Department of Food Technology
School of Interdisciplinary Sciences and Technology
Jamia Hamdard, New Delhi-110062

Roll No.....

15.12.25
M.Tech
I st Sem.

END SEM EXAMINATION (December, 2025).

M.Tech. Food Technology (I Semester)

M.Sc. Food Science & Technology (I Semester)

Paper Title: **Food Engineering;** Paper Code: **MFTC-104/MFSC-104**

Time allotted: 2 hr 30 min **Maximum marks: 60**

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

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

Section-A (Attempt all) (5×2=10 marks)

Questions	Mapping
Q1. Define D-value and its significance in thermal processing.	CO1,5,6;PO6
Q2. What is generation time?	CO7;PO9
Q3. State Fourier's law of heat conduction.	CO1,2;PO1
Q4. What is frictional loss in fluid flow?	CO2;PO2
Q5. Mention two methods of measuring fluid rate.	CO2;PO2

Section- B (Attempt any five) (5×6=30 marks)

Questions	Mapping
Q6. Explain the complete vapor-compression refrigeration cycle with a diagram.	CO3;PO3
Q7. What is Reynolds number? Classify different types of fluid flow.	CO5;PO3
Q8. Discuss thermal kinetics of microbial destruction and explain the role of D, Z, and F values in designing thermal processes.	CO7;PO8
Q9. Derive the relationship between moisture content on dry basis and wet basis.	CO1,3;PO3
Q10. Water flows through a pipe of diameter 0.1 m at a flow rate of 0.02 m^3/s. The kinematic viscosity of water is 1×10^{-6} m^2/s. Calculate the average velocity, Reynolds number and determine the flow regime.	CO5;PO4
Q11. Potatoes with 80 percent moisture content on wet basis are dried to a final moisture content of 10 percent. If we dry 100 kg of potatoes, what is the final weight of the product, and how much water is removed?	CO5;PO3
Q12. A bakery needs 180 kg of dried raisins with a final moisture content of 15% wet basis. The initial moisture content of the grapes used for drying is 80% wet basis. Considering a 7% loss during the drying process, calculate the amount of grapes required initially.	CO3;PO3

Section C (Attempt any two) (2×10=20 marks)

Questions	Mapping
Q13. Derive the heat conduction equation for a cylinder and discuss its applications in food engineering.	CO5;PO4
Q14. Describe the working principle of a single-effect evaporator with a neat diagram, and derive the mass and heat balance equation involved.	CO5;PO4
Q15. A cold storage room is constructed of an inner layer of 12.7 mm of pine, a middle layer of 101.6 mm of cork board, and an outer layer of 76.2 mm of concrete. The wall surface temperature is 255.4 K inside the cold room and 297.1 K at the outside of the concrete. Use conductivities for pine, 0.151; for cork board, 0.0433; and for concrete, 0.762 W/mK. Calculate the heat loss in W for 1 m^2 and the temperature at interface between pine wood and cork board.	CO7;PO5
Q16. A food product requires a 12-log reduction of *Clostridium botulinum* spores. The $D_{121°C}$ = 0.2 min and Z = 10°C. Calculate the F-value at 121°C and the time required at 115°C to achieve the same lethality.	CO7;PO2