

**XE (G): Q. 1 – Q. 9 carry one mark each & Q. 10 – Q. 22 carry two marks each.**

- Q.1 Which of the following is oil soluble pigment present in fruits and vegetables?
- (A) Flavonoids      (B) Carotenoids      (C) Anthocyanins      (D) Tannins
- Q.2 Which of the following represent the group of saturated fatty acids?
- (A) Lauric, Myristic, Arachidic      (B) Palmitic, Linoleic, Linolenic  
(C) Capric, Stearic & Oleic      (D) Behenic, Caprylic, Arachidonic
- Q.3 The anti-nutritional factor present in fava bean is
- (A) Gossypol      (B) Curcine  
(C) Vicine      (D) Cyanogen
- Q.4 Irradiation carried out to reduce viable non-spore forming pathogenic bacteria using a dose between 3 to 10 kGy is called
- (A) Radurization      (B) Thermoradiation  
(C) Radappertization      (D) Radicidation
- Q.5 Identify the correct statement related to the viscosity of Newtonian fluids from the following
- (A) It is not influenced by temperature  
(B) It increases with shearing rate  
(C) It decreases with shearing rate  
(D) It is not influenced by shearing rate
- Q.6 Adult male Wistar rats were fed with a protein based diet. Total 150 g of protein was ingested per animal. If the average weight increased from 110 g to 350 g after the end of the experiment, the Protein efficiency ratio of the given protein would be \_\_\_\_\_. (up to two decimal points)
- Q.7 The initial moisture content of a food on wet basis is 50.76%. Its moisture content (%) on dry basis is \_\_\_\_\_.(up to two decimal points)

- Q.8 The oxygen transmission rate through a  $2.54 \times 10^{-3}$  cm thick low density polyethylene film with air on one side and inert gas on the other side is  $3.5 \times 10^{-6}$  mL  $\text{cm}^{-2} \text{s}^{-1}$ . Oxygen partial pressure difference across the film is 0.21 atm. The permeability coefficient of the film to oxygen is \_\_\_\_\_  $\times 10^{-11}$  mL (STP)  $\text{cm cm}^{-2} \text{s}^{-1} (\text{cm Hg})^{-1}$ .
- Q.9 Ambient air at 30°C dry bulb temperature and 80% relative humidity was heated to a dry bulb temperature of 80°C in a heat exchanger by indirect heating. The amount of moisture gain ( $\text{g kg}^{-1}$  dry air) during the process would be \_\_\_\_\_.
- Q.10 Match the commodity in **Group I** with the bioactive constituent in **Group II**

**Group I**

- P. Ginger  
Q. Green tea  
R. Spinach  
S. Turmeric

**Group II**

1. Lutein  
2. Gingerol  
3. Curcumin  
4. Epigallocatechin gallate

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

- Q.11 Match the process operation in **Group I** with the separated constituent in **Group II**

**Group I**

- P. Extraction  
Q. Degumming  
R. Neutralization  
S. Bleaching

**Group II**

1. Phospholipids  
2. Free fatty acids  
3. Pigments  
4. Crude oil

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

- Q.12 Match the spoilage symptom in **Group I** with the causative microorganism in **Group II**

**Group I**

- P. Green rot of eggs  
Q. Putrid swell in canned fish  
R. Red bread  
S. Yellow discoloration of meat

**Group II**

1. *Micrococcus* spp.  
2. *Serratia marcescens*  
3. *Pseudomonas fluorescens*  
4. *Clostridium sporogenes*

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

Q.13 Match the fermented product in **Group I** with the base material in **Group II**

**Group I**

- P. Sake
- Q. Chhurpi
- R. Natto
- S. Sauerkraut

**Group II**

- 1. Milk
- 2. Cabbage
- 3. Rice
- 4. Soybean

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

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

Q.14 Match the operation in **Group I** with the process in **Group II**

**Group I**

- P. Cleaning
- Q. Grading
- R. Size reduction
- S. Filtration

**Group II**

- 1. Quality separation
- 2. Clarification
- 3. Screening
- 4. Comminution

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

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

Q.15 Out of 7 principles of HACCP system, 4 are listed below. Arrange these principles in the order in which they are applied.

- (P) Conduct a hazard analysis
- (Q) Establish monitoring process
- (R) Establish critical limit
- (S) Establish record keeping and documentation process

- (A) P, R, Q, S
- (B) Q, R, P, S
- (C) P, Q, R, S
- (D) R, S, P, Q

Q.16 Apple juice of 10% total solids (TS) is being concentrated in a single effect evaporator working with a surface condenser to 40% TS under a vacuum of 20 kPa. After some time the vacuum pump stops but the evaporation process continued. Choose the combination of possible implications from the following.

- (P) Product quality is affected
- (Q) Substantial increase in thermal energy requirement
- (R) Decrease in the rate of evaporation

- (A) P & Q
- (B) Q & R
- (C) R & P
- (D) P, Q & R

- Q.17 Identify an example of a classical diffusional mass transfer process without involving heat, among the following.
- (A) Drying of food grains
  - (B) Carbonation of beverages
  - (C) Distillation of alcohol
  - (D) Concentration of fruit juice
- Q.18 For an enzyme catalyzed reaction  $S \rightarrow P$ , the kinetic parameters are:  
 $[S] = 40 \mu\text{M}$ ,  $V_0 = 9.6 \mu\text{M s}^{-1}$  and  $V_{\text{max}} = 12.0 \mu\text{M s}^{-1}$ .  
The  $K_m$  of the enzyme in  $\mu\text{M}$  will be \_\_\_\_\_.(up to one decimal points)
- Q.19 A microbial sample taken at 10 AM contained  $1 \times 10^5$  CFU/mL. The count reached to  $1 \times 10^{10}$  CFU/mL at 8 PM of the same day. The growth rate ( $\text{h}^{-1}$ ) of the microorganism would be \_\_\_\_\_.(up to two decimal points)
- Q.20 Black pepper is ground from an equivalent particle size of 6 mm to 0.12 mm using a 10 hp motor. Assuming Rittinger's equation and that  $1 \text{ hp} = 745.7 \text{ W}$ , the power (hp) of motor required to fine grind black pepper to 0.08 mm would be \_\_\_\_\_.(up to two decimal points)
- Q.21 Green pea (average diameter 0.8 cm) is frozen in a blast freezer operating at  $-40^\circ\text{C}$  and with a surface heat transfer coefficient of  $30 \text{ W m}^{-2} \text{ K}^{-1}$ . The thermal conductivity of pea is  $2.5 \text{ W m}^{-1} \text{ K}^{-1}$ , and latent heat of crystallization is  $2.74 \times 10^2 \text{ kJ kg}^{-1}$ . If the freezing point of pea is  $-1^\circ\text{C}$  and the density is  $1160 \text{ kg m}^{-3}$ , the freezing time in minutes will be \_\_\_\_\_.(up to two decimal points)
- Q.22 The rate of heat transfer from a metal plate is  $1000 \text{ W m}^{-2}$ . The surface temperature of the plate is  $120^\circ\text{C}$  and ambient temperature is  $20^\circ\text{C}$ . The convective heat transfer coefficient ( $\text{W m}^{-2} \text{ }^\circ\text{C}^{-1}$ ) using the Newton's law of cooling will be \_\_\_\_\_.

**END OF THE QUESTION PAPER**

Q.No.	Type	Section	Key/Range	Marks
1	MCQ	GA	A	1
2	MCQ	GA	C	1
3	MCQ	GA	B	1
4	MCQ	GA	B	1
5	MCQ	GA	B	1
6	MCQ	GA	A	2
7	MCQ	GA	D	2
8	MCQ	GA	D	2
9	MCQ	GA	B	2
10	MCQ	GA	C	2
1	MCQ	XE-A	D	1
2	MCQ	XE-A	A	1
3	NAT	XE-A	0.01 to 0.01	1
4	NAT	XE-A	5 to 5	1
5	NAT	XE-A	0.29 to 0.32	1
6	NAT	XE-A	250 to 250	1
7	NAT	XE-A	108 to 108	1
8	MCQ	XE-A	B	2
9	MCQ	XE-A	C	2
10	NAT	XE-A	3 to 3	2
11	NAT	XE-A	0.04 to 0.04	2
1	MCQ	XE-B	B	1
2	MCQ	XE-B	A	1

Q.No.	Type	Section	Key/Range	Marks
3	MCQ	XE-B	D	1
4	MCQ	XE-B	A	1
5	MCQ	XE-B	C	1
6	MCQ	XE-B	B	1
7	MCQ	XE-B	A	1
8	NAT	XE-B	4 to 4	1
9	NAT	XE-B	39 to 42	1
10	MCQ	XE-B	B	2
11	MCQ	XE-B	C	2
12	MCQ	XE-B	C	2
13	MCQ	XE-B	A	2
14	NAT	XE-B	900 to 990	2
15	NAT	XE-B	40 to 42	2
16	NAT	XE-B	2.9 to 3.1	2
17	NAT	XE-B	107 to 127	2
18	NAT	XE-B	440000 to 442000	2
19	NAT	XE-B	0.001 to 0.002	2
20	NAT	XE-B	30 to 45	2
21	NAT	XE-B	4800 to 4800	2
22	NAT	XE-B	1200 to 1350	2
1	MCQ	XE-C	C	1
2	MCQ	XE-C	A	1
3	MCQ	XE-C	B	1

Q.No.	Type	Section	Key/Range	Marks
4	MCQ	XE-C	C	1
5	MCQ	XE-C	A	1
6	MCQ	XE-C	D	1
7	MCQ	XE-C	C	1
8	NAT	XE-C	2 to 2	1
9	NAT	XE-C	6 to 6	1
10	MCQ	XE-C	B	2
11	MCQ	XE-C	A	2
12	MCQ	XE-C	B	2
13	NAT	XE-C	430 to 500	2
14	NAT	XE-C	124 to 124	2
15	NAT	XE-C	2.60 to 2.70	2
16	NAT	XE-C	59.00 to 60.00	2
17	NAT	XE-C	1.85 to 2.00	2
18	NAT	XE-C	132 to 132	2
19	NAT	XE-C	5.01 to 5.17	2
20	NAT	XE-C	5 to 5	2
21	NAT	XE-C	15.5 to 18.5	2
22	NAT	XE-C	1420 to 1480	2
1	MCQ	XE-D	D	1
2	MCQ	XE-D	A	1
3	MCQ	XE-D	D	1
4	MCQ	XE-D	B	1

Q.No.	Type	Section	Key/Range	Marks
5	MCQ	XE-D	B	1
6	NAT	XE-D	52.50 to 53.50	1
7	NAT	XE-D	27.00 to 28.00	1
8	NAT	XE-D	80 to 80	1
9	NAT	XE-D	220.00 to 222.00	1
10	MCQ	XE-D	B	2
11	MCQ	XE-D	B	2
12	MCQ	XE-D	D	2
13	MCQ	XE-D	C	2
14	MCQ	XE-D	C	2
15	MCQ	XE-D	A	2
16	MCQ	XE-D	D	2
17	NAT	XE-D	195.00 to 197.00	2
18	NAT	XE-D	0.01 to 0.02	2
19	NAT	XE-D	14.5 to 15.5	2
20	NAT	XE-D	26.00 to 27.00	2
21	NAT	XE-D	3.10 to 3.20	2
22	NAT	XE-D	13.5 to 14.5	2
1	MCQ	XE-E	B	1
2	MCQ	XE-E	A	1
3	MCQ	XE-E	C	1
4	MCQ	XE-E	A	1
5	MCQ	XE-E	C	1



Q.No.	Type	Section	Key/Range	Marks
6	MCQ	XE-E	D	1
7	NAT	XE-E	160.0 to 161.0	1
8	NAT	XE-E	14.5 to 15.0	1
9	NAT	XE-E	0.30 to 0.32	1
10	MCQ	XE-E	C	2
11	MCQ	XE-E	C	2
12	MCQ	XE-E	D	2
13	MCQ	XE-E	B	2
14	MCQ	XE-E	A	2
15	MCQ	XE-E	D	2
16	NAT	XE-E	332.5 to 336.5	2
17	NAT	XE-E	3.01 to 3.07	2
18	NAT	XE-E	838.0 to 844.0	2
19	NAT	XE-E	961.0 to 962.0	2
20	NAT	XE-E	5.7 to 6.1	2
21	NAT	XE-E	12950.0 to 13000.0	2
22	NAT	XE-E	513.0 to 517.0	2
1	MCQ	XE-F	C	1
2	MCQ	XE-F	A	1
3	MCQ	XE-F	D	1
4	MCQ	XE-F	B	1
5	MCQ	XE-F	D	1
6	MCQ	XE-F	B	1

Q.No.	Type	Section	Key/Range	Marks
7	MCQ	XE-F	A	1
8	NAT	XE-F	1500.00 to 1500.00	1
9	NAT	XE-F	48.52 to 48.72	1
10	MCQ	XE-F	D	2
11	MCQ	XE-F	A	2
12	MCQ	XE-F	B	2
13	MCQ	XE-F	D	2
14	MCQ	XE-F	B	2
15	MCQ	XE-F	D	2
16	MCQ	XE-F	C	2
17	MCQ	XE-F	C	2
18	NAT	XE-F	-25.00 to -24.50	2
19	NAT	XE-F	98.80 to 99.10	2
20	NAT	XE-F	0.90 to 0.93	2
21	NAT	XE-F	17.91 to 18.00	2
22	NAT	XE-F	2600 to 2600	2
1	MCQ	XE-G	B	1
2	MCQ	XE-G	A	1
3	MCQ	XE-G	C	1
4	MCQ	XE-G	D	1
5	MCQ	XE-G	D	1
6	NAT	XE-G	1.55 to 1.65	1
7	NAT	XE-G	103.0 to 103.2	1

Q.No.	Type	Section	Key/Range	Marks
8	NAT	XE-G	54 to 56	1
9	NAT	XE-G	0 to 0	1
10	MCQ	XE-G	B	2
11	MCQ	XE-G	C	2
12	MCQ	XE-G	C	2
13	MCQ	XE-G	A	2
14	MCQ	XE-G	D	2
15	MCQ	XE-G	A	2
16	MCQ	XE-G	C	2
17	MCQ	XE-G	B	2
18	NAT	XE-G	9.8 to 10.2	2
19	NAT	XE-G	1.1 to 1.8	2
20	NAT	XE-G	14.5 to 15.5	2
21	NAT	XE-G	6.0 to 6.4	2
22	NAT	XE-G	10 to 10	2
1	MCQ	XE-H	B	1
2	MCQ	XE-H	C	1
3	MCQ	XE-H	A	1
4	MCQ	XE-H	B	1
5	MCQ	XE-H	B	1
6	MCQ	XE-H	C	1
7	MCQ	XE-H	D	1
8	MCQ	XE-H	D	1

Q.No.	Type	Section	Key/Range	Marks
9	MCQ	XE-H	B	1
10	MCQ	XE-H	A	2
11	MCQ	XE-H	B	2
12	MCQ	XE-H	A	2
13	MCQ	XE-H	B	2
14	NAT	XE-H	1254 to 1256	2
15	NAT	XE-H	19.42 to 19.44	2
16	NAT	XE-H	734.8 to 735.0	2
17	NAT	XE-H	9.16 to 9.18	2
18	NAT	XE-H	12.8 to 13.2	2
19	NAT	XE-H	92.4 to 92.8	2
20	NAT	XE-H	1.3 to 1.4	2
21	NAT	XE-H	0.11 to 0.12	2
22	NAT	XE-H	9.99 to 10.01	2