

- Note: 1. Attempt all the questions.  
2. All the questions carry equal marks.

**Q 1. Answer the following: (Any two) 12**

- (a) Discuss: Air, soil, sewage and water as sources of microorganisms in food.
- (b) Write a short note on microorganisms normally present in milk, eggs, fish and shellfish
- (c) Justify: Nutrients present in food affect microbial growth in it.
- (d) What is the current status of food microbiology?

**Q 2. Answer the following: (Any two) 12**

- (a) Explain the importance of stress adapted microorganisms in food. What are the mechanisms of stress adaptation?
- (b) Explain the sourdough process of bread making.
- (c) What are concentrated starter cultures? How are they produced?
- (d) Schematically explain soy sauce production.

**Q 3. Answer the following: (Any two) 12**

- (a) Discuss the factors affecting heat resistance of microorganisms.
- (b) Write a short note on use of gamma radiation in food preservation.
- (c) Compare the different methods used for low-temperature preservation of food.
- (d) Give the three basic principles to reduce water activity of foods. Describe the different methods used.

**Q 4. Answer the following: (Any two) 12**

- (a) Describe immunoassays for rapid detection of foodborne pathogens and their toxin.
- (b) Define samples and comment on sampling procedure for microbial analysis.
- (c) Comment on risk assessment and management.
- (d) Explain the GMP guidelines for equipment used in food processing

**TURN OVER**

(2)

**Q 5. Do as directed: 12**

**(a) Explain the term: (Any four) 04**

- i. Thermoturics (in food)
- ii. Eh
- iii. Back slopping
- iv. Degree salometer
- v. GRAS substances
- vi. Modified Atmosphere Packaging
- vii. HACCP
- viii. Microbiological specification as per ICMSF

**Q 5. (b) Give two examples of: (Any four) 04**

- i. Bacteria that grow in fruit juices
- ii. Psychrotrophic pathogens found in raw meat and milk
- iii. Starter culture organisms for Swiss cheese
- iv. Cell components damaged by sub lethal stress
- v. FDA approved antibiotics added to food to extend shelf life
- vi. Antimicrobial compounds in spices
- vii. Nonselective agar media for detection of pathogens in food
- viii. Books approved by US authorities for food quality

**Q 5. (c) Give the significance/use of: (Any two) 04**

- i. Extrinsic environment of food
- ii. *Micrococcus* species in sausages
- iii. Filtration for removal of microbes in food
- iv. Verification process of HACCP

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