

G: FOOD TECHNOLOGY

Q. 1 – Q. 9 carry one mark each.

- Q.1 Bread staling is caused by _____.
(A) Caramelisation (B) Gelatinisation (C) Retrogradation (D) Aggregation
- Q.2 Arrange the grades of tea in the increasing order of their leaf size _____, _____ and _____.
(A) Souchang, pekoe and orange pekoe
(B) Pekoe, souchang and orange pekoe
(C) Orange pekoe, souchang, and pekoe
(D) Orange pekoe, pekoe, and souchang
- Q.3 Fruit juice is being pasteurized in a tubular heat exchanger. The retention time in holding tube of 0.2 m² cross sectional area is 3 seconds. If the flow rate of juice is 0.4 m³ s⁻¹, the length of the holding tube in m, is _____.
- Q.4 The oil, which experiences flavor reversion even at the lower peroxide value is _____.
(A) Mustard (B) Soybean
(C) Palm (D) Sesame
- Q.5 80 kg of wheat containing 10 kg of moisture has been dried to a moisture content of 8% wet basis in 3 hours under constant rate period of drying. The drying rate in kg h⁻¹ is _____
- Q.6 The rate of cream separation in a disc bowl centrifuge can be increased by _____.
(A) Increasing the size of the bowl (B) Lower viscosity of fluid
(C) Increasing RPM of the bowl (D) All of these
- Q.7 Which one of the following is not used in mass transfer analysis?
(A) Biot number (B) Peclet number
(C) Schmidt number (D) Sherwood number
- Q.8 Oxygen is permeating through an EVOH film of thickness 't' and solubility coefficient 'S'. If diffusivity of oxygen through the film is 'D', then permeability of oxygen through the film will be _____.
(A) D/t (B) D/S (C) D × S (D) S/D

Q.9 Condensing steam is used to heat vegetable oil in a double pipe co-current heat exchanger. If the inlet and outlet temperature of steam are T_{hi} and T_{ho} , and for vegetable oil T_{ci} and T_{co} , respectively, the log mean temperature difference (ΔT_{LM}) will be _____

(A)
$$\frac{T_{hi} - T_{co}}{\ln \frac{T_{hi} - T_{ci}}{T_{hi} - T_{co}}}$$

(B)
$$\frac{(T_{ho} - T_{co}) - (T_{hi} - T_{co})}{\ln \frac{T_{ho} - T_{ci}}{T_{ho} - T_{co}}}$$

(C)
$$\frac{(T_{hi} - T_{co}) - (T_{ho} - T_{ci})}{\ln \frac{T_{hi} - T_{ci}}{T_{co} - T_{ci}}}$$

(D)
$$\frac{T_{co} - T_{ci}}{\ln \frac{T_{hi} - T_{ci}}{T_{hi} - T_{co}}}$$

Q. 10 – Q. 22 carry two marks each.

Q.10 Match the food spoilage organisms given in Column I with the associated foods given in Column II

Column I

- P. *Clostridium botulinum*
- Q. *Salmonella spp.*
- R. *Vibrio parahaemolyticus*
- S. *Bacillus cereus*

Column II

- 1. Fish
- 2. Cooked starch foods
- 3. Meat, egg and poultry
- 4. Canned foods

- (A) P-4, Q-3, R-1, S-2
(C) P-2, Q-1, R-3, S-4

- (B) P-3, Q-4, R-2, S-1
(D) P-4, Q-3, R-2, S-1

Q.11 Fluid is flowing inside a pipe of radius 'R' in fully developed laminar flow. If the velocity of the fluid at the centre at a distance 'L' is ' v_{max} ', velocity at radial distance of $\frac{3}{4}$ (R) will be ___ times v_{max}

- (A) 9/16 (B) 7/16 (C) 16/9 (D) 16/7

Q.12 A meat ball with a radius of 25.4 mm at a temperature of 700 K, is suddenly plunged into a medium whose temperature is held at 395 K. Assume a convective heat transfer coefficient of $11.5 \text{ W m}^{-2} \text{ K}^{-1}$ and take the average physical properties as: $K = 44 \text{ W m}^{-1} \text{ K}^{-1}$, $\rho = 7850 \text{ kg m}^{-3}$ and $c_p = 0.4606 \text{ kJ kg}^{-1} \text{ K}^{-1}$. The temperature (K) of the meat ball after one hour is _____

Q.13 a) **Assertion:** Acidulates are added in soft drinks to provide a buffering action.
r) **Reason:** Buffers tend to prevent changes in pH and prevent excessive tartness.
Choose the correct answer from the following

- (A) Both a) and r) are true but r) is not the correct reason
(B) Both a) and r) are true and r) is the correct reason for a)
(C) a) is true but r) is false
(D) Both a) and r) are false

Q.14 The D_{121} and Z values for *C. botulinum* spores in canned food are 0.2 min and 10°C respectively. Total time required in min, to reduce the spores from 10^2 to 10^{-6} at 111°C is _____.

- Q.15 a) **Assertion:** Olestra is used as a zero calorie fat replacer
 r) **Reason:** It is a sucrose polyester with 6-8 acyl group and is not absorbed in the human digestive system.
 Choose the correct answer from the following

- (A) Both a) and r) are false
 (B) Both a) and r) are true, but r) is not the correct reason for a)
 (C) a) is true but r) is false
 (D) Both a) and r) are true and r) is the correct reason for a)

- Q.16 Match the enzymes in Column I with their functions in Column II

Column I

- P. Amylase
 Q. Invertase
 R. Phosphatase
 S. Protease

Column II

1. Conversion of sucrose to glucose and fructose
 2. Softening of dough
 3. Effectiveness of pasteurization
 4. Conversion of starch to maltose

- (A) P-1, Q-2, R-3, S-4
 (B) P-4, Q-1, R-3, S-2
 (C) P-1, Q-4, R-2, S-3
 (D) P-2, Q-4, R-3, S-1

- Q.17 Match the terms in Column I with their most appropriate description in Column II

Column I

- P. Enrichment
 Q. Fortification
 R. Supplementation
 S. Complementation

Column II

1. Overcome the deficiency of nutrient by mixing of two plant sources
 2. Overcome the deficiency of nutrient from a synthetic source
 3. Restoration of nutrient which is lost during processing
 4. Addition of nutrient which may or may not originally present

- (A) P-3, Q-4, R-2, S-1
 (B) P-4, Q-3, R-1, S-2
 (C) P-1, Q-2, R-3, S-4
 (D) P-2, Q-3, R-1, S-4

- Q.18 Match the products in Column I with their Original Phase in Column II

Column I

- P. Milk
 Q. Butter
 R. Lactose
 S. Casein

Column II

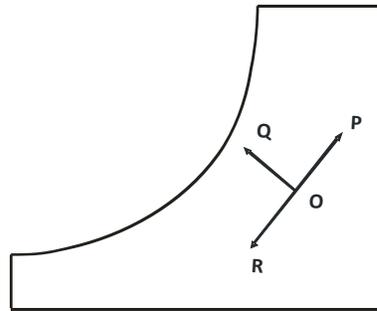
1. Colloidal
 2. Solution
 3. Water in oil emulsion
 4. Oil in water emulsion

- (A) P-3, Q-4, R-1, S-2
 (B) P-3, Q-4, R-2, S-1
 (C) P-4, Q-3, R-2, S-1
 (D) P-4, Q-3, R-1, S-2

- Q.19 a) **Assertion:** Presence of low sulphur containing amino acids make casein in milk to boil, sterilize and concentrate without coagulation even at higher temperature.
 r) **Reason:** This is due to the restricted formation of di-sulphide bonds resulting in increased stability.
 Choose the correct answer from the following

- (A) Both a) and r) are true and r) is the correct reason for a)
 (B) Both a) and r) are true but r) is not the correct reason for a)
 (C) Both a) and r) are false
 (D) a) is true but r) is false

- Q.20 In a typical Psychrometric Chart shown below, the processes OP, OQ and OR related to air water vapor mixture are _____, _____ and _____.



- (A) Cooling & dehumidification, cooling & humidification, heating & humidification
 (B) Cooling & dehumidification, heating & humidification, drying
 (C) Heating & humidification, cooling & humidification, cooling & dehumidification
 (D) Heating & humidification, cooling & dehumidification, drying
- Q.21 A fruit juice with a negligible boiling point rise is being evaporated using saturated steam at 121.1 °C in a triple effect evaporator having equal area in each effect. The pressure of the vapor in the last effect is 25.6 kPa absolute and the corresponding saturation temperature is 65.7 °C. The heat transfer coefficients are $U_1 = 2760$, $U_2 = 1875$ and $U_3 = 1350 \text{ W m}^{-2} \text{ K}^{-1}$. The boiling point (°C) in the first effect is ___ .
- Q.22 In an aeration system, 520 kg of wheat grains having average size of 0.15 mm, shape factor of 0.88 and density of 1040 kg m^{-3} are fluidized using air at 2 atm absolute and 25 °C. If the cross section of empty bed is 0.4 m^2 , the minimum height (m) of the fluidized bed, with voidage of 0.45 will be _____ .

END OF THE QUESTION PAPER