



Department of Food Technology
School of Interdisciplinary Sciences and Technology
Jamia Hamdard, New Delhi-110062
END SEM EXAMINATION
June, 2022, B.Tech 4th SEM

Roll No.

B.Tech
4th Sem.
2022

Paper Title: Food Engineering I, Paper Code: BFIC -- 404

Time allotted: 3Hrs.

Max Marks: 75

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

Section-A (15 Marks, Attempt All)

- Q1. Define Z and F value. (2)
Q2. Cold Point, AR enamel and C enamel (2)
Q3. 12D concept (1)
Q4. Enlist the all CCPs identified in Rooh Afza Processing. (2)
Q5. If diameter of a pipe is 10mm, volumetric flow rate is 7L/s, find its velocity in cm/s? (2)
Q6. Find diameter of the pipe if Velocity of a fluid is 36 mm/s, volumetric flow rate is $1.0472 \text{ cm}^3/\text{s}$. (2)
Q7. Find density of a fluid, if its Kinematic viscosity is $1 \text{ cm}^2/\text{s}$ and dynamic viscosity is 1000cP (2)
Q8. The specific heat of water is higher than other food components. Discuss its advantages as a food technologist. (2)

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

- Q9. 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. (6)
Q10. In the following reaction. Calculate the reaction rate after 200s for the formation of Glucose and Oxygen. $\text{CO}_2 + \text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + \text{H}_2\text{O}$. If the conc. of glucose and Oxygen after 200s is 0.0029 and 0.0015 (6)
Q11. Discuss the impact of Processing on Food Quality (6)
Q12. Discuss the terms: WBT, DBT, Porosity, True Density, Terminal Velocity, Stokes Law, Hysteresis, freezer burn, Carr Index, Hausner ratio, A_w , Sensible Heat (6)
Q13. A culture is inoculated at 11AM with 10^2 cells/ml. At 12 PM the population is determined to be 10^7 cells/ml. Calculate the No of generations and doubling time. (6)
Q14. 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? (6)
Q15. Water has coefficient of viscosity of $1 \times 10^{-4} \text{ Pas}$ at 25°C . What Pressure difference is necessary to keep water moving with a volumetric flow rate of $1.5 \times 10^{-2} \text{ m}^3/\text{s}$ through a 300cm long pipe with a radius of $2 \times 10^{-2} \text{ m}$. (6)

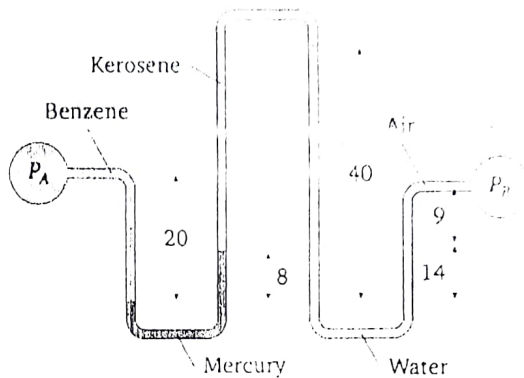
Section C (Attempt any 2) (15 Marks Each)

- Q16. A food industry freezes 15ton of fish by using cold air. If the initial temp is 10°deg and the final temp is -8°deg . Calculate the maximum capacity of the refrigeration plant required, if it (15)

is assumed that the max rate of heat extraction from the product is twice the average rate. If the heat transfer coefficient is 22 J/m^2 . Calculate the surface area of the evaporator coil required if the log mean temp drop across the coil is 12°C . Given the specific heat of fish $3.18 \text{ kJ/kg}^\circ \text{C}$ above freezing and $1.67 \text{ kJ/kg}^\circ \text{C}$ below freezing and the latent heat is 276 kJ/kg .

Q17. (A). Suppose the flow rate of blood in a coronary artery has been reduced to half its normal value by plaque deposits. By what factor has the radius of the artery been reduced, assuming no turbulence occurs? (5)

(B). Calculate $P_A - P_B$, if all the distances are in centimeters. The density of Benzene is 980 , Kerosene: 967 , Mercury: 1080 and Water: 998 . (10)



Q18. Discuss the Canning Process in detail. (15)

Q19. Derive Darcy Weisbach and Poiseuille Equation. Discuss the significance of each equation. (15)

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