



Department of Food Technology
School of Interdisciplinary Sciences and Technology
Jamia Hamdard, New Delhi-110062
END SEM EXAMINATION; Dec, 2023. B Tech 5th SEM

Roll No.....

Shahen

2023

Paper Title: Food Engineering II; Paper Code: BFTC – 502

Time allotted: 3Hrs.

Max Marks: 75

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

Students are supposed to carry their own Calculator. Sharing of Calculator Isn't allowed.

Section-A (15 Marks, Attempt All)

<u>Questions</u>	<u>Marks</u>	<u>Mapping</u>
Q1. Sensible cooling	(2)	PO: 1,4/CO: 3,5
Q2. Humidification	(2)	PO: 1,3 /CO: 2,4
Q3. Conduction	(1)	PO: 1,4/CO: 3,5
Q4. Cold point	(2)	PO: 1,4/CO: 3,4,5
Q5. Forced convection	(2)	PO: 1,2,4/CO:1,2,6
Q6. Evaporation	(2)	PO: 1,2,3/CO:1,2,6
Q7. DBT & WBT	(2)	
Q8. Water activity	(2)	
Q9. Steam economy	(1)	

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

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| Q7. Write a note on psychrometry. Draw a well labelled diagram. | PO: 1,4/CO: 1,3,5 |
| Q8. Derive the equation for MC_{wb} & MC_{db} . | PO: 1,3,4/CO: 3,4,5 |
| Q9. A batch of 10 kg of food product has a moisture content of 200% dry basis. Calculate how much water must be removed from this product to reduce its moisture content to 30% wet basis. | PO: 1,3 /CO: 1,2,4 |
| Q10. A cold storage wall (3 m x 6 m) is constructed of 15 cm thick concrete (thermal conductivity = $1.37 \text{ W/(m } ^\circ\text{C)}$). Insulation must be provided to maintain a heat transfer rate through the wall at or below 500 W. If the thermal conductivity of the insulation is $0.04 \text{ W/(m } ^\circ\text{C)}$, compute the required thickness of the insulation. The outside surface temperature of the wall is 38°C , and the inside wall temperature is 5°C . | PO: 1,4/CO: 1,3,5 |
| Q11. Write a note on Scraped-Surface and Steam infusion Heat Exchanger | PO: 1,4/CO: 3,6,7 |
| Q12. Discuss Fourier's Law and Newtons.Law of cooling | PO: 1,4/CO: 3,6,7 |
| Q13. A hot fluid enters a concentric pipe at a temperature of 300°F and is to be cooled to 200°F by a cold fluid entering at 100°F and heated to 150°F . Determine LMTD for co-current flow and counter-current flow. Draw the pictorial representation as well | PO: 1,3,4/CO:1,3,6 |

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

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| Q14. If 35,000kg of whole milk containing 4% fat is to be separated in a 6 hour period into skim milk with 0.45% fat and cream with 45% fat, what are the flow rates of the two output streams from a continuous centrifuge which accomplishes this separation? | PO: 1,4/CO: 3,5 |
| Q15. Discuss the working of Triple Effect Evaporator. Write its mass and Energy balance along with graphical representation. | PO: 1,3,4/CO:1,3,7 |
| Q16. A feed of 10000kg of soybean is processed in sequence of 3 stages. The feed contains 35% protein, 27.1% carb, 9.4% fibre, 10.5% water and 18% 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 2 nd stage and kg of final meal and weight of protein in the dried meal. | PO: 1,4/CO: 3,5 |