



Department of Food Technology
School of Interdisciplinary Sciences and Technology
Jamia Hamdard, New Delhi-110062
END SEM EXAMINATION
Jan, 2023. M Tech 1st SEM

Roll No.

2022
1052

Paper Title: Food Engineering; Paper Code: MFTC – 105

Time allotted: 3Hrs.

Max Marks: 75

Note: Write to the point. Before answering make sure you have mentioned the Question No. & Section.

Important: At the END, mention how many questions from each section you have attempted.

Section-A (15 Marks, Attempt All)

Questions	Marks	Mapping
Q1. Differentiate between Kinematic & Dynamic Viscosity	(2)	PO: 1.4/CO: 3,5
Q2. Head loss	(2)	PO: 1.3 /CO: 2,4
Q3. Porosity	(1)	PO: 1.4/CO: 3,5
Q4. Color measurement	(2)	PO: 1.4/CO: 3,4,5
Q5. Steam economy	(2)	PO: 1.2,4/CO: 1,2,6
Q6. LMTD	(2)	PO: 1.2,3/CO: 1,2,6
Q7. Supercooling	(1)	PO: 1.4/CO: 1,2,7
Q8. Planks Equation	(1)	PO: 1.4/CO: 1,2,7
Q9. Manometers	(2)	PO: 1.3,4/CO: 1,3,5

Section- B (Attempt any 6) (5 Marks Each)

Questions	Mapping
Q10. The volumetric flow rate of beer flowing in a pipe is 1.8 L/s. The inside diameter of the pipe is 3 cm. The density of beer is 1100 kg/m ³ . Calculate the average velocity of beer and its mass flow rate in kg/s. What is the mass flow rate? If another pipe with a diameter of 1.5 cm is used, what will be the velocity for the same volumetric flow rate?	PO: 1.3,4/CO: 3,4,5
Q11. Write a note on thermal properties of foods.	PO: 1.3 /CO: 1,2,4
Q12. Shelf life of a product stored at 35°C is 10 days. If the Q-10 value of deterioration is 1.8 times. What will be the shelf life if the food product is stored at 5°C.	PO: 1.4/CO: 1,3,5
Q13. A spherical food product is being frozen in an air-blast freezer. The initial product temperature is 10°C and the cold air -40°C. The product has a 7 cm diameter with density of 1000 kg/m ³ , the initial freezing temperature is -1.25°C, the thermal conductivity of the frozen product is 1.2 W/(m K), and the latent heat of fusion is 250 kJ/kg. Compute the freezing time.	PO: 1.4/CO: 3,6,7
Q14. Discuss the modes of heat transfer	PO: 1.4/CO: 3,6,7
Q15. Write a note on Evaporators used in Food Processing	PO: 1.3,4/CO: 1,3,6
Q16. Discuss the changes occurring in Foods during thermal processing	PO: 1.2,4/CO: 1,2,4,6
Q17. Derive the equations for Wet and Dry basis MC	PO: 1.4/CO: 1,3,6
Q18. Discuss the Significance of Psychrometry in Food processing.	PO: 1.3,4/CO: 1,3,7

Section C (Attempt any 2) (15 Marks Each)

Questions	Mapping
Q19. The results of a thermal experiment gave a D value of 7.5min at 110 °C, if there were 4.9×10^4 survivors after 10min. Determine: Initial population, Reaction rate and Final population after 5, 10, 15 and 20 min	PO: 1,4/CO: 3,5
Q20. Discuss the Effects of Freezing on food properties and Factors affecting freezing rate in detail.	PO: 1,3,4/CO: 1,3,7
Q21. Derive Bernoulli's theorem and Darcy-Weisbach Equation	PO: 1,3,4/CO: 3,4,5
Q22. A feed of 10^4 kg of soybean is processed in sequence of 3 stages. The feed contains 30% protein, 30% carb, 10% fibre, 11% water and 19% oil. In the first stage the beans are crushed and pressed to remove oil, giving an expressed oil stream and pressed grains with 6% oil. In the second stage the pressed grains are extracted with hexane to produce an extracted meal with 0.5% oil and hexane-oil mixture. In the last step the meal is dried to produce a meal with 8% moisture. Calculate: kg of pressed beans from the first stage, kg of extracted meal from the 2nd stage and kg of final meal and weight of protein in the dried meal.	PO: 1,3,4/CO: 4,5,6
Q23. (A). A food containing 80% water is to be dried at 100°C down to moisture content of 10%. If the initial temperature of the food is 21°C, calculate the quantity of heat energy required per unit weight of the original material, for drying under atmospheric pressure. The latent heat of vaporization of water at 100°C and at standard atmospheric pressure is 2257 kJ kg^{-1} . The specific heat capacity of the food is $3.8 \text{ kJ kg}^{-1} \text{ } ^\circ\text{C}^{-1}$. Find also the energy requirement/kg water removed. (B). A membrane separation system is used to concentrate total solids (TS) in a liquid food from 10% to 30%. The concentration is accomplished in two stages with the first stage resulting in release of a low-total-solids liquid stream. The second stage separates the final concentration product from a low-total-solids stream, which is returned to the first stage. Determine the magnitude of the recycle stream when the recycle contains 2% TS, the waste stream contains 0.5% TS, and the stream between stages 1 and 2 contains 25% TS. The process should produce 100 kg/min of 30% TS.	PO: 1,3,4/CO: 4,5,6 PO: 1,3,4/CO: 1,4,5,6

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