Q. 1 – Q. 5 carry one mark each.

Q.1 The chairman requested the aggrieved shareholders to _____ him.

(A) bare with (B) bore with (C) bear with (D) bare

Q.2 Identify the correct spelling out of the given options:

(A) Managable (B) Manageable (C) Mangaeble (D) Managible

Q.3 Pick the odd one out in the following:

13, 23, 33, 43, 53

(A) 23 (B) 33 (C) 43 (D) 53

Q.4 R2D2 is a robot. R2D2 can repair aeroplanes. No other robot can repair aeroplanes.

Which of the following can be logically inferred from the above statements?

(A) R2D2 is a robot which can only repair aeroplanes.

(B) R2D2 is the only robot which can repair aeroplanes.

(C) R2D2 is a robot which can repair only aeroplanes.

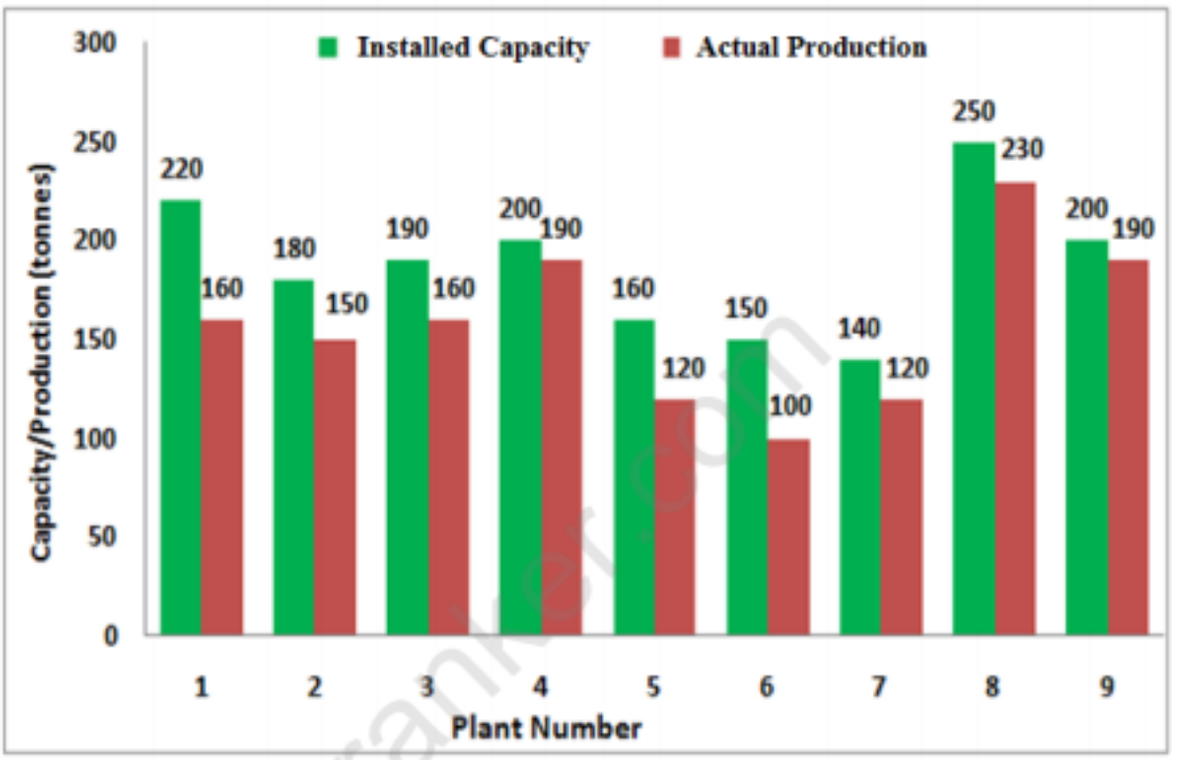
(D) Only R2D2 is a robot.

Q.5 If $|9y-6| = 3$, then $y^2 - 4y/3$ is _____.

(A) 0 (B) +1/3 (C) −1/3 (D) undefined

Q. 6 – Q. 10 carry two marks each.

Q.6 The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is ____.



Q.7 A poll of students appearing for masters in engineering indicated that 60 % of the students believed that mechanical engineering is a profession unsuitable for women. A research study on women with masters or higher degrees in mechanical engineering found that 99 % of such women were successful in their professions.

Which of the following can be logically inferred from the above paragraph?

(A) Many students have misconceptions regarding various engineering disciplines.

(B) Men with advanced degrees in mechanical engineering believe women are well suited to be mechanical engineers.

(C) Mechanical engineering is a profession well suited for women with masters or higher degrees in mechanical engineering.

(D) The number of women pursuing higher degrees in mechanical engineering is small.

Q.8 Sourya committee had proposed the establishment of Sourya Institutes of Technology (SITs) in line with Indian Institutes of Technology (IITs) to cater to the technological and industrial needs of a developing country.

Which of the following can be logically inferred from the above sentence?

Based on the proposal,

(i) In the initial years, SIT students will get degrees from IIT.
(ii) SITs will have a distinct national objective.
(iii) SIT like institutions can only be established in consultation with IIT.
(iv) SITs will serve technological needs of a developing country.

(A) (iii) and (iv) only. (B) (i) and (iv) only.

(C) (ii) and (iv) only. (D) (ii) and (iii) only.

Q.9 Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

(A) 0.2508 (B) 0.2816 (C) 0.2934 (D) 0.6000

Q.10 The numeral in the units position of $211^{870} + 146^{127} \times 3^{424}$ is _____.

END OF THE QUESTION PAPER

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 m^2 cross sectional area is 3 seconds. If the flow rate of juice is 0.4 $m^3 s^{-1}$, 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) $\dfrac{T_{hi}-T_{co}}{\ln\dfrac{T_{hi}-T_{ci}}{T_{hi}-T_{co}}}$

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

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

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

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	**Column II**
P. *Clostridium botulinum*	1. Fish
Q. *Salmonella spp.*	2. Cooked starch foods
R. *Vibrio parahaemolyticus*	3. Meat, egg and poultry
S. *Bacillus cereus*	4. Canned foods

(A) P-4, Q-3, R-1, S-2
(B) P-3, Q-4, R-2, S-1
(C) P-2, Q-1, R-3, S-4
(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 ¾ (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 W m^{-2} K^{-1} and take the average physical properties as: K = 44 W m^{-1} K^{-1}, ρ = 7850 kg m^{-3} and cp = 0.4606 kJ $kg^{-1}K^{-1}$. 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	**Column II**
P. Amylase	1. Conversion of sucrose to glucose and fructose
Q. Invertase	2. Softening of dough
R. Phosphatase	3. Effectiveness of pasteurization
S. Protease	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	**Column II**
P. Enrichment	1. Overcome the deficiency of nutrient by mixing of two plant sources
Q. Fortification	2. Overcome the deficiency of nutrient from a synthetic source
R. Supplementation	3. Restoration of nutrient which is lost during processing
S. Complementation	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

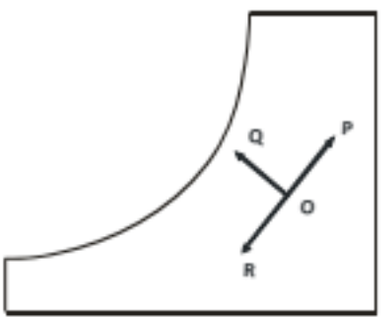
Column I	**Column II**
P. Milk	1. Colloidal
Q. Butter	2. Solution
R. Lactose	3. Water in oil emulsion
S. Casein	4. Oil in water emulsion

(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 $U_3 = 1350$ W m^{-2} 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