of a particle in a fluid. | | CO4 | U | 3 |
| 15. | Explain the snapping-bending test for biscuits. | | CO5 | An | 3 |
| 16. | Express the phenomenon of reflection, transmission and refraction of light. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Illustrate the principle and working of gas comparison pycnometer for determination of porosity with a neat sketch. | CO1 | An | 8 |
|  | b. | Calculate the sphericity of a cylindrical object of diameter 1.2 cm and height 1.9 cm. | CO1 | A | 4 |
|  |  |  |  |  |  |
| 18. | a. | Explain the construction and principle of capillary flow viscometer with a neat sketch and deduce an expression for viscosity of Newtonian fluid. | CO2 | U | 8 |
|  | b. | Classify rheology and describe the types of viscous fluids with examples. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 19. | a. | Appraise the measurement method for thermal conductivity of foods using Differential Scanning Calorimeter (DSC). | CO3 | An | 8 |
|  | b. | Calculate the specific heat of wheat grain at 20◦C with the approximate composition data given in the following table.   |  |  |  | | --- | --- | --- | | Component | Weight (%) | Specific Heat Equation | | Water | 8.5 | Cp *water* = 4176.2 − 0.0909 T + 5.4731 × 10−3T2 | | Carbohydrate | 75.3 | Cp *CHO* = 1548.8 + 1.9625 T − 5.9399 × 10−3T2 | | Protein | 14.1 | Cp *protein* = 2008.2 + 1.2089 T − 1.3129 × 10−3T2 | | Fat | 0.7 | Cp *fat* = 1984.2 + 1.4373 T − 4.8008 × 10−3T2 | | Ash | 1.4 | *Cp ash =* 1092.6 + 1.8896 T − 3.6817 × 10−3T2 | | CO3 | A | 4 |
|  |  |  |  |  |  |
| 20. | a. | Explain in detail about the TWO important properties used in designing air/hydro conveying and separation equipment. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain in detail the double compression test for texture profile analysis. Provide diagrams wherever necessary. | CO5 | U | 8 |
|  | b. | Examine the effect of the following on the dielectric properties of foods:  (i) Moisture content (ii) Temperature | CO5 | An | 4 |
|  |  |  |  |  |  |
| 22. | a. | Derive the Laplace equation to determine the relationship between the surface tension and the rise or depression of a liquid in a capillary. | CO4 | An | 8 |
|  | b. | Write a brief note on the frictional properties of biomaterials. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 23. | a. | Elaborate on the principle and applications of microwave heating. | CO5 | U | 8 |
|  | b. | Compare the compression and puncture tests to determine firmness of the product. | CO2 | An | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Examine the principle of colorimeter and the colour measurement using CIE colour order system. | CO6 | A | 6 |
|  | b. | Colorimetric properties of tapioca slices during microwave frying in sunflower oil are studied in terms of a CIE scale. As a standard, a BaSO4 plate with L∗, a∗, and b∗ values of 96.9, 0.0, and 7.2, respectively was used. L∗, a∗, and b∗ values of tapioca slices are given in the Table. Determine ΔE∗ values of the tapioca slices during frying and discuss the results.  Table. Colour Values of Tapioca Slices During Frying   |  |  |  |  | | --- | --- | --- | --- | | Frying Time (min) | L\* | a\* | b\* | | 3.0 | 69.73 | 0.657 | 39.40 | | 4.0 | 67.63 | 2.576 | 45.31 | | 5.0 | 63.47 | 3.143 | 46.20 | | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify the different physical properties of biological materials. |
| **CO2** | Interpret the rheological properties of food and measurement methods. |
| **CO3** | Examine the various thermal properties of food and its measurement techniques. |
| **CO4** | Analyze the hydro and aerodynamic properties of biological materials. |
| **CO5** | Choose appropriate textural and electromagnetic techniques for the characterization of food materials. |
| **CO6** | Justify the use of appropriate color measuring devices for sorting food materials using optical properties. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 5 | 4 | 11 | - | - | 21 |
| **CO2** | 2 | 11 | - | 8 | - | - | 21 |
| **CO3** | 1 | 1 | 4 | 11 | - | - | 17 |
| **CO4** | 1 | 4 | 12 | 8 | - | - | 25 |
| **CO5** | - | 17 | - | 7 | - | - | 24 |
| **CO6** | - | 4 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2027** | **Duration** | **3hrs** |
| **Course Name** | **FOOD PACKAGING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define shelf life of food. | | CO1 | R | 1 |
| 2. | Give an example for tertiary package. | | CO1 | A | 1 |
| 3. | Recall and write the thickness of aluminium foil used for making rigid and semi rigid foil containers. | | CO2 | R | 1 |
| 4. | Name the colorant used in amber glass. | | CO2 | R | 1 |
| 5. | Recall the weight (g/m2) range of kraft paper. | | CO3 | R | 1 |
| 6. | Write the use of kappa number. | | CO3 | A | 1 |
| 7. | Define lap seal. | | CO4 | U | 1 |
| 8. | Write any two methods used to print on food packages. | | CO5 | A | 1 |
| 9. | Define GTR. | | CO5 | R | 1 |
| 10. | Expand TTIs. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write the changes that occur in the food due to non-enzymatic reaction. | | CO2 | An | 3 |
| 12. | List the applications of aluminum foils in the food packaging. | | CO2 | A | 3 |
| 13. | Write the benefits of wax coating in paperboards. | | CO3 | A | 3 |
| 14. | Distinguish between thermosetting and thermoplastics. | | CO3 | U | 3 |
| 15. | Discuss the working principle and application of vacuum sealing. | | CO4 | A | 3 |
| 16. | Write the classification of bio-based and biodegradable packaging materials. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Summarize the functions of packaging. | CO1 | A | 5 |
|  | b. | Explain the accelerated shelf life test (ASLT) process and its various phases. | CO2 | E | 7 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the manufacturing process of three piece cans. | CO3 | U | 6 |
|  | b. | Write the essential requirements for an interior coating of metal cans. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | List all types of papers and explain any two with their application. | CO3 | A | 6 |
|  | b. | Appraise the benefits of wax coating in paperboards. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | List all common types of plastics used in the food industry with their key properties. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain any two major types of labels used for foods and list the minimum information required on a label. | CO5 | U | 6 |
|  | b. | Explain any two printing processes used to print films and papers. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Assess the chemical pulping process. | CO3 | An | 9 |
|  | b. | Write a short note on Holographic labels. | CO5 | A | 3 |
|  |  |  |  |  |  |
| 23. | a. | Elaborate on the press and blow process of making a glass container. | CO4 | U | 6 |
|  | b. | Compare the various surface treatments for improving the strength of glass containers. | CO4 | An | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the freshness indicators with example. | CO6 | A | 4 |
|  | b. | Explain in detail about time temperature indicators. | CO6 | A | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the need and functions of packaging in food systems. |
| **CO2** | Understand about shelf life of food and various methods of estimating it. |
| **CO3** | Apply their knowledge of different packaging materials, their manufacturing process and equipment involved. |
| **CO4** | Analyze various closures and sealing mechanisms for use in different packaging solutions. |
| **CO5** | Evaluate and select different printing and labelling methods based on legislative requirements. |
| **CO6** | Devise innovations in food packaging and their applications. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | - | 18 | - | - | - | 19 |
| **CO2** | 2 | - | 3 | 3 | 7 | - | 15 |
| **CO3** | 1 | 15 | 16 | 9 | - | - | 41 |
| **CO4** | - | 7 | 3 | 6 | - | - | 16 |
| **CO5** | 1 | 12 | 4 | - | - | - | 17 |
| **CO6** | 1 | 3 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP2030** | **Duration** | **3hrs** |
| **Course Name** | **FOOD PLANT UTILITY SYSTEMS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Spell out the permissible limit for the lead content in water. | | CO1 | R | 1 |
| 2. | Enumerate any two minerals that commonly contribute to the hardness of water. | | CO1 | R | 1 |
| 3. | What is the pressure output range available for water-tube boilers? | | CO3 | R | 1 |
| 4. | Describe how often maintenance of the firebrick refractory system is typically required for fire-tube boilers. | | CO3 | R | 1 |
| 5. | Correlate the torque, speed, and power. | | CO2 | U | 1 |
| 6. | Name any one advantage of using a vane pump. | | CO2 | R | 1 |
| 7. | List two types of shafts. | | CO4 | R | 1 |
| 8. | State the solid waste management hierarchy. | | CO5 | R | 1 |
| 9. | What is the maximum allowable belt speed for the transportation of grains? | | CO6 | R | 1 |
| 10. | Signify the use of a screw conveyor in handling grains. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain the significance of water quality in the food industry. | | CO1 | U | 3 |
| 12. | List two boiler accessories and describe their functions. | | CO3 | R | 3 |
| 13. | Explain how the efficiency of a centrifugal pump is determined. | | CO2 | U | 3 |
| 14. | Enumerate the problems associated with shafts. | | CO4 | R | 3 |
| 15. | Explain the impact of improperly managed waste on humans. | | CO5 | U | 3 |
| 16. | Elaborate on the maintenance required for the screw conveying system. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify and explain the different methods of treatment of water supplies. | CO1 | An | 8 |
|  | b. | Explain the ion exchange technique in water treatment. | CO1 | A | 4 |
|  |  |  |  |  |  |
| 18. | a. | Explain the construction and working principle of a fire tube boiler. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | Describe the working principles and construction of a diaphragm pump. | CO2 | U | 8 |
|  | b. | A boiler generates 6200 kg of steam per hour at 9 bar and 0.91 dry from feed water at 37 ºC. The boiler uses 820 kg of coal per hour having a calorific value of 32,000 kJ/kg. Determine the efficiency of the boiler. | CO3 | A | 4 |
|  |  |  |  |  |  |
| 20. | a. | Describe the design considerations for hollow shafts, including material selection. | CO4 | U | 6 |
|  | b. | Explain different types of drive systems. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain different types of plant piping materials used in food processing industries. | CO2 | A | 6 |
|  | b. | Describe the working principles and construction of a centrifugal pump. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain sludge and wastewater disposal systems for food plants. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Design belt conveyor for material handling in food plants. | CO6 | C | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain different types of screw conveying systems. | CO6 | U | 8 |
|  | b. | Explain the criteria for the selection of material handling machines and conveyors. | CO6 | U | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Classify industrial water and water treatment processes. |
| **CO2** | Understand the working principle of pumps and their applications. |
| **CO3** | Apply their knowledge on working principle of steam generators and measurement of performance. |
| **CO4** | Analyze the various power transmission elements and their design. |
| **CO5** | Evaluate food effluent treatment plants. |
| **CO6** | Design and construct various material handling systems. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 3 | 4 | 8 | - | - | 17 |
| **CO2** | 1 | 18 | 6 | - | - | - | 25 |
| **CO3** | 5 | - | 4 | 12 | - | - | 21 |
| **CO4** | 4 | 12 | - | - | - | - | 16 |
| **CO5** | 1 | 3 | 12 | - | - | - | 16 |
| **CO6** | 5 | 12 | - | - | - | 12 | 29 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2031** | **Duration** | **3hrs** |
| **Course Name** | **REFRIGERATION AND COLD STORAGE ENGINEERING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define Net Refrigeration Effect. | | CO1 | R | 1 |
| 2. | Define tier in refrigeration system. | | CO2 | R | 1 |
| 3. | Mention the percentage of carbon-di-oxide at which extreme discomfort occurs in humans. | | CO3 | R | 1 |
| 4. | Write ANY TWO advantages of summer air conditioning system. | | CO3 | A | 1 |
| 5. | Express the “total heat load” with an equation. | | CO3 | U | 1 |
| 6. | Write the maximum temperature for the survival of *mesophiles*. | | CO4 | A | 1 |
| 7. | List ANY FOUR packaging materials for chilled foods. | | CO5 | R | 1 |
| 8. | Name the category under which fluidized-bed freezers are classified. | | CO4 | R | 1 |
| 9. | Mention the two important consideration in hand stacking of carcass meat. | | CO4 | R | 1 |
| 10. | Mention the freezing rate of rapid freezers. | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | List ANY FOUR desirable properties of a refrigerant. | | CO1 | R | 3 |
| 12. | Describe the various noise levels in the air conditioning systems. | | CO3 | U | 3 |
| 13. | Explain the use of small delivery vehicles in chilled transport. | | CO5 | A | 3 |
| 14. | List the FOUR stages in cooling of milk. | | CO5 | U | 3 |
| 15. | Discuss the various factors in selection of cabinets in refrigerated display. | | CO6 | U | 3 |
| 16. | Differentaite between effective and nominal freezing time. | | CO4 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the Li Br Absorption refrigeration system | CO1 | An | 6 |
|  | b. | A refrigerating system works on reverse Carnot cycle. The higher temperature in the system is 35℃ and the lower temperature is -15℃. The capacity is to be 12 tonnes. Determine:   1. COP of Carnot Refrigerator 2. Heat rejected from the system per hour. 3. Power required. | CO1 | An | 6 |
|  |  |  |  |  |  |
| 18. | a. | Classify air conditioning systems according to construction and operating characteristics. | CO3 | U | 8 |
|  | b. | Discuss the moisture-solid relationship in air conditioning design. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 19. | a. | Analyze the various requirements for the location of cold storages. | CO2 | An | 6 |
|  | b. | Discuss the various spaces that are to be maintained in block stacking. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Examine the various heat loads in the design of cold storage. | CO3 | A | 6 |
|  | b. | Explain the various raking system in the cold storages. | CO2 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Summarize the various types of refrigerated display. | CO6 | E | 6 |
|  | b. | Differentiate between minimum, optimum and maximum growth temperature. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the components of freezing curve with a NEAT diagram. | CO4 | A | 6 |
|  | b. | Five-centimeter potato cubes are individually quick frozen (IQF) in a blast freezer operating at -40℃ and with a surface heat transfer coefficient of 30 Wm-2K-1. If the freezing point of the potato is measured as -1.0℃ and the density is 1180 kg m-3, calculate the expected freezing time for each cube. If the cubes are then packed into a cardboard carton measuring 20 cm x 10 cm x 10 cm, calculate the freezing time. Also calculate the freezing time for IQF freezing of 2.5 cm cubes.  (Additional data: the thickness of the card is 1.5 mm, the thermal conductivity of the card is 0.07 Wm-1K-1, the conductivity of potato is 2.5 W m-1 K-1 and the latent heat of crystallization 2.74 x 105 J kg-1. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the various types of freezers. | CO4 | An | 6 |
|  | b. | Analyze the crystal size and its effect of texture and quality of foods during freezing. | CO4 | An | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the various components of traceability systems. | CO6 | A | 6 |
|  | b. | Describe the various door seals, insulation, and aging units in the maintenance of refrigerant plants. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the principle of refrigeration and various refrigeration cycles. |
| **CO2** | Understand factors affecting cold storage of food commodities. |
| **CO3** | Calculate the thermal load for the air conditioning system. |
| **CO4** | Analyze freezing and its effect on the texture of food. |
| **CO5** | Predict the problems encountered in chilling of foods |
| **CO6** | Design cold supply chain management systems for food sector. |

|  |  |  |  |  |  |  |  |
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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | - | 12 | - | - | - | 16 |
| **CO2** | 1 | 6 | - | 12 | - | - | 19 |
| **CO3** | 1 | 16 | 7 | - | - | - | 24 |
| **CO4** | 3 | 9 | 7 | 18 | - | - | 37 |
| **CO5** | 1 | 3 | 3 | - | - | - | 7 |
| **CO6** | - | 9 | 6 | - | 6 | - | 21 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2032** | **Duration** | **3hrs** |
| **Course Name** | **BAKERY, BEVERAGES, AND CONFECTIONERY TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define the term “Gristing”. | | CO1 | R | 1 |
| 2. | Name one type of equipment used for proofing in the baking process. | | CO2 | U | 1 |
| 3. | What does an Amylograph measure in the analysis of wheat quality? | | CO2 | An | 1 |
| 4. | List the different types of soluble and insoluble proteins in wheat flour. | | CO1 | R | 1 |
| 5. | Define the term “Massecuite**”.** | | CO1 | R | 1 |
| 6. | What is molasses, and how is it utilized in the sugar industry? | | CO3 | U | 1 |
| 7. | **List the types of yeast used in the beer manufacturing process.** | | CO4 | R | 1 |
| 8. | Define the term **“Kilning ”.** | | CO4 | R | 1 |
| 9. | Write the composition of cocoa beans. | | CO6 | U | 1 |
| 10. | Define the term “confectionery”. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Write the Structure and composition of wheat. | | CO1 | U | 3 |
| 12. | Describe the technology involved in the manufacturing of wafers. | | CO2 | R | 3 |
| 13. | Explain the different types of sugars, their sources, and common uses in the food industry. | | CO3 | U | 3 |
| 14. | Enumerate the production process of rum, using a detailed flow chart to illustrate the sequential steps. | | CO4 | R | 3 |
| 15. | Examine the various faults that can occur in confectionery production, explore their underlying causes, and discuss effective prevention strategies. | | CO5 | Ap | 3 |
| 16. | Analyze the sources and diverse applications of carbon dioxide in the food industry. | | CO5 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Enumerate in detail about the dough and gluten strength tests with graphs. Explain how the quality and performance of dough and gluten strength affect the various food production processes. | CO2 | R | 6 |
|  | b. | Explain the different types of biscuit doughs and elucidate each dough process with suitable examples. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain and illustrate the various types of ovens utilized in the bakery industry, emphasizing their unique features and functions, and how they contribute to the production of diverse baked goods. | CO1 | Ap | 6 |
|  | b. | Elucidate the sequential stages involved in the bread manufacturing process, including the key ingredients, equipment, and techniques used at each step, and how these stages collectively contribute to the production of bread. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the technology of sugar manufacture, detailing each unit operation and its significance in producing high-quality sugar production. | CO5 | R | 6 |
|  | b. | Write the technological processes and methods involved in the production of jaggery, encompassing the key steps, equipment, and innovations that contribute to the manufacturing of traditional jaggery. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Distinguish the classifications of wine and elucidate the fundamental process of wine production. | CO4 | An | 6 |
|  | b. | Explain the different beer types, the key quality considerations in brewing, and the intricate beer manufacturing process. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Summarize the technology and quality aspects involved in the production process of soft carbonated beverages. | CO6 | U | 6 |
|  | b. | Describe the application of probiotics and hydrodynamic cavitation in the production of beverages, and explore the potential benefits and challenges associated with these innovative techniques. | CO6 | R | 6 |
|  |  |  |  |  |  |
| 22. | a. | Elucidate the intricacies of the whiskey manufacturing process and its adherence to quality aspects. | CO5 | U | 6 |
|  | b. | Discuss the process of string consistency and its correlation with total solids in confectionery and the technology involved in the processing of hard-boiled candies. | CO4 | Ap | 6 |
|  |  |  |  |  |  |
| 23. | a. | Enumerate the technology used in aerated confectionery, detailing the methods of incorporating air or gas into confectionery products. Discuss how aeration affects texture, taste, and market demand. | CO4 | R | 6 |
|  | b. | Classify packaging materials and explain in detail about Retort Packaging and Modified Atmosphere Packaging. | CO2 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the technology used in the production of chocolates, detailing the key steps. Explain how each step influences the final quality of chocolate products and the challenges involved in chocolate production. | CO5 | U | 6 |
|  | b. | Explain the key ingredients and the technological processes involved in the production of toffees. | CO5 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge of the ingredients, process, and machinery involved in bakery, confectionery and beverage technology. |
| CO2 | Understand the factors affecting the quality of baked and confectionery products. |
| CO3 | Apply gained knowledge in manufacturing of new products |
| CO4 | Analyze the process for maintaining and improving the quality of the final product |
| CO5 | Evaluate the steps involved in the process and improve existing technologies or develop newer technologies |
| CO6 | Design and create newer processes and products that are better economically, nutritionally or technologically. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 3 | 9 | 6 | - | - | - | 18 |
| CO2 | 9 | 13 | 1 | - | - | - | 23 |
| CO3 | - | 4 | - | - | - | - | 4 |
| CO4 | 11 | - | 6 | 12 | - | - | 29 |
| CO5 | 7 | 24 | 3 | 3 | - | - | 37 |
| CO6 | 6 | 7 | - | - | - | - | 13 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2033** | **Duration** | **3hrs** |
| **Course Name** | **PLANTATION AND SPICES PRODUCT TECHNOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Name the commercially growing coffee species. | | CO2 | R | 1 |
| 2. | Name the chemical compound in coffee responsible for stimulating effect. | | CO2 | R | 1 |
| 3. | Mention the key indicator to stop the fermentation process in green brick tea. | | CO3 | U | 1 |
| 4. | Write the examples for fermented and non-fermented tea. | | CO4 | R | 1 |
| 5. | Mention the fat content in high fat cocoa cake. | | CO2 | R | 1 |
| 6. | Define panning in chocolate making. | | CO1 | R | 1 |
| 7. | Name the food grade solvents used in solvent extraction process. | | CO3 | U | 1 |
| 8. | Define encapsulation. | | CO6 | R | 1 |
| 9. | Name the component responsible for yellow colour in turmeric. | | CO6 | R | 1 |
| 10. | Name the component responsible for pungency in pepper. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Draw the process flow chart of wet and dry processing of coffee. | | CO1 | U | 3 |
| 12. | Enumerate the changes in tea leaves during withering process. | | CO2 | An | 3 |
| 13. | Draw the process flow chart for chocolate manufacturing. | | CO3 | U | 3 |
| 14. | Explain the cold press extraction process. | | CO5 | A | 3 |
| 15. | Discuss the manufacturing process of white pepper. | | CO4 | A | 3 |
| 16. | Summarize the garlic dehydration process. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the methods used for decaffeination of coffee. | CO1 | U | 7 |
|  | b. | Analyze the physico-chemical changes in coffee during roasting process. | CO2 | An | 5 |
|  |  |  |  |  |  |
| 18. | a. | Summarize the production of instant tea with flow chart. | CO2 | U | 8 |
|  | b. | List the flavor incorporation methods for tea and explain any one method. | CO3 | A | 4 |
|  |  |  |  |  |  |
| 19. | a. | Analyze the change in cocoa beans during fermentation and also explain methods of fermentation. | CO4 | An | 6 |
|  | b. | Discuss the mixing and refining step in chocolate manufacturing. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Elaborate the maceration process of essential oil extraction. | CO5 | A | 7 |
|  | b. | Explain in detail steam distillation with a diagram. | CO5 | U | 5 |
|  |  |  |  |  |  |
| 21. | a. | Explain in detail about post-harvest processing of turmeric. | CO3 | U | 6 |
|  | b. | Explain in detail about production of black pepper, white pepper and ground pepper. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the production methods of Instant coffee. | CO6 | U | 6 |
|  | b. | Discuss the steps involved in production of cinnamon quills. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the decaffeination methods of soluble tea. | CO1 | U | 8 |
|  | b. | Discuss the functional properties of clove. | CO6 | A | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain in detail the curing process of vanilla. | CO3 | U | 7 |
|  | b. | Discuss the manufacturing process of vanilla extract and list the factors influencing the quality of vanilla extract. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the different unit operations and equipments involved in coffee, tea, cocoa and spices processing. |
| CO2 | Understand the quality standards in coffee, tea, cocoa and spices processing industries. |
| CO3 | Apply their knowledge on processing and quality aspects in reducing quality losses and optimization of processing parameters in coffee, tea, cocoa and spices processing industries. |
| CO4 | Analyze the quality of plantation and spices products based on industrial standards. |
| CO5 | Evaluate and point out the appropriate technique for the extraction of spice oil and oleoresin from specific spices. |
| CO6 | Develop functional products based on the functional properties of plantation and spices crops. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 24 |  |  |  |  | 25 |
| CO2 | 3 | 8 |  | 8 |  |  | 19 |
| CO3 |  | 18 | 4 |  |  |  | 22 |
| CO4 | 1 |  | 3 | 6 |  |  | 10 |
| CO5 | 1 | 5 | 10 | 5 |  |  | 21 |
| CO6 | 2 | 21 | 4 |  |  |  | 27 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2034** | **Duration** | **3hrs** |
| **Course Name** | **MEAT, POULTRY AND FISH PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Name a meat protein that is soluble in water. | | CO1 | R | 1 |
| 2. | Recall the microorganism that causes fungal spoilage and causes white spots in meat. | | CO3 | R | 1 |
| 3. | Indicate the space requirement for lairaging sheep. | | CO2 | U | 1 |
| 4. | Indicate the scalding temperature for pigs. | | CO2 | U | 1 |
| 5. | Mention the temperature for the curing room. | | CO2 | R | 1 |
| 6. | Indicate the water activity of intermediate moisture meat products. | | CO2 | U | 1 |
| 7. | Indicate the chilling tempeature for poulty carcass. | | CO4 | U | 1 |
| 8. | Recall and write the energy value for egg. | | CO5 | R | 1 |
| 9. | Indicate the range of salinity of Brackishwater fish. | | CO4 | U | 1 |
| 10. | Define belly bursting. | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | State typical colour of meat from various species. | | CO1 | R | 3 |
| 12. | Enlist any four factors that affect meat quality. | | CO1 | R | 3 |
| 13. | Classify sausages based on moisture content. | | CO3 | U | 3 |
| 14. | Write the carcass characteristics for poultry meat. | | CO4 | A | 3 |
| 15. | Draw the neat and labeled structure of egg. | | CO4 | R | 3 |
| 16. | Recall and write the uses of fish protein concentrate. | | CO5 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain composition of muscle and its modifiers. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain the process of antemortem inspection for animals. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Illustrate the steps involved in production of sausages. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain the packaging of products. | CO5 | U | 6 |
|  | b. | Explain refrigerated storage of poultry meat. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Discuss microbial spoilage of eggs. | CO5 | R | 10 |
|  | b. | Enlist Functional properties of egg white and egg yolk. | CO5 | R | 2 |
|  |  |  |  |  |  |
| 22. |  | Elaborate the HACCP plan for poultry industry. | CO4 | R | 12 |
|  |  |  |  |  |  |
| 23. |  | Discuss post mortem muscle chemistry. | CO1 | R | 12 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the steps involved in canning of fish. | CO5 | U | 12 |
|  |  |  |  |  |  |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the muscle structure related to physical and chemical properties. |
| CO2 | Explain the slaughtering methods and carcass processing of different types of meats |
| CO3 | Demonstrate effective preservation methods for ensuring consumer safety |
| CO4 | Analyze meat quality with respect to HACCP and GMP of meat, poultry and fish processing |
| CO5 | Evaluate the quality of processed and preserved poultry and egg products |
| CO6 | Design layout for slaughter houses and meat processing units |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 19 | 24 | -- | -- | -- | -- | 43 |
| CO2 | 1 | 3 | 12 | -- | -- | -- | 16 |
| CO3 | 1 | 3 | -- | -- | -- | -- | 4 |
| CO4 | 22 | 8 | 3 | -- | -- | -- | 33 |
| CO5 | 16 | 18 | -- | -- | -- | -- | 34 |
| CO6 | -- | -- | -- | -- | -- | -- | -- |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2035** | **Duration** | **3hrs** |
| **Course Name** | **STORAGE ENGINEERING OF FOOD MATERIALS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The engineering properties of food are important for \_\_\_\_ of food products.  a. Process Design b. Manufacture c. Both a and b d. None | | CO1 | U | 1 |
| 2. | The curved lines on a psychrometric chart indicates \_\_\_\_\_\_  a. Dry bulb temp. b. Wet bulb temp. c. Specific Humidity d. RH | | CO1 | R | 1 |
| 3. | The part of the refrigeration unit in which the refrigerant changes from vapor to liquid is called  a. Condenser b. Throttle valve c. Compressor d. Evaporator | | CO2 | U | 1 |
| 4. | The cheapest refrigerant is  a. Ammonia b. F-12 c. Air d. F-22 | | CO2 | R | 1 |
| 5. | The density of foods after freezing\_\_\_\_  a. First increase and the decreases b. Increases  c. Unchanged d. Decreases | | CO3 | U | 1 |
| 6. | Rapid freezing leads to the formation of \_\_\_\_\_ ice crystals. | | CO3 | U | 1 |
| 7. | MAP is also known as  a. Vacuum packaging b. Gas flushing c. Passive packaging  d. Controlled packaging | | CO4 | U | 1 |
| 8. | Shelf-life testing is the measure of \_\_\_\_\_\_ and storage time  a. Quality b. Quantity c. Both a and b d. None | | CO4 | U | 1 |
| 9. | Controlled atmospheric storage is used for the storage of  a. Jam b. Juices c. Dried products d. Fruits & vegetables | | CO5 | U | 1 |
| 10. | Trench silo has\_\_\_ cross-section  a. Trapezoidal b. Circular c. Rectangular d. Triangular | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain the two types of Angle of repose. | | CO1 | U | 3 |
| 12. | Compare shell and tube evaporator with shell and tube condenser. | | CO2 | An | 3 |
| 13. | Justify the importance of time-temperature indicators in frozen food transport. | | CO3 | An | 3 |
| 14. | Express the principle of modified atmospheric storage. | | CO4 | U | 3 |
| 15. | Analyze the basic approaches to determine the shelf life of food products. | | CO5 | An | 3 |
| 16. | List the traditional storage structures used in rural and urban regions of India. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain the P**sychrometric chart with a neat sketch.** | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Estimate the cooling load in cold storage. | CO2 | E | 6 |
|  | b. | Describe any three types of evaporators. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. |  | Categorize the changes in principal constituents during frozen storage of food. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. | a. | List the advantages of Modified atmospheric storage. | CO4 | U | 6 |
|  | b. | Demonstrate the methods of creating a modified atmosphere condition. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | List the disadvantages of Controlled atmospheric storage. | CO5 | U | 6 |
|  | b. | Discuss the biochemical considerations of CAS. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. |  | Examine the factors that are affecting the shelf life of fruits and vegetables during storage. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 23. |  | Outline the requirements for the ideal CA storage room. | CO5 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the improved structures adopted for storing grains. | CO6 | E | 6 |
|  | b. | Summarize the modern storage structures adopted for storing grains. | CO6 | E | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Identify the specific storage requirements for various food materials. |
| **CO2** | Understand the pre-requisites for the safe handling and storage of food materials. |
| **CO3** | Solve problems related to identification of time-temperature combinations, cooling load and other operational parameters for food materials storage. |
| **CO4** | Analyze the shelf-life testing of various food materials during storage. |
| **CO5** | Evaluate the pest control strategies in the storage space used for food storage. |
| **CO6** | Design structures for storage of grains and other major crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 16 | - | - | - | - | 17 |
| **CO2** | 1 | 7 | - | 3 | 6 | - | 17 |
| **CO3** | - | 2 | - | 15 | - | - | 17 |
| **CO4** | - | 11 | 6 | 12 | - | - | 29 |
| **CO5** | - | 13 | - | 15 | - | - | 28 |
| **CO6** | - | 4 | - | - | 12 | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2036** | **Duration** | **3hrs** |
| **Course Name** | **PROCESS ECONOMICS AND PLANT LAYOUT DESIGN** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | What does “I” in PIECES stand for? | | CO1 | U | 1 |
| 2. | Explain the term – “Schedule feasibility”. | | CO1 | R | 1 |
| 3. | EHEDG stands for? | | CO2 | R | 1 |
| 4. | List the components of SS 314. | | CO3 | R | 1 |
| 5. | Expand PRP. | | CO2 | R | 1 |
| 6. | Expand – OSHA. | | CO5 | R | 1 |
| 7. | What is the other name for cost index? | | CO6 | R | 1 |
| 8. | Capital cost is the sum of? | | CO5 | R | 1 |
| 9. | ROI refers to? | | CO5 | R | 1 |
| 10. | Explain the term – Amortisation. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Calculate the amount of milk required to manufacture 100 kg of *Kalakhand*. | | CO1 | An | 3 |
| 12. | Briefly outline the importance of deciding the scope of a project. | | CO6 | U | 3 |
| 13. | Mr.YY wishes to set up a bakery industry in Coimbatore? Comment on the suitability of such a project. | | CO3 | An | 3 |
| 14. | Differentiate between process and product layout design. | | CO2 | U | 3 |
| 15. | Mr. X wants to buy an evaporator of 1000kg/h capacity. He observed that Mr. Y has an evaporator of 50 kg/h capacity that costs Rs. 8 Lakhs. (bought in 2012). What will the projected cost of the evaporator that Mr. X wants to buy? Given – CEPCI index for 2022 and 2010 are 816 and 550.8 respectively. | | CO5 | An | 3 |
| 16. | Mr. XYZ, a financial analyst, observed that the venture of XX has yielded 50 crores of total returns in 5 years. His initial investment was 5 crores. Calculate the Rate of return on investment of his venture. | | CO5 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Prepare a technical feasibility study for a company that plans to manufacture multi millet cookies, recommending an appropriate location for the project | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. | a. | M/s. Fruitiee wants to set up an orange marmalade unit of 250kg/h capacity. Construct a process flow diagram for the same and also calculate the amount of raw materials required for such a venture. | CO6 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | Discuss briefly on the principles of sanitary design | CO2 | U | 8 |
|  | b. | Discuss on the requirements for a hygienic design of pipes | CO2 | U | 4 |
|  |  |  |  |  |  |
| 20. | a. | Construct the layout for a plant manufacturing 500 kg /h of frozen shrimps, based on the principles of Simplified systematic plant layout design. Given – total available area is 500 m2 | CO3 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Discuss on the PRPs that are mandated prior to setting up of a jam processing unit. | CO6 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Mr. AA wants to set up a frozen shrimp unit of 1000 kg/h capacity. His friend has a similar plant of 250kg/h capacity set up in 2012. Determine the total investment cost. Given – cost of the spiral freezer in 2012 of 250 kg / h capacity was 30 Lakhs. Cost of a pre–cooler of a similar capacity – 8 lakhs. Given – CEPCI index for 2022 and 2012 are 816 and 584.6 respectively | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Discuss briefly on contribution of general expenses towards total product cost. | CO5 | A | 6 |
|  | b. | Mr. BAA wishes to borrow Rs. 5 lakhs to meet a financial obligation. This money can be borrowed from a loan agency at a monthly interest rate of 2 percent. Determine the following:  a. The total amount of principal plus simple interest due after 2 years if no intermediate payments are made.  b. The total amount of principal plus compounded interest due after 2 years if no intermediate payments are made | CO5 | A | 2x3 = 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Draw the cash-flow diagram and correlate the following with reference to the diagram- a. Payback time b. Capitalised cost | CO6 | U | 2X4 = 8 |
|  | b. | Ms. *Rupeewise* financial firm observed that the venture of Mr. XX has yielded 25 crores of total returns in 5 years. His initial investment was 1 crore. Calculate the Rate of return on investment of his venture. | CO6 | A | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | To gain knowledge on the various factors involved in setting up a Food Processing Industry |
| CO2 | To understand the process of food plant layout design. |
| CO3 | To apply their knowledge to design projects for setting up a Food Processing Industry. |
| CO4 | To analyse the problems involved in deciding the level of manufacture of a food product |
| CO5 | To evaluate the options involved and decide on the right choice based on the economics of the system |
| CO6 | To develop own industry or plan turn-key projects based on the request from customers |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 4 |  | 12 |  |  | 17 |
| CO2 | 2 | 3 | 24 |  |  |  | 29 |
| CO3 | 1 | 3 | 9 | 3 |  |  | 16 |
| CO4 |  |  | 12 |  |  |  | 12 |
| CO5 | 3 |  | 12 | 6 |  |  | 21 |
| CO6 | 2 | 11 | 16 |  |  |  | 29 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20FP2037** | **Duration** | **3hrs** |
| **Course Name** | **FAT AND OIL PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Give an example of monosaturated fat. | | CO1 | U | 1 |
| 2. | Recall the refractive index of oil. | | CO1 | R | 1 |
| 3. | Define smoke point of fat. | | CO2 | R | 1 |
| 4. | Name the commonly used solvent for oil extraction. | | CO3 | R | 1 |
| 5. | Mention the commonly used binary solvents in miscellar refining. | | CO3 | U | 1 |
| 6. | Define Hydrogenation process. | | CO2 | R | 1 |
| 7. | Mention the peroxide value of fresh oil. | | CO4 | U | 1 |
| 8. | Mention the catalyst that converts unsaturated acid groups into the saturated acid groups in hydrogenation process. | | CO4 | U | 1 |
| 9. | Define Dewaxing in oil refining. | | CO5 | R | 1 |
| 10. | Name the residual product obtained in formation of soap. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Classify lipids based on composition with suitable examples. | | CO1 | An | 3 |
| 12. | List the steps involved in the oil expulsion. | | CO2 | R | 3 |
| 13. | Recall and write the role of oxygen scavenger in active packaging. | | CO6 | R | 3 |
| 14. | Differentiate between alkali refining and deodorization. | | CO3 | An | 3 |
| 15. | List the factors that affect the quality of oil. | | CO6 | R | 3 |
| 16. | Mention the two processing steps undertaken to prevent crystallization and settling of chilled oils. | | CO5 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the principle and importance of Peroxide value in fats and oil. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the coconut oil extraction process. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Write a short note on batch and continuous bleaching in oil refining. | CO3 | A | 6 |
|  | b. | Explain the winterization process along with its application. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the quality control parameters in edible oil industry. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Summarize the types of rancidity. | CO6 | U | 6 |
|  | b. | Explain the Primary oxidation products. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Summarize the types of refining process for oil. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Write a short note on thermal properties of oil. | CO4 | A | 6 |
|  | b. | Describe the process of Triacylglycerol formation. | CO1 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Write about the major byproducts of oil processing industry along with their uses. | CO5 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the importance of fats and oils in human diet. |
| **CO2** | Describe the manufacturing process of oils and fats. |
| **CO3** | Apply knowledge on manufacture to design alternate fats. |
| **CO4** | Analyze the quality attributes of oils and fats. |
| **CO5** | Defend the use of specialty fats to meet human dietary requirement. |
| **CO6** | Design suitable packaging materials for fats and oils. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 7 | 13 | - | 3 | - | - | 23 |
| **CO2** | 5 | 12 | - | - | - | - | 17 |
| **CO3** | 1 | 7 | 6 | 3 | - | - | 17 |
| **CO4** | - | 2 | 18 | - | - | - | 20 |
| **CO5** | 2 | 15 | 12 | - | - | - | 29 |
| **CO6** | 18 | - | - | - | - | - | 18 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP2038** | **Duration** | **3hrs** |
| **Course Name** | **DRYING TECHNOLOGY OF FOOD MATERIALS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Express the relationship between wet basis and dry basis moisture content. | | CO1 | U | 1 |
| 2. | What are the desired objectives of the drying system? | | CO1 | R | 1 |
| 3. | Write the disadvantages of mechanical drying systems. | | CO2 | R | 1 |
| 4. | Distinguish the difference between moisture content and water activity. | | CO2 | U | 1 |
| 5. | Write the recommended air flow rate for a continuous mixing type dryer. | | CO3 | R | 1 |
| 6. | Write the applications of freeze drying in food industries. | | CO3 | A | 1 |
| 7. | List down the types of feeding techniques in drum drying. | | CO4 | R | 1 |
| 8. | Choose an appropriate dryer for producing instant food formulations. | | CO4 | A | 1 |
| 9. | What is the specific steam consumption of the drum dryer? | | CO5 | R | 1 |
| 10. | Define specific moisture extraction rate. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | 300 kg of paddy at 18% moisture content (wb) is dried to 13% moisture content (wb) for milling. Calculate the amount of moisture removed in drying. | | CO3 | An | 3 |
| 12. | Describe the drying curve for food materials. | | CO1 | U | 3 |
| 13. | Classify various types of airflow in grain drying systems. | | CO2 | An | 3 |
| 14. | Write the applications of spray drying and drum drying systems in food industries. | | CO4 | A | 3 |
| 15. | What are the factors that will affect osmotic dehydration? | | CO5 | U | 3 |
| 16. | Write the factors to be considered to increase the efficiency of the dryer. | | CO5 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | 35 𝑚3/𝑚𝑖𝑛 of a stream of moist air at 25 °C DBT and 19 °C WBT are mixed with 25 𝑚3/𝑚𝑖𝑛 of a second air stream at 30°C DBT and 23°C WBT. Barometric pressure is one standard atmosphere. Determine the dry bulb and wet bulb temperature of the resulting mixture. | CO5 | An | 8 |
|  | b. | Explain moisture content determination by indirect methods. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 18. | a. | Briefly explain the dielectric and chemical drying of food materials. | CO2 | U | 8 |
|  | b. | What are the advantages and disadvantages of sun drying? | CO2 | U | 4 |
|  |  |  |  |  |  |
| 19. | a. | In a dryer, 10 tonnes of wheat (final weight) is dried from 21% (db) to 13% (db) moisture content per hour. Calculate the heat requirement for drying and the necessary air flow rate for the drying system.  Given that: Dryer efficiency = 70 %  Latent heat of evaporation: 445 kcal/kg  Specific heat of air: 0.32 kcal/kg °C  Drying air temperature = 44 °C  Ambient air condition = 30 °C and 24 °C dry and wet bulb temperature respectively. | CO5 | An | 8 |
|  | b. | Explain about factors affecting the drying process of cereals and pulses. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 20. | a. | Explain mechanical methods for drying agricultural produce. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain recirculatory dryers used for drying grains. | CO3 | U | 6 |
|  | b. | Differentiate between deep bed and flat bed dryers. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain with a neat sketch the principle and operation of a spray dryer. | CO6 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Classify and explain different types of drum drying for liquid foods. | CO4 | A | 8 |
|  | b. | Explain the principles involved in freeze drying. | CO4 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the construction and operation of heat pump drying. | CO6 | An | 8 |
|  | b. | Summarize the factors to be considered while selecting dryers for various food materials. | CO5 | E | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge on drying principles. |
| CO2 | Understand different types of dryers for different food materials. |
| CO3 | Apply the principles to solve problem on drying. |
| CO4 | Analyze the efficiency of industrial dryers. |
| CO5 | Evaluate the dryer performance. |
| CO6 | Design dryers for different types of foods. |

|  |  |  |  |  |  |  |  |
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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 8 | - | - | - | - | 9 |
| CO2 | 1 | 19 | 12 | 3 | - | - | 35 |
| CO3 | 1 | 10 | 1 | 3 | - | - | 15 |
| CO4 | 1 | 4 | 12 | - | - | - | 17 |
| CO5 | 1 | 6 | - | 16 | 4 | - | 27 |
| CO6 | 1 | - | - | 20 | - | - | 21 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP2043** | **Duration** | **3hrs** |
| **Course Name** | **NOVEL PROCESSING TECHNIQUES OF FOOD PRESERVATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Sketch the osmotic dehydration process for fruits & vegetables. | | CO1 | U | 1 |
| 2. | Give some examples of osmotic dehydration in the food industry. | | CO2 | R | 1 |
| 3. | The HHP is characterized by three parameters. Name them. | | CO1 | R | 1 |
| 4. | In PEF, according to the intensity of the field strength, …………………… can be either reversible (cell membrane discharge) or irreversible (cell membrane breakdown or lysis), but this effect can be controlled depending on the application. | | CO3 | A | 1 |
| 5. | Hydrostatic Pressure Processing is a **thermal**/**non-thermal** preservation technique. | | CO1 | U | 1 |
| 6. | The HHP is characterized by three parameters. Name them. | | CO3 | A | 1 |
| 7. | Provide the pressure range for reverse osmosis in psi/kPa. | | CO4 | An | 1 |
| 8. | State the types of membrane concentration. | | CO2 | U | 1 |
| 9. | Enumerate any two drying technologies. | | CO4 | E | 1 |
| 10. | State the difference between osmosis and diffusion. | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Define electroporation. | | CO2 | U | 3 |
| 12. | State any TWO conventional methods of food preservation with example. | | CO6 | C | 3 |
| 13. | Enlist the different types of non-thermal food preservation technologies. | | CO3 | A | 3 |
| 14. | Recall the working principle of ultrasound based food preservation. | | CO5 | E | 3 |
| 15. | Provide the types of sonication and explain at least one of them. | | CO3 | A | 3 |
| 16. | Sketch the mechanism/principle of PEF. | | CO4 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Illustrate with the help of a diagram ATLEAST 3 types of non-thermal food processing with illustrations. | CO3 | A | 6 |
|  | b. | Derive the equation for Fick’s Law of diffusion. | CO5 | E | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain hybrid drying technologies. | CO4 | An | 8 |
|  | b. | State two major counter current flow that takes place simultaneously across the semi permeable cell membrane during osmotic pre-concentration with diagram. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 19. |  | Describe in detail with the help of a i) diagram the ii) principle, iii) mechanism of action of pulsed electric field processing of foods and its iv) advantages and limitations. | CO5 | E | 12 |
|  |  |  |  |  |  |
| 20. | a. | Discuss in detail the ultrasound processing effects in fruit juices. | CO6 | C | 8 |
|  | b. | State the advantages and limitations of ultrasound based preservation. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 21. |  | Choose a specific industry like milk industry, meat industry, etc or waste water treatment and write a case study for the use of different types of membrane concentration. | CO5 | E | 12 |
|  |  |  |  |  |  |
| 22. |  | Explain in detail the i) Packaging Requirements of HHP Technology ii) Which Type of foods can be processed using HHP and iii) State the advantages and disadvantages of HPP. | CO6 | C | 12 |
|  |  |  |  |  |  |
| 23. |  | Comment in brief on “ultrasound” as a food preservation and processing aid. | CO4 | An | 6 |
|  |  | Provide the application of microwave processing for foods. | CO3 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Describe drying technologies in detail with illustrations wherever necessary. | CO5 | E | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the fundamentals of various food preservation techniques. |
| CO2 | Understand the importance of preservation techniques. |
| CO3 | Apply knowledge of choosing appropriate methods food systems. |
| CO4 | Analyze methods of various preservation techniques. |
| CO5 | Evaluate and characterize the quality of products. |
| CO6 | Design new manufacture techniques to develop process for specific purposes. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 2 |  |  |  |  | 4 |
| CO2 | 1 | 12 |  |  |  |  | 13 |
| CO3 |  |  | 20 |  |  |  | 20 |
| CO4 |  |  |  | 18 | 1 |  | 19 |
| CO5 |  |  |  |  | 45 |  | 45 |
| CO6 |  |  |  |  |  | 23 | 23 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3001** | **Duration** | **3hrs** |
| **Course Name** | **MASS TRANSFER AND SEPARATION TECHNIQUES**  **IN FOOD PROCESSING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A(5 X 16= 80 MARKS)**  **(**Answer any five from the following**)** | | | | | |
| 1. | a. | Explain Mass transfer coefficients. | CO1 | U | 8 |
|  | b. | A mixture of He and N**2** gas is contained in a pipe at 298 K and 1 atm total pressure which is constant throughout. At one end of the pipe at point 1 the partial pressure p**A1** of He is 0.60 atm and at the other end 0.2 m (20 cm) p**A2** = 0.20 atm. Calculate the flux of He at steady state if D**AB** of the He–N**2** mixture is 0.687 × 10**−4** m**2**/s (0.687 cm**2**/s). Use SI and cgs units. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 2. | a. | State the methods used to determine mass transfer coefficients. | CO2 | R | 8 |
|  | b. | Discuss diffusion in solids following ficks Law.  The gas hydrogen at 17°C and 0.010 atm partial pressure is diffusing through a membrane of vulcanized neoprene rubber 0.5 mm thick. The pressure of H**2** on the other side of the neoprene is zero. Calculate the steady-state flux, assuming that the only resistance to diffusion is in the membrane. The solubility S of H**2** gas in neoprene at 17°C is 0.051 m**3** (at STP of 0°C and 1 atm)/m**3** solid · atm and the diffusivity D**AB** is 1.03 × 10**−10** m**2**/s at 17°C | CO2 | C | 8 |
|  |  |  |  |  |  |
| 3. | a. | Explain the basic principle of evaporation. | CO3 | U | 8 |
|  | b. | Describe types of distillation with the help of illustrations. | CO3 | R | 8 |
|  |  |  |  |  |  |
| 4. | a. | Explain the concept of boiling point diagram. | CO4 | U | 8 |
|  | b. | What do you understand by Agitated thin film evaporators? | CO4 | R | 8 |
|  |  |  |  |  |  |
| 5. | a. | Explain Liquid-liquid extraction. | CO5 | U | 8 |
|  | b. | Indicate the properties of super critical fluids. | CO5 | U | 8 |
|  |  |  |  |  |  |
| 6. | a. | Describe the factors affecting solubility of gases in a liquid. | CO5 | R | 8 |
|  | b. | Explain venturi scrubber and wetted wall towers. | CO4 | U | 8 |
|  |  |  |  |  |  |
| 7. | a. | Explain the concept of ficks law. | CO1 | U | 8 |
|  | b. | Differentiate between single effect and multiple effect evaporator. | CO2 | R | 8 |
|  |  |  |  |  |  |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 8. | a. | Describe the process of separation by membranes. | CO6 | R | 20 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the principles of various mass transfer and separation processes. |
| CO2 | Express the various mass transfer and separation processes. |
| CO3 | describe the types of separation processes in food engineering |
| CO4 | Calculate the material balance in food processing units. |
| CO5 | appraise the performance of processing unit operations |
| CO6 | provide solutions to the issues in food processing operations |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  | 24 |  |  |  |  | 24 |
| CO2 | 16 |  |  |  |  | 8 | 24 |
| CO3 | 8 | 8 |  |  |  |  | 16 |
| CO4 | 8 | 16 |  |  |  |  | 24 |
| CO5 | 8 | 16 |  |  |  |  | 24 |
| CO6 | 20 |  |  |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3002** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF FOOD FLAVOURANTS AND COLOURANTS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Explain the various theories of olfactory perception. | CO1 | A | 8 |
|  | b. | Classify taste according to their basic nature. | CO2 | An | 8 |
|  |  |  |  |  |  |
| 2. | a. | Generalize the flavour changes in food during fermentation. | CO1 | U | 8 |
|  | b. | Describe the various bittering agents in coffee and cocoa. | CO5 | R | 8 |
|  |  |  |  |  |  |
| 3. | a. | Explain the various steps in extraction and isolation of chlorophyll. | CO5 | A | 8 |
|  | b. | Discuss the application of Cochineal in Food Industry. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 4. | a. | Explain the Solid Phase Micro Extractionmethod of headspace analysis. | CO6 | An | 8 |
|  | b. | Explain in detail the various distillation techniques used in food. | CO6 | U | 8 |
|  |  |  |  |  |  |
| 5. | a. | Describe in detail ANY TWO encapsulation techniques. | CO6 | U | 8 |
|  | b. | Discuss in detail the type of core, examples and potential benefits of encapsulation in food industries. | CO4 | U | 8 |
|  |  |  |  |  |  |
| 6. | a. | Explain the purge and trap head space analysis. | CO6 | An | 8 |
|  | b. | Explain the construction and working of SDE apparatus. | CO5 | A | 8 |
|  |  |  |  |  |  |
| 7. | a. | Examine the various factors affecting the stability of flavors. | CO3 | R | 8 |
|  | b. | Explain the application of annatto in Food Industry. | CO5 | An | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Summarize the various test protocol considerations to be employed during sensory analysis. | CO3 | E | 10 |
|  | b. | Explain the sensory testing environment required for sensory analysis of food. | CO4 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** |
| CO1 | recognize the basics of flavours and colours and their safety aspects |
| CO2 | understand the correlation between appearance and taste |
| CO3 | develop methods for stabilization of flavourants and colourants |
| CO4 | assess the quality of a food based on flavaourants and colourants |
| CO5 | develop a new range of flavorants and colorants |
| CO6 | design new techniques for analysis of colorants and aroma chemicals |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 16 | 8 |  |  |  | 24 |
| CO2 |  |  |  | 8 |  |  | 8 |
| CO3 | 8 |  |  |  | 10 |  | 18 |
| CO4 |  | 8 | 10 |  |  |  | 18 |
| CO5 | 8 |  | 16 | 8 |  |  | 32 |
| CO6 |  | 16 |  | 16 |  |  | 32 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP3003** | **Duration** | **3hrs** |
| **Course Name** | **FOOD SAFETY REGULATIONS AND CONTROL** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. |  | Review the physical, chemical and biological characteristics of food hazards. Add short notes on sanitation protocol as well. | CO1 | U | 16 |
|  |  |  |  |  |  |
| 2. |  | Discuss the roles and responsibilities of an individual authority during food processing and operation with industrial perspective. | CO2 | A | 16 |
|  |  |  |  |  |  |
| 3. |  | Elaborate on the instrumental, microbial and chemical quality attributes of food safety and regulations. | CO3 | U | 16 |
|  |  |  |  |  |  |
| 4. |  | Examine the attributes and significance of kaizen, 5S principles and food surveillance system to monitor food safety. | CO4 | A | 16 |
|  |  |  |  |  |  |
| 5. |  | Exemplify the salient features, benefits of International Plant Protection Convention (IPPC) and roles of Codex India contact point. | CO5 | U | 16 |
|  |  |  |  |  |  |
| 6. |  | Compare the relative sensory evaluation methods for food, water qualities and other utilities. Write short notes of their statistical analysis. | CO3 | AN | 16 |
|  |  |  |  |  |  |
| 7. |  | Demonstrate the theory, practice and applications of HACCP on food systems. | CO4 | U | 16 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | |
| 8. |  | Design an organizational chart for your own firm based on Food safety and Standards Act. Outline a review process through adjunction & food safety appellate tribunal for any assumed deviation. | CO6 | C | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | recognize the various national and international regulatory bodies working to ensure food safety in the food industries. |
| CO2 | understand the safety aspects in food industries with special emphasis on GMO and irradiated foods, water, meat and dairy products. |
| CO3 | apply their knowledge of regulations to develop manuals and protocols for food systems based on existing standards both national & international. |
| CO4 | analyze and point out the various offences of Food Business Operators based on their knowledge of food regulations. |
| CO5 | evaluate the various food hazards in a food system based on HACCP and ISO 22000:2018 standards. |
| CO6 | create new food safety management systems or innovative norms for safety of foods. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 16 |  |  |  |  | 16 |
| CO2 |  |  | 16 |  |  |  | 16 |
| CO3 |  | 16 |  | 16 |  |  | 32 |
| CO4 |  | 16 | 16 |  |  |  | 32 |
| CO5 |  | 16 |  |  |  |  | 16 |
| CO6 |  |  |  |  |  | 20 | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP3004** | **Duration** | **3hrs** |
| **Course Name** | **INSTRUMENTAL TECHNIQUES FOR FOOD ANALYSIS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Classify chromatographic separations according to the nature of stationary and mobile phase and the mode of operation. | CO1 | U | 8 |
| b. | Explain the different mechanisms exploited in chromatography for the separation of mixtures. | CO1 | An | 8 |
|  |  |  |  |  |  |
| 2. |  | Discuss in detail the principle, instrumentation and application of FTIR in determining the functional group present in the given sample. | CO2 | U | 16 |
|  |  |  |  |  |  |
| 3. |  | Describe the function of various components of single beam Atomic Absorption Spectroscopy with a neat sketch. | CO3 | A | 16 |
|  |  |  |  |  |  |
| 4. | a. | Compare and contrast 13C and 1H NMR in determining the structure of the given compound. | CO4 | E | 8 |
| b. | Interpret the role of shielding and deshielding groups on the chemical shift in NMR with suitable examples. | CO4 | A | 8 |
|  |  |  |  |  |  |
| 5. | a. | Explain conductometry , its type and state their scope and limitations. | CO5 | An | 8 |
| b. | Give an account on the basic principles involved in Potentiometry and explain the methods of determination of pCO2, pHCO3. | CO5 | A | 8 |
|  |  |  |  |  |  |
| 6. | a. | Summarize various detectors used in Gas Chromatography. | CO1 | U | 12 |
| b. | List the applications of HPLC in food processing industries. | CO1 | R | 4 |
|  |  |  |  |  |  |
| 7. |  | Illustrate the principle, instrumentation and application of Mass Spectrometer with a neat sketch. | CO4 | A | 16 |
| **PART – B (1 X 20 = 20 MARKS)** | | | | | |
| 8. | a. | Compare the role SEM and TEM in studying the morphological characteristics of food materials | CO6 | E | 10 |
| b. | State the importance of texture analyzer in determining the physical properties of food materials. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the components of the mixture using chromatographic techniques. |
| CO2 | Identify the functional groups present in the food sample |
| CO3 | Calculate the trace metals present in the food sample |
| CO4 | Analyze the structure of the novel compound isolated from natural source |
| CO5 | Assess the molecular weight of the given component |
| CO6 | Organize components from mixture based on electrical property |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 20 | --- | 8 | --- | --- | 32 |
| CO2 | --- | 16 | --- | --- | --- | --- | 16 |
| CO3 | --- | --- | 16 | --- | --- | --- | 16 |
| CO4 | --- | --- | 24 | --- | 8 | --- | 32 |
| CO5 | --- | --- | 8 | 8 | --- | --- | 16 |
| CO6 | --- | --- | 10 | --- | 10 | --- | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20FP3005** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED FOOD PROCESS EQUIPMENT DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Discuss in detail the design considerations in process equipment design. | CO1 | U | 8 |
| b. | Summarize the mechanical properties of the materials with a stress-strain diagram. | CO1 | E | 8 |
|  |  |  |  |  |  |
| 2. | a. | Describe various classification of pressure vessels. | CO2 | R | 8 |
| b. | Recall and write the type and application of different nozzles. | CO2 | R | 8 |
|  |  |  |  |  |  |
| 3. | a. | Compare controlled and modified atmospheric storage. | CO3 | An | 8 |
| b. | A cold storage room is to be constructed with an inner layer of 5 mm wood board, a middle layer of corkboard and an outer layer of 10 mm of brick. Air inside the cold storage is to be maintained at 5°C. The maximum air temperature outside the cold storage is expected to reach 50°C. Thermal conductivities of wood, corkboard and brick are 0.15, 0.043 and 0.69 W/m K respectively. The convective heat transfer coefficient of inside and outside air are 100 and 10 W/m2 K respectively. What thickness of cork board is needed to keep the heat loss to 10 W/m2 | CO3 | A | 8 |
|  |  |  |  |  |  |
| 4. | a. | A specific enzyme E acts as a catalyst in the fermentation of substrate A (the reactant). At a given enzyme concentration in the aqueous feed stream of 25 l/min. Find the volume of plug flow reactor required to achieve 95% conversion of reactant A (CAo = 2 mole/l). The kinetics and stoichiometry of the fermentation reactions are given by  *Enzyme*  *A R, (mol/l.min).* | CO4 | E | 8 |
| b. | Deduce the design equation for ideal batch reactor and Continuous Stirred Tank Reactors starting from steady state material balance equation. | CO4 | An | 8 |
|  |  |  |  |  |  |
| 5. | a. | Two liquids are flowing in a double pipe heat exchanger both at the rate of 1770 kg/h. The inner pipe of the heat exchanger has an inner diameter of 2.5 cm and wall thickness of 0.125 cm. The inner pipe is made up of copper having thermal conductivity (K) = 328 kcal/hr m2°C/m. The outer pipe of the heat exchanger has an internal diameter of 5 cm. For simplicity assume that both liquids have physical properties comparable with that of water. The liquid in the inner tube is being cooled from 70°C to 55°C at the expense of the liquid flowing in the outer tube which is entering 20°C. Calculate the length of the heat exchanger required if the liquids are flowing in a counter current manner. Physical properties of water: Viscosity at 62.5°C = 0.452 cp and viscosity at 27.5°C = 0.840 cp. Thermal conductivity at 62.5°C = 0.57 kcal/hr m2°C/m and at 27.5°C = 0.528 kcal/hr m2°C/m. | CO5 | E | 10 |
| b. | Fruit juice having a specific heat of 3.85 kJ/kg K is being preheated from 5°C to 45°C in a counter flow double pipe heat exchanger. Heating agent is hot water entering at 75°C and leaving at 65°C. The flow of fruit juice is 1.5 kg/s and the area of the heat exchanger is 10 m2. Calculate the overall heat transfer coefficient. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 6. | a. | Crude flows at the rate of 10000 kg/hr through the inside pipe of the double pipe heat exchanger and is heated from 32°C to 90°C. The heat is supplied by a petroleum fraction initially at 230°C flowing through the annular space. If the temperature of the heating fluid falls down to 100°C inside the heat exchanger, compare the performances of parallel and counter current exchangers with respect to the heat transfer area and fluid flow rates. Overall heat transfer coefficient is 400 kcal/hrm°C. Specific heats of crude oil and petroleum fraction are 0.56 and 0.6 kcal/kg°C respectively. | CO4 | A | 10 |
| b. | Discuss in detail the importance of overall heat transfer coefficient and derive the expression for the same. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 7. | a. | A parallel flow heat exchanger is to be designed to heat 3000 kg/hr of water from 25°C to 50°C with steam condensing at 130°C on the outside of the tubes. Calculate the required number of tubes for the operation.  Available tube size:  Internal diameter = 22.5 mm  Outside diameter = 25.0 mm  Length = 3 meters  Steam side heat transfer coefficient = 7500 kcal/m2hr°C  Thermal conductivity of metal = 90 kcal/mhr°C  Thermal conductivity of water = 0.54 kcal/mhr°C  Velocity of water = 3.5 m/s | CO5 | An | 8 |
| b. | A single-effect evaporator is to be designed to concentrate 10000 kg/hr of a chemical solution from 10% to 20% solids by weight. Feed enters at 30°C. Saturated steam at 110°C (latent heat of 540 kcal/kg) is available. Condensate leaves at saturation temperature. The solution boils at 45°C (latent heat = 570 kcal/kg). Specific heats of all solutions may be taken as 1.0. U may be taken as 1800 kcal/hrm2 °C. Calculate i. Steam consumption, kg/hr and ii. Heat transfer area. | CO5 | E | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |  |  |  |  |
| 8. | a. | Deduce the expression for total drying time for the cabinet dryer. | CO6 | An | 8 |
| b. | 1000 kg (dry mass) of non-porous solid is dried under constant drying conditions with an air velocity of 0.75 m/s. The area of the drying surface is 55 m2. If the initial rate of drying is 0.3 g/m2s, how long will it take to dry a material from 0.15 to 0.025 kg water/kg dry solid? The critical moisture content is 0.125 kg water/kg dry solid. Assume that the falling rate is linear. The equilibrium moisture content may be assumed to be zero. If the air velocity is increased to 4 m/s, what will be the anticipated saving in drying time? Assume that the rate of evaporation in a constant rate period is proportional to the air velocity raised to the power of 0.8. | CO6 | A | 12 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the factors that affects the design of equipments |
| CO2 | Classify the design variables based on various properties |
| CO3 | Relate various process variables |
| CO4 | Prioritize the critical variables for the design of equipments |
| CO5 | Recommend a conceptual design model |
| CO6 | Assess the validity of the conceptual model |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | --- | 8 | --- | --- | 8 | --- | 16 |
| CO2 | 16 | --- | --- | --- | --- | --- | 16 |
| CO3 | --- | --- | 8 | 8 | --- | --- | 16 |
| CO4 | --- | 6 | 10 | 8 | 8 | --- | 32 |
| CO5 | --- | --- | 6 | 8 | 18 | --- | 32 |
| CO6 | --- | --- | 12 | 8 | --- | --- | 20 |
|  | | | | | | | **132** |

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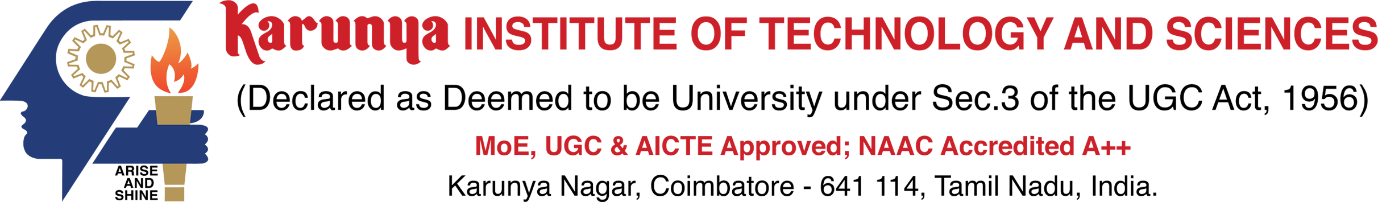
**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3006** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN FOOD PROCESS ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | For the evaluation of pasteurization process, it is recommended to utilize F value based on a reference temperature of 70°C and a Z value of 7°C. For the evaluation of cooking process and other chemical changes that occur during processing the recommended reference temperature of 100°C and Z value 30°C. Calculate the pasteurization and cooking value of following constant temperature process.   |  |  |  | | --- | --- | --- | | Process | Temperature (°C) | Time, (s) | | A | 80 | 15 | | B | 95 | 5 | | C | 70 | 145 | | D | 112 | 223 | | CO1 | E | 8 |
|  | b. | Calculate the lethality rate for the give kinetic data using general method. TDT is characterized by a Fo (at 121.1°C) of 2.52 min with a z value of 10°C.  Time (min): 0, 5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85& 90  Temp.(ºC): 60,65,70,78,86,93,102,110,115,118,120,121,121,118,111,101,85,74 &60. | CO1 | E | 8 |
| 2. | a. | Explain the different methods of freeze driers with a suitable diagram. | CO2 | An | 8 |
|  | b. | Meat Patty with an initial moisture content of 400% (dry-weight basis) is poured into 0.5 cm layers in a tray placed in a freeze drier operating at 40 Pa. It is to be dried to 8% moisture (dry-weight basis) at a maximum surface temperature of 55ºC. Assuming that the pressure at the ice front remains constant at 78 Pa, estimate (a) the drying time and (b) the drying time if the layer of food is increased to 0.9 cm and dried under similar conditions. (Additional data: the dried food has a thermal conductivity of 0.03 W/m K, a density of 470 kg /m3, a permeability of 2.4 x10-8 kg/s and the latent heat of sublimation is 2.95 x 103 kJ/ kg.) | CO2 | A | 8 |
|  |  |  |  |  |  |
| 3. | a. | Express the various design aspects of spray dryer with a neat diagram. | CO3 | C | 16 |
|  |  |  |  |  |  |
| 4. | a. | Interpret the major interactions responsible for structural organization of food components. | CO5 | R | 8 |
|  | b. | Summarize the applications of nanotechnology in food processing. | CO5 | U | 8 |
|  |  |  |  |  |  |
| 5. | a. | Write the principle, theory and methods of encapsulation process. | CO4 | A | 16 |
|  |  |  |  |  |  |
| 6. | a. | Five-centimetre apple cubes are individually quick frozen (IQF) in a blast freezer operating at - 40ºC and with a surface heat transfer coefficient of 30 W/ m2 K. If the freezing point of the potato is measured as - 1.0ºC and the density is 1180 kg/ m3. Estimate the expected freezing time for each cube. If the cubes are then packed into a cardboard carton measuring 20 cm x10 cm x10 cm, calculate the freezing time. Also calculate the freezing time for IQF freezing of 2.5 cm cubes. (**Additional data:** the thickness of the card is 1.5 mm, the thermal conductivity of the card is 0.07 W/mK, the thermal conductivity of potato is 2.5 W/mK and the latent heat of crystallisation 2.74 x 105 J/ kg.) | CO2 | E | 8 |
|  | b. | Interpret the different methods of release pattern for encapsulated materials. | CO4 | A | 8 |
|  |  |  |  |  |  |
| 7. | a. | Describe the working of combined fluid bed and heat pump drying system | CO3 | R | 8 |
|  | b. | Explain the structural design principles used to assemble food grade ingredients. | CO5 | An | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Summarize the role of biosensors in food industries. | CO6 | U | 10 |
|  | b. | Analyze the working principle of automated method of sensory evaluation. | CO6 | An | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the role of time – temperature combination of food processing. |
| CO2 | Explain the low temperature food preservation. |
| CO3 | Identify the suitable drying methods for specific food. |
| CO4 | Describe the technology that useful for targeted food delivery. |
| CO5 | Analyze the importance of food nano structures |
| CO6 | Evaluate the efficiency of biosensors in food applications. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **COs** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | - | - | - | 16 | - | 16 |
| CO2 | - | - | 8 | 8 | 8 | - | 24 |
| CO3 | 8 | - | - | - | - | 16 | 24 |
| CO4 | - | - | 24 | - | - | - | 24 |
| CO5 | 8 | 8 | - | 8 | - | - | 24 |
| CO6 | - | 10 | - | 10 | - | - | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3011** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN DAIRY, MEAT AND FISH PROCESSING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Describe the quality measurement tests of meat. | CO6 | R | 8 |
|  | b. | Recall the nutritional composition of meat. | CO2 | R | 8 |
|  |  |  |  |  |  |
| 2. | a. | Express your view on factors determining the selection of milk transportation methods. | CO1 | U | 8 |
|  | b. | Miss. Veena wants to export meat sausage from India to Dubai. Help her to understand the unit operations involved in meat sausage preparation. | CO1 | A | 8 |
|  |  |  |  |  |  |
| 3. | a. | Record the microbiology and safety of meat and meat products. | CO6 | U | 16 |
|  |  |  |  |  |  |
| 4. | a. | Recite the basics components of HTST pasteurization with neat flow diagram. | CO4 | R | 16 |
|  |  |  |  |  |  |
| 5. | a. | Summarize the reasons, significance and inspection facilities required for conducting ante-mortem inspection. | CO3 | E | 16 |
|  |  |  |  |  |  |
| 6. | a. | Mr. Kishan wants to start a tuna fish canning industry, guide him about various steps involved in canning process. | CO2 | A | 10 |
|  | b. | Summarize or enlist the methods of preservation of meat. | CO4 | E | 6 |
|  |  |  |  |  |  |
| 7. | a. | Explain the types of LTLT pasteurizers. | CO5 | A | 8 |
|  | b. | Rewrite the methods of production of fish body oil or fish liver oil. | CO3 | C | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Report the principles of hazard analysis and critical control point. | CO6 | C | 3 |
|  | b. | Illustrate in detail about milk reception quality control tests practicing in milk processing plants. | CO6 | A | 17 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | understand the precautions that need to be taken while handling products from this segment |
| CO2 | decall the different types of meat, poultry and fish and the processes involved in their processing |
| CO3 | analyze the challenges in developing new value-added products from this segment |
| CO4 | evaluate the hygienic and safe handling of Meat, Fish and Dairy Products |
| CO5 | design the machinery involved in the Meat, Fish and Dairy Products processing segment |
| CO6 | Create solutions for quality checks involved in Meat, Fish and Dairy Products processing segment |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  | 8 | 8 |  |  |  | 16 |
| CO2 | 8 |  | 10 |  |  |  | 18 |
| CO3 |  |  |  |  | 16 | 8 | 24 |
| CO4 | 16 |  |  |  | 6 |  | 22 |
| CO5 |  |  | 8 |  |  |  | 8 |
| CO6 | 8 | 16 | 17 |  |  | 3 | 44 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3012** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN PROCESSING OF CEREALS, PULSES AND OIL SEEDS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the working principle of the LSU dryer. | CO2 | R | 8 |
|  | b. | Write a detailed account of parboiling of paddy. | CO2 | A | 12 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the process flow of wheat milling with a special mention of the working principle of milling equipment. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Explain any two value added products of maize with a neat flow diagram. | CO6 | A | 10 |
|  | b. | With a neat diagrammatic representation, describe the extraction and refining process of corn oil. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the various pulse milling operations with a neat flow chart. | CO3 | A | 20 |
|  |  |  |  |  |  |
| 5. | a. | Elaborate on the extraction of sunflower oil and coconut oil. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write the concept of nixtamalization and wet milling of corn. | CO4 | A | 12 |
|  | b. | Describe the structure and composition of maize. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 7. | a. | Explain the mechanical oil extraction process. Mention its advantages and disadvantages. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Elucidate the soyabean processing with a neat diagrammatic representation. | CO6 | An | 12 |
|  | b. | With a neat flow diagram, describe the drying process of soy products. | CO5 | U | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write the methods of millet processing and its products. | CO6 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge on the structure, composition and pre milling operations of food grains, pulses and oil seeds |
| CO2 | Understand the Paddy Processing and Rice milling equipment which will help them for developing entrepreneurial skills. |
| CO3 | Develop skills needed in milling of pulses and oil seeds which will promote employment. |
| CO4 | Analyze the suitable method for corn/maize milling |
| CO5 | Predict a better equipment for processing the raw materials |
| CO6 | Apply the knowledge to process food grains into value added products |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 28 | - | - | - | - | 28 |
| CO2 | 8 | - | 12 | - | - | - | 20 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | - | 12 | - | - | - | 12 |
| CO5 | - | 18 | - | 40 | - | - | 58 |
| CO6 | - | - | 30 | 12 | - | - | 42 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3013** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN PROCESSING OF HORTICULTURE, SPICES AND PLANTATION PRODUCTS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO / BL** | **Marks** |
|  |  | **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** |  |  |
| 1. |  | Discuss in detail on the method of precooling of fruits and vegetables. | CO3 / A | 20 |
| **(OR)** | | | | |
| 2. |  | M/s. Fruiteo Company wants to set up a fruit processing company. They want your expert comments on the manufacture of a. Orange squash and b. Mixed fruit Jam. Can you help them? | CO4/ A | 20 |
|  |  |  |  |  |
| 3. | a. | Discuss briefly on the radiation preservation of  i) Potato ii) Onions. | CO6 / A | 10 |
| b. | M/s. Vegeto Company wants you to set up a unit for the manufacture of vegetables using Modified atmosphere packaging. Can you help them in the development of technology for the same? | CO6 / A | 10 |
| **(OR)** | | | | |
| 4. |  | M/s. Dehydro company is planning to set up their fruit powder manufacturing unit by spray drying. Can you help them? | CO3 / A | 20 |
|  |  |  |  |  |
| 5. | a. | While Tea leaves are green, during the process of CTC tea manufacture it is black. – Can you explain the chemical changes for the same? | CO2 / An | 10 |
| b. | Outline the technology for the manufacture of CTC tea. | CO2 / A | 10 |
| **(OR)** | | | | |
| 6. |  | Outline the method for the manufacture of the following:  a) Oolong tea b) Decaffeinated tea | CO2 / A | 20 |
|  |  |  |  |  |
| 7. |  | Outline the method of coffee bean processing by the wet method. | CO1 / A | 20 |
| **(OR)** | | | | |
| 8. |  | Discuss in detail on the method of cocoa powder manufacture. | CO4 / A | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | |
| 9. |  | Discuss briefly on the following:  a) Methods for the manufacture of chilli oleoresin.  b) Manufacture of encapsulated curcumin. | CO5 / A | 20 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Define the different unit operations and its equipments involved in coffee, tea and cocoa processing |
| CO2 | Gain knowledge in processing of plantation crops and spices and also its value added products. |
| CO3 | Outline ways in which quality loss can be minimised during preparation and processing. |
| CO4 | Develop value added products from plantation products and spices. |
| CO5 | Demonstrate appropriate technique for the extraction of spice oil and oleoresin with quality standards. |
| CO6 | Acquire a confident to get placement in any kind of cereals and spices industry with minimum post harvest losses and maximum benefit to the industry. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 20 |  |  |  | 20 |
| CO2 |  |  | 10 + 20 | 10 |  |  | 40 |
| CO3 |  |  | 20 + 20 |  |  |  | 40 |
| CO4 |  |  | 20 +20 |  |  |  | 40 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  |  | 20 |  |  |  | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3014** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN REFRIGERATION AND COLD SUPPLY CHAIN MANAGEMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Explain practical vapor absorption refrigeration system with neat diagram. | CO1 | U | 8 |
| b. | Recall the desirable properties of refrigerants. | CO1 | R | 8 |
|  |  |  |  |  |  |
| 2. | a. | Interpret various Psychrometric process with suitable sketch. | CO2 | A | 10 |
| b. | Calculate the rate of heat loss through a 15 cm thick wall composed of 5cm pine wood (K = 1.05), 1.25 cm of asbestos (K = 1.55) and 8.75 cm of mineral wool (K= 0.042). The inside and outside surfaces are at 20°C and 50°C respectively. Also calculate the temperature drop through each of these layers. The unit of K is W/m K. | CO2 | An | 6 |
|  |  |  |  |  |  |
| 3. | a. | Demonstrate the applications of Controlled and Modified Atmospheric Packaging for the storage of fruits and vegetables. | CO3 | A | 16 |
|  |  |  |  |  |  |
| 4. | a. | Summarize microbial spoilage in chilled foods. | CO4 | U | 10 |
| b. | Report the Optimum storage conditions of fruits and vegetables. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 5. | a. | Explain in detail various freezing equipment used in industries. | CO5 | A | 16 |
|  |  |  |  |  |  |
| 6. | a. | A refrigeration machine is required to produce ice at 0°C from water at 20°C. The machine has a condenser temperature of 298 K while the evaporator temperature is 268 K. The relative efficiency of the machine is 50% and 6 kg of Freon-12 refrigerant is circulated through the system per minute. The refrigerant enters the compressor with a dryness fraction of 0.6. Specific heat of water is 4.187 kJ/kg K and the latent heat of ice is 335 kJ/kg. Calculate the amount of ice produced in 24 hours. The table of properties of Freon-123 is given below.   |  |  |  |  | | --- | --- | --- | --- | | Temperature K | Liquid heat kJ/kg | Latent heat kJ/kg | Entropy of liquid kJ/kg | | 298 | 59.7 | 138.0 | 0.2232 | | 268 | 31.4 | 154.0 | 0.1251 | | CO1 | E | 16 |
|  |  |  |  |  |  |
| 7. | a. | Report various heat load calculations for the cold storage of fruits and vegetables. | CO4 | A | 10 |
| b. | Predict various criteria to be considered for the design of cold storage units. | CO4 | U | 6 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Describe various protocols to be adopted for air, marine and road transport of perishables in detail. | CO6 | A | 20 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall refrigeration of food and its operational components. |
| CO2 | Classify various forms of food refrigeration in plants, stores and logistics. |
| CO3 | Apply advanced food freezing concepts and techniques. |
| CO4 | Point out food safety aspects of chilled foods and frozen foods. |
| CO5 | Assess cold chain management in the food distribution sector. |
| CO6 | Develop cold storage and packaging of frozen perishable products |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 8 | 8 | --- | --- | 16 | --- | 32 |
| CO2 | --- | --- | 10 | 6 | --- | --- | 16 |
| CO3 | --- | --- | 16 | --- | --- | --- | 16 |
| CO4 | --- | 16 | 16 | --- | --- | --- | 32 |
| CO5 | --- | --- | 16 | --- | --- | --- | 16 |
| CO6 | --- | --- | 20 | --- | --- | --- | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3015** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN ENGINEERING PROPERTIES OF FOOD MATERIALS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Illustrate the principle and working of gas comparison pycnometer for determination of porosity with a neat sketch. | CO1 | U | 10 |
|  | b. | Explain the methods of determination of porosity of an object. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Classify rheology and explain the various rheological properties of foods. | CO2 | A | 10 |
|  | b. | Explain in detail about capillary flow viscometer. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the methods used for determining thermal conductivity of foods. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | State the basic principle of microwave heating and explain them. | CO3 | R | 5 |
|  | b. | Discuss the effect of dielectric properties on food constituents. | CO3 | U | 15 |
|  |  |  |  |  |  |
| 5. | a. | Explain the terms angle of repose and angle of internal friction. | CO4 | U | 10 |
|  | b. | List the applications of engineering properties in design and operations of agricultural equipment. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the Texture Profile Analysis (TPA) curve. | CO5 | U | 8 |
|  | b. | Write short notes on Compression test, Snapping – Bending test, cutting shear, puncture and penetration tests. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 7. | a. | Describe the construction and working of Bomb calorimeter and list the applications of thermal properties in food industries. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Elaborate the instruments used for testing rheological behavior of dough. | CO4 | An | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Compile the various color measuring instruments and explain the method of color measurement. | CO6 | C | 20 |

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| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Interpret physical properties of food materials. |
| CO2 | Elaborate Rheological properties of foods and their applications. |
| CO3 | Recognize the thermal properties of food materials. |
| CO4 | Outline the Hydro and Aerodynamic properties of food materials. |
| CO5 | Infer Textural and EM properties of foods. |
| CO6 | Examine the optical properties of food. |

|  |  |  |  |  |  |  |  |
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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | - | 10 | - | - | 20 |
| CO2 | - | - | 20 | - | - | - | 20 |
| CO3 | 45 | 15 | - | - | - | - | 60 |
| CO4 | 10 | 10 | - | 20 | - | - | 40 |
| CO5 | - | 8 | 12 | - | - | - | 20 |
| CO6 | - | - | - | - | - | 20 | 20 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3017** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN FOOD PACKAGING TECHNOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Describe the various packaging tests conducted on packaging material. | CO5 | R | 8 |
|  | b. | Discuss the basic methods for vacuum packaging of meats. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 2. | a. | Examine the various plastics used in the packaging. | CO2 | A | 8 |
|  | b. | Analyze the following glass manufacturing processes:   1. Blow and blow. 2. Wide mouth press and blow 3. Narrow neck press and blow | CO3 | An | 8 |
|  |  |  |  |  |  |
| 3. | a. | Explain the key properties of glass containers. | CO3 | A | 8 |
|  | b. | Summarize the various types of lamination used for packaging materials. | CO3 | E | 8 |
|  |  |  |  |  |  |
| 4. | a. | Explicate the factors to be considered in developing antimicrobial films. | CO4 | A | 8 |
|  | b. | Explain the application of silver zeolite to packaging materials. | CO3 | An | 8 |
|  |  |  |  |  |  |
| 5. | a. | Analyze the barrier and mechanical properties of biobased packaging materials. | CO3 | An | 8 |
|  | b. | Classify biobased packaging materials based on their origin and method of production and explain the methods to assess biodegradability. | CO4 | U | 8 |
|  |  |  |  |  |  |
| 6. | a. | Explain the concept of Modified Atmospheric Packaging. | CO6 | A | 8 |
|  | b. | Describe the various film additives used in edible packaging. | CO6 | U | 8 |
|  |  |  |  |  |  |
| 7. | a. | Write the principles and applications of RFID tags. | CO6 | A | 8 |
|  | b. | Explain the maintenance of product quality using intelligent packaging. | CO6 | U | 8 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | |
| 8. | a. | Write the U.S. regulatory requirements in relation to food safety. | CO6 | A | 10 |
|  | b. | Describe the role of nanotechnology in foods. | CO6 | R | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge on shelf life of food and various methods of estimating it. |
| CO2 | Understand the need and functions of packaging as a solution to various factors affecting food. |
| CO3 | Apply their knowledge of packaging materials to pick the right material for packaging of  foods. |
| CO4 | Analyze the packages for their life cycle. |
| CO5 | Evaluate selection of test methods for packaging materials. |
| CO6 | Devise innovations in eco-packaging designs for food systems. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 8 | 8 | - | - | - | 16 |
| CO2 | - | - | 8 | - | - | - | 8 |
| CO3 | - | - | 8 | 24 | 8 | - | 40 |
| CO4 | - | 8 | - | - | - | - | 8 |
| CO5 | 8 | - | - | - | - | - | 8 |
| CO6 | 10 | 16 | 26 | - | - | - | 52 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3017** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN FOOD PACKAGING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO/BL** | **Marks** |
|  |  | **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** |  |  |
| 1. |  | M/s. Quicko Ltd. is seeking your advice on accelerated shelf-life testing. Can you guide them and also give them a detailed report on the same? | CO1 / A | 20 |
| **(OR)** | | | | |
| 2. |  | Briefly outline the methods for testing the following in a packaging material:  i) Testing of mechanical strength ii) WVTR | CO5 / A | 2\*10 = 20 |
|  |  |  |  |  |
| 3. |  | Give your comments on the suitability of metallic cans for packing of (i) tomato sauce (ii) malted powders. Do give your suggestions on the same. | CO3 / An | 2\*10 =20 |
| **(OR)** | | | | |
| 4. |  | Mr. AA seeks clarifications on (i) laminates and (ii) co-extruded films. Can you help him and suggest him on the types of products that are well suited for each of the above? | CO3 / An | 2\*10 = 20 |
|  |  |  |  |  |
| 5. |  | Discuss briefly on the following packaging technologies:  i) Oxygen scavengers ii) Ethylene scavengers. | CO6 / A | 2\*10 = 20 |
| **(OR)** | | | | |
| 6. |  | Discuss in detail on the technology of edible coatings for minimally processed foods. | CO6 / An | 20 |
|  |  |  |  |  |
| 7. | a. | Discuss briefly on the Life cycle assessment for food and beverage packaging materials. | CO4 / A | 10 |
| b. | M/s. Biopak Ltd. wants to develop a biodegradable packaging material for their products. Can you help them and also help them in evaluating the biodegradability of any packaging material. | CO5 / An | 10 |
| **(OR)** | | | | |
| 8. |  | Discuss briefly on the following:  i) MAP and its applications in Foods.  ii) Freshness and safety indicators in food packaging. | CO2 / A | 20 |
|  | | **PART – B(1 X 20= 20 MARKS)**  **COMPULSORY QUESTION** |  |  |
| 9. |  | M/s. Oilo company found that their coconut oil samples are getting blue in colour during storage. It was found that this is due to the migration of the printed ink from the sachets on to the oil. They need your assistance in understanding about migration characteristics and also the methods for determining the same. How will you help them? | CO5 / A | 20 |

CO – COURSE OUTCOME BL – BLOOMS’ LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge on shelf life of food and various methods of estimating it. |
| CO2 | Understand the need and functions of packaging as a solution to various factors affecting food. |
| CO3 | Apply their knowledge of packaging materials to pick the right material for packaging of foods. |
| CO4 | Analyze the packages for their life cycle. |
| CO5 | Evaluate selection of test methods for packaging materials. |
| CO6 | Devise innovations in eco-packaging designs for food systems. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 20 |  |  |  | 20 |
| CO2 |  |  | 20 |  |  |  | 20 |
| CO3 |  |  |  | 20 + 20 |  |  | 40 |
| CO4 |  |  | 10 |  |  |  | 10 |
| CO5 |  |  | 20 +20 | 10 |  |  | 50 |
| CO6 |  |  | 20 | 20 |  |  | 40 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20FP3018** | **Duration** | **3hrs** |
| **Course Name** | **EMERGING TRENDS IN FOOD PROCESS ENGINEERING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Classify the hurdles and interpret the principles of hurdle technology in preserving food quality. | CO1 | U | 8 |
|  | b. | Interpret the applications of hurdle technology in food processing. | CO1 | R | 8 |
|  |  |  |  |  |  |
| 2. | a. | Explain the basic principle of UV light, types of UV treatment, the mechanism of inactivation of microbes by UV light and its application. | CO2 | A | 12 |
|  | b. | Discuss the principle of Pulsed Light and explain the microbial inactivation mechanism. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 3. | a. | Illustrate the principle, construction and working of Microwave processing equipment. | CO3 | An | 8 |
|  | b. | Report the recent advancement in microwave processing of foods. | CO3 | C | 8 |
|  |  |  |  |  |  |
| 4. | a. | State the principles of HPP and demonstrate the construction and working of HPP unit with a neat sketch. List the applications of HPP in food industries. | CO4 | An | 16 |
|  |  |  |  |  |  |
| 5. | a. | Explain the concept of irradiation, describe the process of irradiation and mention the advantages and disadvantages of irradiation. | CO6 | A | 12 |
|  | b. | Classify the irradiation treatment based on the level of irradiation. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 6. | a. | Write a detailed note on instrumentation, mechanism of inactivation and applications of PEF technology in ensuring safety of food products. | CO2 | A | 16 |
|  |  |  |  |  |  |
| 7. | a. | Describe the Electron beam irradiation and its applications. | CO5 | R | 8 |
|  | b. | Explain the following term: i. Thermosonication ii. Manosonication and iii. Thermomanosonication. | CO4 | A | 8 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | |
| 8. | a. | Describe the microbial destruction mechanism of cold plasma with a neat diagram. | CO6 | U | 10 |
|  | b. | Summarize the applications of cold plasma in food processing. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Remember the principles of preservation. |
| CO2 | Interpret the various emerging techniques available for food processing. |
| CO3 | Apply the techniques for preservation of foods. |
| CO4 | Analyze the most suitable method for processing foods. |
| CO5 | Explain a novel food preservation technique. |
| CO6 | Evaluate the suitability of the techniques for specific foods. |

|  |  |  |  |  |  |  |  |
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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 8 | 8 | - | - | - | - | 16 |
| CO2 | - | 4 | 28 | - | - | - | 32 |
| CO3 | - | 4 | - | 8 | - | 8 | 20 |
| CO4 | - | - | 8 | 16 | - | - | 24 |
| CO5 | 8 | - | - | - | - | - | 8 |
| CO6 | - | 10 | 22 | - | - | - | 32 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3001** | **Duration** | **3hrs** |
| **Course Name** | **FOOD CHEMISTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define water, and elucidate its physical properties with examples. | CO1 | R | 10 |
|  | b. | Describe the classification of Monosaccharides and Disaccharides. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Elucidate the physical and chemical properties of carbohydrates using illustrative examples. | CO3 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Explain in detail the functions and classification of lipids. | CO1 | U | 10 |
|  | b. | Categorize different types of free radicals and antioxidants. What are the key dietary sources for the antioxidants in various foods? | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write in detail about the functional properties of proteins and what factors are prioritized when using proteins in the food industry. | CO4 | A | 10 |
|  | b. | Recall and write the classification of enzymes and factors affecting enzyme activity. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Summarize the role of Vitamin E, sources, loss factors, stability, bioavailability, deficiency risks, and potential toxicity in food and health. | CO5 | U | 10 |
|  | b. | Enumerate the structure, sources, factors leading to loss, stability, bioavailability, risks of deficiency, and potential toxicity of Potassium. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define water activity and discuss its role in food packaging and the shelf life of foods. | CO2 | A | 10 |
|  | b. | Discuss the processes of hydrogenation and the development of fat mimetics that influence the fat's composition and nutritional properties. | CO6 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Examine unsaponifiable compounds, esterification reactions, and the impact of frying on fats. | CO2 | U | 10 |
|  | b. | Explore the sorption phenomena of water and their applications in foods. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain in detail the structure, sources, loss factors, stability considerations, bioavailability mechanisms, deficiency risks, and toxicity concerns related to Zinc. | CO5 | U | 10 |
|  | b. | Describe the comprehensive elements of Vitamin A, its chemical structure, sources, susceptibility to degradation, stability, absorption rates, potential deficiencies, and toxicological aspects. | CO5 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Classify pigments and explore the Structure, sources, and applications of anthocyanin in food products. | CO6 | R | 10 |
|  | b. | How does the chemistry of carotenoids influence their wide-ranging applications, and what are the principal sources that determine their significance across various industries? | CO6 | R | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the general chemical structures of major components of foods (water, proteins, carbohydrates, and lipids) and selected minor components (vitamins and minerals). |
| CO2 | Understand, plan, perform, and analyze a range of chemical investigations with an emphasis on food analysis |
| CO3 | Demonstrate the ability to relate the chemical composition of foods to their functional properties |
| CO4 | Examine a molecular rationalization for the observed physical properties and reactivity of major food components. |
| CO5 | Evaluate and determine the approaches that may be used to control the reactivity of those food components that are likely to impact the overall quality of finished products. |
| CO6 | Predict how changes in overall composition are likely to change the reactivity of individual food components. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | - | - | - | - | 30 |
| CO2 | - | 30 | 10 | - | - | - | 40 |
| CO3 | 20 | - | - | - | - | - | 20 |
| CO4 | - | - | 10 | - | - | - | 10 |
| CO5 | - | 50 | - | - | - | - | 50 |
| CO6 | 20 | - | 10 | - | - | - | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3002** | **Duration** | **3hrs** |
| **Course Name** | **FOOD AND INDUSTRIAL MICROBIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | State the factors affecting the growth characteristics of bacteria in food. | CO1 | R | 10 |
|  | b. | Summarize the nutritional requirements of bacteria. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Determine the effect of microbial spoilage in the following food commodities: (i) Meat spoilage (ii) Fruit and Vegetable spoilage (iii) Fermented dairy products | CO2 | A | 15 |
|  | b. | Write a short note on the membrane filtration technique. | CO2 | A | 5 |
|  |  |  |  |  |  |
| 3. | a. | Describe the pathogenic mechanisms, diagnosis, treatment, and control measures of amoebic dysentery. | CO3 | R | 10 |
|  | b. | Differentiate between GMP and GHP. Explain the steps followed in GHP in food industries to overcome the foodborne disease. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write the methods used in the preservation of industrial strains. | CO4 | A | 10 |
|  | b. | Evaluate the screening methods employed for the isolation of high yielding strains. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | With a neat flow diagram, describe the glutamic acid production with a highlight on the fermentation conditions for better yield. | CO5 | U | 15 |
|  | b. | Mention the applications of amylase enzyme in food processing. | CO5 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Sketch a flow diagram of acetic acid fermentation. Mention its advantages and disadvantages. | CO5 | A | 10 |
|  | b. | Define single cell protein. Describe the production of *Spirulina* and its applications. | CO5 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the principle and procedure of Polymerase chain reaction followed in the detection of foodborne pathogens. | CO3 | A | 12 |
|  | b. | Write a short note on (i) Botulinum toxin  (ii) Aflatoxin | CO3 | U | 8 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Illustrate the production of cheese with a special mention of Microbiology. | CO2 | A | 15 |
|  | b. | Write the role of lactic acid bacteria in yogurt production. | CO2 | A | 5 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | With a neat sketch, explain the working principle and processing of fermented products in a spray dryer. | CO6 | A | 12 |
|  | b. | Write short notes on lyophilization. | CO6 | U | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the beneficial and spoilage microorganisms associated with foods. |
| CO2 | Understand the role of microorganisms in water and food commodities. |
| CO3 | Examine the role of causative agents and pathogenesis of disease-causing food-borne pathogens and their toxins. |
| CO4 | Illustrate the media formulation, sterilization and culture conditions for the development of suitable strain for industrial fermentation. |
| CO5 | Evaluate the industrial production of organic acids, amino acids, Vitamins, and Polysaccharides. |
| CO6 | Comprehend the techniques and underlying principle of downstream processing. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 | - | - | - | - | 20 |
| CO2 | - | - | 40 | - | - | - | 40 |
| CO3 | 10 | 18 | 12 | - | - | - | 40 |
| CO4 | - | - | 10 | 10 | - | - | 20 |
| CO5 | 15 | 15 | 10 | - | - | - | 40 |
| CO6 | - | 8 | 12 | - | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3003** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES OF FOOD PRESERVATION** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Classify foods according to their pH. | CO1 | U | 10 |
|  | b. | Explain the processing of food products using pulsed light technology. | CO6 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Illustrate the aspects involved in the retort processing. | CO2 | A | 10 |
|  | b. | Explain the preservation technique using salt and sugar with examples. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Give a detailed account of low-temperature food preservation methods. | CO3 | A | 10 |
|  | b. | Summarize the working principle of the spray drier with a schematic diagram. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the preservation technique by irradiation with an example. | CO6 | A | 10 |
|  | b. | Illustrate the drying curve highlighting the constant and falling rate period. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the chemical preservatives used in food industries and their permissible limits for different foods. | CO5 | U | 10 |
|  | b. | Summarize the HTST pasteurization using a neat sketch. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Summarize the effect of a pulsed electric field on microorganisms. | CO6 | A | 10 |
|  | b. | Describe the mode of action of sulphur dioxide in the food industry as a preservative. | CO5 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Illustrate the working principle of microwave heating using a neat sketch. | CO6 | An | 10 |
|  | b. | Summarize the principle and process of freeze-drying. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the principles of a fluidized bed drier and the equipment used for this purpose. | CO4 | A | 10 |
|  | b. | Explain the principle of cold plasma for food preservation. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the principle of hurdle technology as applied to foods with suitable examples. | CO6 | E | 10 |
|  | b. | Summarize the working principle of ohmic heating in food preservation with an example. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the basic principles involved in food preservation. |
| CO2 | Understand the various processing methods. |
| CO3 | Comprehend suitable techniques for the preservation of various foods. |
| CO4 | Apply the modern technologies of food preservation in industry. |
| CO5 | Analyze the conventional and novel preservation techniques. |
| CO6 | Evaluate and suggest proper preservation methods and equipment. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | - | - | - | - | 10 |
| CO2 | - | 20 | - | - | - | - | 20 |
| CO3 | - | 10 | - | - | - | - | 10 |
| CO4 | 10 | 20 | 10 | - | - | - | 40 |
| CO5 | 20 | - | 10 | - | - | - | 30 |
| CO6 | - | 50 | 10 | 10 | - | - | 70 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3004** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF CEREALS, PULSES AND OILSEEDS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Recall with a neat sketch the structure of maize. | CO1 | R | 10 |
|  | b. | Analyze the composition of wheat. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the various by products of wheat. | CO2 | U | 10 |
|  | b. | Evaluate the SDS sedimentation and falling number tests on wheat. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Assess the various types of paddy separators. | CO3 | E | 10 |
|  | b. | Generalize the different methods of production of quick cooking rice. | CO2 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the production of popcorn. | CO4 | A | 10 |
|  | b. | Explain the manufacture of maltodextrin. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the CFTRI method of pulse milling. | CO5 | An | 10 |
|  | b. | Justify ISP and its production process. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the traditional and modern methods of paddy parboiling. | CO2 | R | 10 |
|  | b. | Illustrate the products of acid hydrolysis and liquefaction of starch. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Express the Tempering-Degerming method of dry milling of corn. | CO2 | C | 10 |
|  | b. | Describe the various graders used for milled rice. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Appraise the modified and retrograded starches. | CO6 | An | 10 |
|  | b. | Illustrate the Engleberg rice huller with its working principle. | CO3 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain about traditional Ghani method of oil expression. | CO1 | U | 10 |
|  | b. | Explain the refining process of oil. | CO1 | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the basic concept of cereals, pulses and oil seeds processing. |
| CO2 | Understand the various unit operations involved in milling. |
| CO3 | Analyze and select suitable equipment for milling. |
| CO4 | Apply the knowledge to process grains into value-added products. |
| CO5 | Create new products from pulses and legumes. |
| CO6 | Gain knowledge on converting the waste into wealth |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 20 |  | 10 | 10 |  | 50 |
| CO2 | 10 | 10 | 10 |  |  | 20 | 50 |
| CO3 | 10 |  |  | 10 | 10 |  | 30 |
| CO4 |  |  | 20 |  |  |  | 20 |
| CO5 |  |  |  | 10 | 10 |  | 20 |
| CO6 |  |  |  | 10 |  |  | 10 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3005** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF FRUITS AND VEGETABLE PROCESSING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Write the advantages for pre-cooling of fruits and vegetables. | CO4 | R | 10 |
|  | b. | Summarize the processing steps for fruit juice production. | CO6 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | With respect to the Indian fruit and vegetable processing industry, Analyze SWOT. | CO3 | An | 10 |
|  | b. | Explain in detail process of hydro-cooling the fruits. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the process of aseptic packaging with a neat diagram. | CO5 | U | 10 |
|  | b. | Explain the potential advantages and disadvantages in MAP. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain in detail about Controlled atmospheric storage. | CO5 | U | 10 |
|  | b. | Describe the principle and mechanism behind Osmotic dehydration and factors involved in it. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe in detail all the three types of canning processes. | CO5 | R | 10 |
|  | b. | Explain in detail about Modified Atmosphere Packaging. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Enlist and explain factors responsible considered during the Evaporation of fruit pulps. | CO2 | R | 10 |
|  | b. | Describe concentration using membranes for fruit juices. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe pickling process and enlist the defects occurring in pickles. | CO4 | R | 10 |
|  | b. | Draw the technological processing flowchart for the RTS production and give FSSAI specifications. | CO4 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the canning process for baby corn in detail along with processing flowchart. | CO6 | U | 10 |
|  | b. | Enlist all the factors on which pre-cooling of fruits and vegetables depend by which the post-harvest losses can be minimized. | CO1 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Construct the technological flow chart for the production of Jelly. | CO6 | C | 10 |
|  | b. | Explain the processing of mixed fruit jam as per industrial standards. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Acquire knowledge of different physical, chemical and nutritional properties of fruits and vegetables. |
| CO2 | Acquire insight into the various chemical and biochemical changes that occur during processing. |
| CO3 | Learn various ways of designing and monitoring processing chains |
| CO4 | Gain thorough knowledge about laws, regulations and the monitoring agencies involved in food safety and labeling of fruits and vegetables. |
| CO5 | Understand the methods of packaging, shelf life and related factors in the processing of fruits and vegetables. |
| CO6 | Know how fruits and vegetables are processed in industries. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 30 | 10 | - | - | - | - | 40 |
| CO2 | 10 | - | - | - | - | - | 10 |
| CO3 | - | 10 | - | 10 | - |  | 20 |
| CO4 | 20 | - | - | - | - | 10 | 30 |
| CO5 | 10 | 30 | - | - | - | - | 40 |
| CO6 | - | 30 | - | - | - | 10 | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **22FT3006** | **Duration** | **3hrs** |
| **Course Name** | **BAKERY AND CONFECTIONARY TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Explain the general principles and operations involved in the milling process of wheat to produce flour, highlighting key stages and their significance. | CO1 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the functions of key ingredients such as fat, emulsifiers, oxidants, reducing agents, and conditioners in bakery products, emphasizing their roles in product texture, shelf-life, and sensory attributes | CO3 | U | 10 |
|  | b. | Compare and contrast the characteristics and applications of Cocoa Butter Equivalent (CBE) and Cocoa Butter Substitute (CBS) in bakery products, highlighting their role in fat-based formulations and product development. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Enumerate the technology of biscuits, including key ingredients, mixing and forming processes, and baking methods, and evaluate how variations in formulation and processing influence biscuit texture, flavor, and shelf-life. | CO2 | R | 10 |
|  | b. | Discuss about the technology of cakes, including sponge cakes, butter cakes, and chiffon cakes, and discuss the role of ingredients such as fats, sugars, and leavening agents in achieving desired cake structure, texture, and volume. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write about the advancements in the technology of noodles and pasta products, comparing and contrasting single-screw and twin-screw extrusion methods, and analyze their impact on product quality, processing efficiency, and nutritional attributes. | CO4 | A | 10 |
|  | b. | Summarize the technology of flaked products, including cereals and grains, discussing the principles of flaking processes, equipment used, and the effects on product texture, digestibility, and shelf-life. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Distinguish the stages of sugar cooking, from syrup preparation to caramelization, and examine the effects of temperature, time, and agitation on sugar transformation and flavor development. | CO5 | R | 10 |
|  | b. | Discuss the technology of hard-boiled candies, including ingredient formulation, cooking methods, shaping techniques, and coating processes, and evaluate factors influencing candy texture and hardness. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the physical and chemical factors influencing wheat quality and their implications on flour production and end-product quality. | CO1 | R | 10 |
|  | b. | Define rheology, explain in detail about the wet gluten and fflour starch viscosity tests with graphs and discuss how the quality and performance of dough and gluten strength affect the various food production processes. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Write the significance of oxidants and reducing agents in bakery applications, examining their effects on dough development, gluten formation, and the overall quality of baked goods. | CO1 | U | 10 |
|  | b. | Discuss the functions of conditioners in bakery formulations, considering their role in dough strengthening, moisture management, and tolerance to processing variations. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Enumerate the technology of cookies, examining factors such as dough rheology, mixing techniques, and baking conditions, and discuss the effects of ingredient choices and processing parameters on cookie spread, texture, and sensory attributes. | CO6 | U | 10 |
|  | b. | Describe the technology of pastries, encompassing laminated pastries, puff pastries, and short crust pastries, and analyze the principles of layering, folding, and baking techniques involved in pastry production. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Analyze the manufacturing process of chocolates, from cocoa bean processing to conching and tempering, and evaluate the critical quality aspects at each stage, such as cocoa bean selection, roasting profiles, and particle size reduction methods. | CO6 | R | 10 |
|  | b. | Write about the importance of ingredient quality and sourcing in toffee production, focusing on factors such as milk solids, sugar types, flavorings, and additives, and their impact on taste, texture, and shelf-life. | CO6 | R | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Know the various ingredients used in the baking industry. |
| CO2 | Study the processes involved in baking technology. |
| CO3 | Understand the factors affecting the quality of baked and confectionery products |
| CO4 | Design products with better quality. |
| CO5 | Learn about the process involved in confectionery products |
| CO6 | Get exposure to the different parameters involved in the scale-up of bakery products production. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 20 | 20 | - | - | - | 60 |
| CO2 | 20 | - | - | - | - | - | 20 |
| CO3 | - | 20 | - | - | - | - | 20 |
| CO4 | - | 10 | 10 | - | - | - | 20 |
| CO5 | 10 | 20 | - | - | - | - | 30 |
| CO6 | 20 | 10 | - | - | - | - | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3007** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF PLANTATION CROPS AND SPICES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Assess the cup characteristics of *C. arabica* and *C. robusta* coffee plants. | CO1 | E | 10 |
|  | b. | Explain coffee fermentation process and also analyze the changes encountered during fermentation process. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Compare the process of decaffeination of green coffee with water, organic solvents and carbon dioxide. | CO3 | E | 10 |
|  | b. | Summarize the decaffeination methods for instant tea or soluble tea. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the biochemical changes that take place during withering and fermentation of tea leaves. | CO3 | An | 10 |
|  | b. | Explain the steps involved in instant tea production with a neat flow diagram. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the changes in cocoa beans during fermentation and also explain methods of fermentation. | CO1 | An | 10 |
|  | b. | Explain the mixing and refining step in chocolate manufacturing. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Assess the quality defects of chocolate. | CO1 | E | 10 |
|  | b. | Explain the steps involved in vanilla curing. | CO6 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Summarize the palm oil processing with flow chart. | CO5 | E | 10 |
|  | b. | Discuss the steps involved in coconut processing with flow chart. | CO6 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the production of black pepper, white pepper and ground pepper. | CO4 | U | 10 |
|  | b. | Illustrate the methods and production of oleoresin from major spices. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Illustrate the flow chart for cardamom processing and explain drying methods. | CO6 | A | 10 |
|  | b. | Explain the processing steps involved in primary and secondary products of ginger. | CO4 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Illustrate the quality specifications for cumin seeds, powder and oil. | CO1 | R | 10 |
|  | b. | Explain the steps involved in the garlic dehydration process with flowchart. | CO4 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the chemistry of plantation crops and spice processing |
| CO2 | Recall the various unit operations involved in processing |
| CO3 | Explore the suitable techniques for coffee and tea processing |
| CO4 | Develop processes for spice processing |
| CO5 | Learn the techniques of extraction of oleoresins from spices |
| CO6 | Develop novel plantation-based products |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | - | - | 10 | 20 | - | 40 |
| CO2 | - | 10 | 10 | 10 | - | - | 30 |
| CO3 | - | 10 | - | 10 | 10 | - | 30 |
| CO4 | - | 20 | 10 | - | - | - | 30 |
| CO5 | - | - | 10 | - | 10 | - | 20 |
| CO6 | - | 20 | 10 | - | - | - | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3008** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF MILK AND MILK PRODUCTS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Summarize the physico-chemical properties of milk. | CO1 | U | 10 |
|  | b. | Appraise the role of constituents used in the manufacture of ice cream. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the manufacturing steps involved in the processing of butter and explain. | CO2 | U | 15 |
|  | b. | Interpret the term instantization and agglomeration of milk powders. | CO2 | A | 5 |
|  |  |  |  |  |  |
| 3. | a. | Extend on the method of manufacture of Sterilized and Toned milk. | CO3 | U | 10 |
|  | b. | Construct the flow chart for manufacturing of Cottage cheese and explain. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the principle and working of a homogenizer and summarize the effect of homogenization on milk. | CO4 | U | 10 |
|  | b. | Explain the process involved in the production of milk powder using drum driers. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Report the various methods of filling of milk and illustrate the form-fill seal machine in detail. | CO5 | A | 15 |
|  | b. | Analyze the operations involved in the packaging and storage of cheddar cheese. | CO5 | An | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Examine the various platform and quality tests for milk. | CO1 | A | 10 |
|  | b. | Compare the gravity and centrifugal method of manufacturing cream. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Develop the flow chart for the manufacture of ice cream and explain in detail. | CO3 | A | 15 |
|  | b. | How much kg each of 28% cream and 3% milk will be required to make 500 kg of a mixture testing 4% fat? | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the method of manufacture of the Srikhand and Khoa with a help of a flow chart. | CO6 | U | 10 |
|  | b. | Appraise the pre-stratification and Creamery butter method of producing ghee and its advantages. | CO3 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Criticize the method of manufacture of any five fermented milk products with the help of flow chart. | CO6 | An | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | To gain knowledge on properties and composition of milk. |
| CO2 | To understand the processing techniques of milk. |
| CO3 | To learn the different milk products manufacturing. |
| CO4 | To understand the equipment used in dairy products manufacturing. |
| CO5 | To learn the packaging and storage of various milk products. |
| CO6 | To acquire knowledge on the Indian dairy products and their manufacturing |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | 10 | 10 | - | - | 30 |
| CO2 | - | 15 | 10 | 10 | - | - | 35 |
| CO3 | - | 10 | 25 | 10 | - | - | 45 |
| CO4 | - | 20 | - | - | - | - | 20 |
| CO5 | - | - | 15 | 5 | - | - | 20 |
| CO6 | - | 10 | - | 20 | - | - | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3009** | **Duration** | **3hrs** |
| **Course Name** | **NUTRITION AND METABOLISM** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Enumerate the processes of digestion, assimilation, and transportation of nutrients in the human body. | CO1 | R | 10 |
|  | b. | Describe the use of nutrient supplementation and fortification in addressing nutritional deficiencies. Provide examples and their impact on public health. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the role of cyanogen and lectins in food and its potential health risks. How can individuals mitigate these risks? | CO2 | U | 10 |
|  | b. | Discuss the relationship between nutrition and disorders associated with kidney, with a focus on acute renal failure. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the key steps and significance of glycolysis (EMP) in energy production. How does it contribute to cellular respiration? | CO4 | U | 10 |
|  | b. | Discuss about the Tricarboxylic Acid (TCA) cycle and its role in the carbohydrate metabolism. How does it link to both anabolic and catabolic pathways in metabolism? | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain in detail beta oxidation of fatty acids. | CO4 | U | 10 |
|  | b. | Write in detail about the biochemistry of cholesterol biosynthesis. How is cholesterol synthesized, and why is it essential for the human body? | CO4 | Ap | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the metabolic pathways for the biosynthesis and degradation of aliphatic amino acid glycine, providing specific examples. | CO4 | U | 10 |
|  | b. | Describe in detail about the urea cycle. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze and write the genetic factors that can lead to inborn errors in carbohydrate metabolism, and discuss how early diagnosis and dietary interventions can improve the quality of life for affected individuals. | CO5 | An | 10 |
|  | b. | Explain the concept of micronutrient defects and their link to osteoporosis. What are the key micronutrients involved, and how can osteoporosis be prevented or managed through nutrition? | CO5 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explore the challenges and considerations in geriatric nutrition, including the nutritional needs of the elderly population. | CO6 | U | 10 |
|  | b. | Analyze the role of nutrition in sports performance and recovery. How does sports nutrition differ from standard dietary guidelines? | CO6 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Write about the recommended dietary intake (RDI) and acceptable dietary intake (ADI), and how are they determined for different nutrients? | CO3 | R | 10 |
|  | b. | Write about the specific nutritional recommendations for Infants and children and the impact of malnutrition on their development. | CO6 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the specific nutritional recommendations for individuals during pregnancy and the impact of maternal nutrition on fetal development. | CO5 | U | 10 |
|  | b. | Write about the use of nutrition in the treatment and prevention of age-related disorders such as diabetes. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the basics of nutrition and metabolism of the major macromolecules. |
| CO2 | Describe the biochemistry process, the basic concept of human nutrition, and the relationship of the consumption of foods to nutritional status and health. |
| CO3 | Apply their knowledge in food biochemistry and nutrition in designing a new range of products with improved nutritional characteristics. |
| CO4 | Analyze the stages in the catabolism of food molecules and describe what occurs during each stage. |
| CO5 | Evaluate the biological functions of foods for health in addition to nutritional values. |
| CO6 | Formulate specialized nutrition for pediatric, geriatric, and sport’s needs. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | - | - | - | - | - | 20 |
| CO2 | - | 20 | - | - | - | - | 20 |
| CO3 | 10 | - | - | - | - | - | 10 |
| CO4 | - | 50 | 10 | - | - | - | 60 |
| CO5 | - | 20 | - | 10 | - | - | 30 |
| CO6 | 10 | 20 | - | 10 | - | - | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **22FT3010** | **Duration** | **3hrs** |
| **Course Name** | **FOOD QUALITY SYSTEMS AND MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Summarize all the main quality attributes to be considered while analyzing the quality of any food product. | CO1 | U | 10 |
|  | b. | Enlist and explain all types of hazards involved in food industry. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain factors affecting food safety. | CO2 | U | 10 |
|  | b. | Explain the intrinsic and extrinsic factors involved in food quality. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain Total Quality Management and enlist any five major tools used in it. | CO2 | R | 10 |
|  | b. | There is a Company named “National organics” which produces fresh fruits and vegetables and sale them in retail market. The company needs to implement GAP. Develop a GAP for the said company. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | In the chronological order enlist all the HACCP principles. | CO3 | U | 10 |
|  | b. | Enlist the issues addressed in GLP. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe in detail process for licensing and registration of food business. | CO5 | U | 10 |
|  | b. | Write and explain all the salient features of FSSAI Act 2006. | CO6 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the Functioning and responsibilities of the WHO. | CO5 | R | 10 |
|  | b. | Summarize the highlights of FSSAI Act 2006. | CO5 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the Plan Do Check Act cycle used in the ISO Audit system. | CO2 | U | 10 |
|  | b. | Write a short note on Sensory evaluation. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Enlist all the facilities addressed by GHP. | CO5 | R | 10 |
|  | b. | Summarize clause 7 and all its sub clauses as per ISO 22000:2018. | CO2 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write a detailed report on the auditable clauses for implementing ISO 22000:2018 in Bakery industry. | CO6 | C | 20 |
|  |  |  |  |  |  |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Know the quality attributes of food and their analysis methods. |
| CO2 | Evaluate the structure and processes of quality management systems. |
| CO3 | Gain knowledge about HACCP and its implementation. |
| CO4 | Familiar with food safety, food contamination, and food adulteration. |
| CO5 | Learn the history, importance, and concepts of food regulations. |
| CO6 | Understand the global and domestic food safety standards. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | - | - | - | - | 30 |
| CO2 | 10 | 30 | - | - | - | - | 40 |
| CO3 | - | 20 | - | - | - | - | 20 |
| CO4 | 10 | - | - | - | - | - | 10 |
| CO5 | 30 | 20 | - | - | - | - | 50 |
| CO6 | 10 | - | - | - | - | 20 | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **22FT3017** | **Duration** | **3hrs** |
| **Course Name** | **TECHNOLOGY OF MEAT, POULTRY AND FISH PROCESSING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Summarize the composition of muscle fat and its modifiers. | CO1 | U | 10 |
|  | b. | Explicate the muscle structure with a neat diagram. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the steps involved in slaughtering of beef. | CO3 | U | 10 |
|  | b. | Discuss the operational factors the affect the quality of meat. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Classify sausages and explain the steps involved in its manufacture. | CO3 | U | 10 |
|  | b. | Define ISO 22000 and outline its primary objectives in ensuring food safety and quality management within the food industry. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Outline the steps involved in processing of poultry. | CO6 | U | 10 |
|  | b. | Explain the composition and nutritional significance of poultry meat, detailing its macronutrient and micronutrient content. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Analyze the structure and composition of eggs, including their various components and nutritional significance. | CO1 | An | 10 |
|  | b. | Examine the functional properties of egg white and yolk, considering their roles in culinary applications and nutritional contributions. | CO6 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate the microbial spoilage of eggs, considering factors influencing spoilage, microbial species involved, and strategies for prevention and management. | CO5 | E | 10 |
|  | b. | Analyze the stunning methods used in poultry processing, considering their effectiveness, ethical implications, and impact on animal welfare. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Define and explain various types of offal obtained during meat processing. | CO3 | R | 10 |
|  | b. | Explain the meat plant hygiene, | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Expound the steps involved in canning of meat. | CO3 | A | 10 |
|  | b. | Summarize the utlilization of fish protein concentrate that is obtained as a byproduct. | CO3 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Examine the factors contributing to the spoilage of fish, including environmental influences, microbial growth, and enzymatic reactions, and analyze their implications for food safety and quality management. | CO5 | R | 10 |
|  | b. | Write short note on fish oil. | CO3 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the composition of flesh foods |
| CO2 | Learn the types and grades of meat, poultry, and sea foods |
| CO3 | Explain processing techniques used for the production of commercial meat, poultry, and sea foods |
| CO4 | Understand meat plant sanitation, hygiene, and standards. |
| CO5 | Assess the factors that affect the quality of meat |
| CO6 | Evaluate the processing techniques and their effect on nutritional value |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | -- | 20 | -- | 20 | -- | -- | 40 |
| CO2 | -- | -- | -- | -- | -- | -- | -- |
| CO3 | 10 | 30 | 20 | 10 | -- | -- | 70 |
| CO4 | 10 | 10 | -- | -- | -- | -- | 20 |
| CO5 | 10 | 10 | -- | -- | 10 | -- | 30 |
| CO6 | 10 | 10 | -- | -- | -- | -- | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3018** | **Duration** | **3hrs** |
| **Course Name** | **FOOD PACKAGING TECHNOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | State the levels of packaging and discuss the environments for which food packaging materials are designed. | CO1 | R | 10 |
|  | b. | Analyze the reason for food spoilage and the need for packaging. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Summarize method of testing the tensile properties, impact strength, and tear strength, coefficient of friction and adhesion properties of plastics. | CO2 | U | 10 |
|  | b. | Breakdown the tests used to evaluate the travel worthiness of a packaging material. | CO2 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Categorize the different types of lacquers used in metal cans. | CO3 | An | 10 |
|  | b. | Describe the Bag-on-valve system used in the manufacture of aerosol cans with a neat sketch. Recall the application of aerosol cans in food systems. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the Blow and blow (B&B) and Press and blow (P&B) process of manufacturing glass containers. | CO3 | A | 10 |
|  | b. | Discuss the methodology of annealing, hot-end and cold-end treatment given to glass containers. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Summarize the important milestones in the history of polymer development and distinguish between thermoplastics and thermosets. | CO3 | U | 10 |
|  | b. | Contrast between injection molding, blow molding, extrusion blow molding, injection blow molding and stretch blow molding. Use sketches wherever applicable. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the sachet & pouch systems employed in manufacture of food packs. | CO4 | U | 10 |
|  | b. | Summarize the types of sealing methods that are used in the manufacture of sachet & pouches. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Point out the basic requirements of a label as per FSSA, 2006. | CO5 | An | 10 |
|  | b. | Classify the different types of paper and paperboards that are used in manufacture of packaging for food systems. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Design a label for frozen chicken breast package; state the labeling information that is to be put up to meet consumer need. | CO5 | C | 10 |
|  | b. | Breakdown and explain the mechanism of Lithography and Electrophotography printing techniques with neat diagrams. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Point out the different gases and equipment used in modified atmosphere packaging. | CO6 | An | 10 |
|  | b. | Discuss the various vacuum packaging systems used for food system. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Study the need and functions of packaging to protect and store food. |
| CO2 | Gain knowledge on the shelf life of food and accelerated shelf-life testing. |
| CO3 | Know the different packaging materials based on their properties and their application. |
| CO4 | Learn about the filling and sealing techniques used for different food materials. |
| CO5 | Interpret labeling methods and legislature. |
| CO6 | Know about the advanced food packaging techniques. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | - | - | 10 | - | - | 20 |
| CO2 | - | 10 | - | - | 10 | - | 20 |
| CO3 | - | 30 | 10 | 20 | - | - | 60 |
| CO4 | - | 20 | - | - | - | - | 20 |
| CO5 | - | - | - | 20 | - | 10 | 30 |
| CO6 | - | 10 | - | 20 | - | - | 30 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3019** | **Duration** | **3hrs** |
| **Course Name** | **FOOD ADDITIVES AND INGREDIENTS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Summarize the application of food colourants in different food categories with their limits. | CO3 | A | 10 |
|  | b. | Define and classify the flavouring agents based on their production process with the help of examples. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Categorize and discuss the sweeteners used in the food industry in detail. | CO4 | U | 10 |
|  | b. | Explain the applications of antioxidants and chelating agents in the food industry with examples. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss in detail the preservatives, their classification, mode of action, and limits prescribed by FSSAI. | CO1 | U | 10 |
|  | b. | Differentiate between nutritive and non-nutritive sweeteners with two examples. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Distinguish between emulsifiers and stabilizers based on their properties with the help of examples. | CO2 | E | 10 |
|  | b. | Categorize and discuss the fat replacer used in the food industry in detail. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the synthetic antioxidants used in the food industry in detail. | CO5 | R | 10 |
|  | b. | Distinguish between taste modifiers and flavour enhancers with examples. | CO6 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write a detailed note on the food pigments. | CO2 | U | 10 |
|  | b. | Differentiate between anti-caking agents and humectants based on their role and importance in the food industry with suitable examples. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the safety aspects of food additives with suitable examples. | CO3 | An | 10 |
|  | b. | Discuss the health impact of food pigments with examples. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Classify the food additives and discuss their application in the food industry in detail. | CO1 | A | 10 |
|  | b. | Discuss the mode of action of sulphur dioxide and nitrate in the food industry as a preservative. | CO3 | An | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Distinguish between bleaching agents and maturing agents based on their role and importance in food industries with suitable examples. | CO5 | U | 10 |
|  | b. | Discuss the labelling requirements of food additives with examples. | CO3 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the importance of additives in maintaining or improving food quality. |
| CO2 | Demonstrate and relate the level of addition of food additives to its quality. |
| CO3 | Understand the applications of food additives and methods to study their permissible limits. |
| CO4 | Categorize and choose the appropriate additive depending on the type of food. |
| CO5 | Identify and design newer products with better quality using additives that are economical and safe. |
| CO6 | Develop a new range of additives that are multifunctional and safe. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | 20 | - | - | - | 30 |
| CO2 | - | 10 | - | - | 10 | - | 20 |
| CO3 | - | - | 10 | 30 | - | - | 40 |
| CO4 | 10 | 10 | 10 | - | - | - | 30 |
| CO5 | 10 | 40 | - | - | - | - | 50 |
| CO6 | - | - | 10 | - | - | - | 10 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **22FT3020** | **Duration** | **3hrs** |
| **Course Name** | **NUTRACEUTICALS AND HEALTH FOODS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define Nutraceuticals.Write in detail about the evolution of the nutraceuticals and functional foods market. | CO1 | R | 10 |
|  | b. | Classify nutraceuticals. State the significance of nutraceuticals and functional foods in disease management. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe in detail the classification and sources of dietary fiber. | CO1 | R | 10 |
|  | b. | Define Antioxidants. Discuss the types and functions of Antioxidants. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Recall and write the methods of isolation and extraction of bioactive compounds. | CO3 | R | 10 |
|  | b. | Summarize the steps involved in the purification of bioactive compounds by High Performance liquid chromatography. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Appraise the health benefits of Probiotics. | CO4 | U | 10 |
|  | b. | Define Synbiotics. Write a detailed note on synbiotic food products. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. |  | Describe the development and stability of functional foods in detail. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Elaborate on the food sources, metabolism, bioavailability, and health benefits of the Carotenoids. | CO2 | A | 10 |
|  | b. | Categorize the isolation methods of alkaloids and phenolics. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. |  | Explain the classification of food matrices. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Define Prebiotics. Write the classification and their effects on gut microbe and health. | CO4 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Relate nutrigenomics and personalized nutrition. | CO6 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the role of nutraceuticals and functional food in health and disease |
| CO2 | Present ideas and concepts on issues of functional foods and nutraceuticals. |
| CO3 | Apply the basic concepts of nutraceuticals and functional foods, their chemical nature, and methods of extraction. |
| CO4 | Acquire knowledge of probiotics and their role in disease prevention. |
| CO5 | Evaluate the standards of evidence required for efficacy and safety assessment of nutraceutical and functional foods. |
| CO6 | Know about various phytochemicals, their health promotion, and disease prevention. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 10 | - | - | - | - | 30 |
| CO2 | 10 | - | 10 | - | - | - | 20 |
| CO3 | 10 | 10 | 10 | - | - | - | 30 |
| CO4 | - | 20 | 20 | - | - | - | 40 |
| CO5 | - | 20 | - | 20 | - | - | 40 |
| CO6 | - | - | 20 | - | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **22FT3022** | **Duration** | **3hrs** |
| **Course Name** | **FOOD TOXICOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Proper gut health is necessary for proper wellbeing – Justify the statement. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Write short notes on:  (i) Therapeutic dosage  (ii) Lethal dosage | CO1 | R | 10 |
|  | b. | Describe the methods for clinical testing of animals in detail. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Differentiate between LD50 and LC50. Explain the methods for the determination of toxicity. | CO3 | R | 10 |
|  | b. | Briefly outline the methods for testing:  a) Teratogenicity b) Carcinogenicity. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Elaborate on the procedures for the selection of animals for chronic toxicity testing. | CO4 | U | 10 |
|  | b. | Paraphrase the methods for testing the following:   1. Genetic toxicity b) Mutagenicity | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the biotransformation reactions that take place in Phase I reactions. | CO5 | U | 10 |
|  | b. | Cytochrome P450 plays a major role in xenobiotic biotransformation - Justify the statement. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss briefly on the Phase II reactions and the factors affecting the same. | CO2 | A | 10 |
|  | b. | State the role of Phase II enzymes in the body. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. |  | Write a detailed note on the following:   1. Favism b) Cyanogens   c) Phytoalexin d) Ochratoxin | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the source, activity , and mode of action of the following:   1. Transmissible Spongiform Encephalopathy 2. Paralytic shellfish poisoning | CO4 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Expound the importance of the following:   1. Heavy metal toxicity 2. Pesticide residues and health effects | CO6 | An | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the role of nutraceuticals and functional food in health and disease |
| CO2 | Present ideas and concepts on issues of functional foods and nutraceuticals. |
| CO3 | Apply the basic concepts of nutraceuticals and functional foods, their chemical nature, and methods of extraction. |
| CO4 | Acquire knowledge of probiotics and their role in disease prevention. |
| CO5 | Evaluate the standards of evidence required for efficacy and safety assessment of nutraceutical and functional foods. |
| CO6 | Know about various phytochemicals, their health promotion, and disease prevention. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 30 | - | - | - | - | - | 30 |
| CO2 | 10 | - | 10 | - | - | - | 20 |
| CO3 | 10 | 10 | 10 | - | - | - | 30 |
| CO4 | - | 20 | 20 | - | - | - | 40 |
| CO5 | 10 | 10 | - | 20 | - | - | 40 |
| CO6 | - | - | - | 20 | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3023** | **Duration** | **3hrs** |
| **Course Name** | **FOOD BIOTECHNOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the Recombinant DNA technology and its applications in the food industry. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Distinguish between batch and continuous fermentation. | CO2 | An | 10 |
|  | b. | Define flavor potentiators. State the applications and manufacturing process of MSG and 5’nucleotides. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the regulations concerning GMO at the national and international level. | CO3 | A | 10 |
|  | b. | State few risks, management and public concern of genetically modified foods. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Elaborate on natural preservatives and their applications in food systems. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | Summarize the steps involved in nucleic acid hybridization in the identification of bacteria. | CO5 | R | 10 |
|  | b. | Define PCR. Draw a process flow to detect the microorganisms from spoiled foods. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | With a neat block diagram, explain the fermentation process of traditional fermented foods. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the steps involved in the production of transgenic plants. | CO1 | R | 10 |
|  | b. | Write the concepts and applications of Bt Brinjal in detail. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Write a detailed note on GMO foods concerning current production guidelines and labeling of GMO foods. | CO3 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the use of biosensors in the dairy industry. | CO6 | A | 10 |
|  | b. | Describe the working principle of any two biosensors. | CO6 | R | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Understand the application of genetic information of animal and plant species in food. |
| CO2 | Learn the importance of applications of biotechnology in food. |
| CO3 | Explain the applications of GMO foods |
| CO4 | Apply the role of bio preservatives in foods. |
| CO5 | Evaluate the application of molecular techniques in the characterization food borne pathogens. |
| CO6 | Apply biosensors in foods. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 | - | - | - | 40 |
| CO2 | 10 | - | 20 | 10 | - | - | 40 |
| CO3 | - | 10 | 30 | - | - | - | 40 |
| CO4 | - | - | - | 20 | - | - | 20 |
| CO5 | 10 | - | - | 10 | - | - | 20 |
| CO6 | 10 | - | 10 | - | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22FT3024** | **Duration** | **3hrs** |
| **Course Name** | **ENZYMES IN FOOD PROCESSING** | **Max. Marks** | **100** |

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| **Q. No** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Tabulate various types of enzymes along with biochemical properties. | CO1 | R | 10 |
|  | b. | Explain the nomenclature of enzymes with suitable examples. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss various properties of enzymes. | CO1 | U | 10 |
|  | b. | Explain the salient points for DNAzymes. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Summarize the sources and production of abzymes. | CO4 | U | 10 |
|  | b. | Discuss and write a short notes on Metalloenzymes. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the types of enzyme inhibition. | CO3 | R | 10 |
|  | b. | Devise michaelis-menten equation along with the graphical representation. | CO3 | C | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the factors affecting enzyme activity. | CO3 | R | 10 |
|  | b. | Explain feedback inhibition in enzymes. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe allosteric regulation in enzymes. | CO5 | R | 10 |
|  | b. | Summarize compartmentation of metabolic pathways. | CO6 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the Kinetics of a single-substrate enzyme. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the enzymes in membrane. | CO6 | U | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the role of thermophilic enzyme as industrial enzyme. | CO6 | U | 10 |
|  | b. | Explain cellulose degrading enzymes with suitable examples. | CO4 | R | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Describe the structure, functions, and mechanisms of action of enzymes |
| CO2 | Understand the enzyme activity in foods |
| CO3 | Learn kinetics of enzyme-catalyzed reactions and enzyme inhibitory and regulatory processes |
| CO4 | Understand immobilization of enzymes |
| CO5 | Apply the acquired skills to the applications of enzymes and their future potential |
| CO6 | Evaluate the application of various enzymes at the industry level |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 30 | 10 | -- | -- | -- | -- | 40 |
| CO2 | -- | -- | -- | -- | -- | -- | -- |
| CO3 | 50 | -- | -- | -- | -- | 10 | 60 |
| CO4 | 10 | 20 | -- | -- | -- | -- | 30 |
| CO5 | 10 | -- | -- | -- | -- | -- | 10 |
| CO6 | -- | 40 | -- | -- | -- | -- | 40 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23FP1001** | **Duration** | **3hrs** |
| **Course Name** | **BASICS OF FOOD SCIENCE AND TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | List down the primary functions of food additives. | | CO1 | U | 1 |
| 2. | List any two characteristic features of organic pigments. | | CO1 | R | 1 |
| 3. | Name the scale used to measure the acidity or alkalinity of a substance. | | CO2 | R | 1 |
| 4. | Classify flavors in foods. | | CO1 | R | 1 |
| 5. | Give examples of chemical leavening agents. | | CO3 | R | 1 |
| 6. | Define decimal reduction time. | | CO3 | U | 1 |
| 7. | Recall the two main temperature categories in thermal processing. | | CO3 | U | 1 |
| 8. | Give two examples of a physical change. | | CO1 | R | 1 |
| 9. | List down the factors affecting the destruction of microorganisms. | | CO3 | U | 1 |
| 10. | The organisms that survive the pasteurization process are of two types. Name them. | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State the undesirable effects of enzyme activity. | | CO2 | U | 3 |
| 12. | Explain thermoduric and thermophilic organisms. | | CO2 | U | 3 |
| 13. | Provide the methods of low-temperature preservation. | | CO3 | An | 3 |
| 14. | Determine D value of a micro-organism from the following data obtained at 110°C. Assuming ‘first order’ kinetics, calculate the decimal reduction time (D value) from the equation given Y = -0.4197X + 7.2505   |  |  | | --- | --- | | **Time (min)** | **Log10 viable count (cfu/g)** | | 0.2 | 7.1 | | 0.5 | 7.1 | | 1 | 7 | | 2 | 6.4 | | 4 | 5.2 | | 6 | 4.9 | | 8 | 4 | | 10 | 3 | | | CO3 | An | 3 |
| 15. | State the different types of pasteurization method in milk processing | | CO5 | An | 3 |
| 16. | The slope of the TDT curve is defined as “Z”. Define Z value. | | CO3 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Comparison of the effect of freezing methods (quick freezing and slow freezing) on microorganisms | CO3 | A | 6 |
|  | b. | Discuss in brief the effect of freezing on micro-organisms. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Discuss in detail at least THREE methods of food preservation using non-thermal techniques | CO4 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Explain the principle and instrumentation of Individual Quick Freezing with illustration wherever necessary. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. | a. | Discuss in brief about the food safety regulations & standards while providing details on Hazard Analysis Critical Control Point (HACCP). | CO5 | E | 12 |
|  |  |  |  |  |  |
| 21. | a. | Comment on the advantages of microorganisms as a source for enzyme production with examples. | CO2 | A | 6 |
|  | b. | Assess a detailed Case Study of High-Temperature preservation in the food industry. | CO3 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Classify the test methods in sensory evaluation and describe EACH method in detail. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain the following basic concepts associated with the thermal destruction of micro-organisms   1. Thermal death time 2. D value 3. Z value 4. F value 5. 12 D concept | CO3 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain some of the recent trends in the food science and food industry with the help of real-life examples. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Assess the nutritive value of different foods. |
| **CO2** | Relate the health of an individual with the prescribed dietary intake. |
| **CO3** | Analyze the factors influencing thermal processing of foods. |
| **CO4** | Evaluate the quality and safety of non-thermally processed foods. |
| **CO5** | Adopt food quality management systems with reference to national and international standards. |
| **CO6** | Implement novel trends in developing safe and nutritious food products |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 1 |  |  |  |  | 5 |
| **CO2** | 1 | 6 | 6 |  |  |  | 13 |
| **CO3** | 1 | 3 | 15 | 36 |  |  | 95 |
| **CO4** |  |  | 12 |  |  |  | 12 |
| **CO5** |  |  |  | 15 | 12 |  | 27 |
| **CO6** |  |  | 12 |  |  |  | 12 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23FP1002** | **Duration** | **3hrs** |
| **Course Name** | **BAKERY, BEVERAGES AND CONFECTIONERY TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What is the particle size of wheat semolina? | | CO1 | R | 1 |
| 2. | Enlist any two grade determining factors of wheat quality. | | CO1 | U | 1 |
| 3. | Justify the addition of calcium propionate to bread | | CO4 | A | 1 |
| 4. | Name a surfactant used in biscuits. | | CO2 | R | 1 |
| 5. | Expand TCH. | | CO3 | U | 1 |
| 6. | What is chaptalization? | | CO5 | R | 1 |
| 7. | X prepares a grape juice of 20 ⸰brix. Determine the amount of alcohol generated, assuming that the final product has soluble solids of 4 ⸰brix. | | CO4 | A | 1 |
| 8. | If a distilled spirit label mentions 90 ⸰proof v/v, calculate the alcohol concentration. | | CO4 | R | 1 |
| 9. | Enlist the standards for water to be used for a carbonated beverage. | | CO5 | U | 1 |
| 10. | ***Doctoring*** in a confectionery product refers to ………….. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Enlist the importance of Hagberg falling number. | | CO2 | U | 3 |
| 12. | Describe the method of batter preparation for a Devil’s delight cake, giving reasons. | | CO4 | A | 3 |
| 13. | Describe the industrial method used for increasing the yield of sugar cane juice | | CO5 | A | 3 |
| 14. | Briefly outline the process of manufacture of port wine. | | CO4 | U | 3 |
| 15. | Illustrate the classification of distilled spirits. | | CO5 | An | 3 |
| 16. | Give reasons for fat bloom in chocolates. | | CO4 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Mr. X needs a technology for the production of refined wheat flour. With a neat flow diagram explain the same. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain the significance of the following – a) p/l ratio of an alveograph  b) extensograph reading. c) Farinograph water absorption. | CO2 | An | 3x4 = 12 |
|  |  |  |  |  |  |
| 19. |  | Give reasons for the following – a) Cracks on the external surface of bread.  b) sunken cakes. c) uncooked bread | CO5 | An | 3x4 = 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain the process of sulphite treatment for defecation of sugarcane juice. | CO4 | U | 6 |
|  | b. | Enlist the steps involved in the manufacture of jaggery. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. |  | With the help of a neat flow diagram, discuss in detail on the steps involved in the manufacture of lager beer. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Mr. X wants the technology for manufacture of a cola -type carbonated beverage. As a consultant, explain the process for the same. | CO6 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Outline the steps involved in the manufacture of toffees. | CO3 | U | 9 |
|  | b. | Give reasons for blooming in toffees. | CO3 | A | 3 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Outline the process for the manufacture of hard-boiled candies. | CO6 | U | 6 |
|  | b. | Explain the process for the manufacture of dark chocolates. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Gain knowledge on the ingredients, process and machinery involved in bakery, confectionery and beverage technology. |
| **CO2** | Understand the factors affecting the quality of baked and confectionery products. |
| **CO3** | Apply gained knowledge in manufacturing of new products |
| **CO4** | Analyze the process for maintaining and improving the quality of the final product |
| **CO5** | Evaluate the steps involved in the process and improve existing technologies or develop newer technologies |
| **CO6** | Design and create newer process and products that are better economically, nutritionally or technologically |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 12 |  |  |  | 14 |
| **CO2** | 1 | 3 |  | 12 |  |  | 16 |
| **CO3** |  | 1+9 | 3 |  |  |  | 13 |
| **CO4** | 1 | 3 + 12 | 1+1+3+3 |  |  |  | 24 |
| **CO5** | 1 | 1+12 | 3 | 3 + 12 |  |  | 32 |
| **CO6** |  | 1+12 |  | 12 |  |  | 25 |
|  | | | | | | | **124** |