

R4556

Sub. Code

25MZO2C1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

ANIMAL PHYSIOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The digestive enzyme Ptyalin is found in the secretions of _____ (CO1, K1)
(a) Stomach (b) Small intestine
(c) Large intestine (d) Buccal cavity
2. In the stomach Hydrochloric acid (HCl) is secreted by _____ (CO1, K1)
(a) Mucous neck cells (b) Chief cells
(c) Oxyntic cells (d) Argentaffin cells
3. Which unique artery carry deoxygenated blood? (CO2, K2)
(a) Pulmonary artery (b) Coronary artery
(c) Aorta (d) Carotid artery
4. Identify the plasma protein which plays important role in blood clotting. (CO2, K2)
(a) Albumin (b) Globulin
(c) Fibrinogen (d) Keratin

5. The functional unit of kidney is called as _____ (CO3, K1)
- (a) Flame cells (b) Kidney cells
(c) Henle's loop (d) Nephron
6. In the sarcomere the I bands only contain _____ filaments (CO3, K2)
- (a) Actin (b) Myosin
(c) Troponin (d) Trophomyosin
7. In these animals the body temperature resembles that of atmospheric temperature (CO4, K2)
- (a) Homeotherms (b) Eurytherms
(c) Thermoneutral (d) Poikilotherms
8. This behaviour is also called as summer sleep (CO4, K2)
- (a) Hibernation (b) Aestivation
(c) Perspiration (d) Napping
9. In the continuous light or the dark condition our endogenous clock will _____ (CO5, K2)
- (a) Stopped (b) Entrained
(c) Free run (d) Arrhythmic
10. Hormones that influence the secretion of other hormones are called as (CO5, K2)
- (a) Pituitary hormones
(b) Secretory hormones
(c) Tropic hormones
(d) Secondary messenger

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) How is physiology related with other sciences?
(CO1, K3)

Or

- (b) Explain about the absorption of food materials into the circulatory system.
(CO1, K3)

12. (a) Analyse the different parts of kidney with a diagrammatic representation.
(CO2, K4)

Or

- (b) Illustrate the anatomy of human heart and its function.
(CO2, K4)

13. (a) Illustrate the ultrastructure of the sarcomere with a neat sketch.
(CO3, K4)

Or

- (b) How do you demonstrate the conduction and transmission of nerve impulse.
(CO3, K3)

14. (a) Evaluate the significance of hormone action for the health.
(CO4, K5)

Or

- (b) Compare the adaptations of homeotherms and poikilotherms.
(CO4, K4)

15. (a) Justify the presence of endogenous clock in organisms with explanations.
(CO5, K5)

Or

- (b) List out the different types of adaptations of animals for desert environment.
(CO5, K4)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Assess the importance of haemoglobin in maintaining efficient oxygen transport and transfusion safety. (CO1, K5)
- Or
- (b) Critically analyse the process of digestion, absorption and energy balance in humans. (CO1, K4)
17. (a) Discuss about the cardiac cycle and explain the electrical and mechanical events associated with each phase. (CO2, K3)
- Or
- (b) Illustrate the structure of nephron and analyse its role in urine formation. (CO2, K4)
18. (a) Examine the generation and propagation of nerve impulse with reference to ionic movements across the membrane. (CO3, K4)
- Or
- (b) Critically evaluate the functional significance of sensory organs in adapting animals to their environment. (CO3, K5)
19. (a) How do you assess the physiological adaptations of animals to extreme temperatures and freezing conditions. (CO4, K4)
- Or
- (b) Evaluate the hormonal control of osmoregulation in vertebrates. (CO4, K5)
20. (a) Argue about the consequences of endocrine disorders on animal physiology and behaviour. (CO5, K5)
- Or
- (b) Compare circadian, circannual and lunar rhythms in animal behaviour and survival. (CO5, K5)

R4557

Sub. Code

25MZO2C2

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

IMMUNOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. This is one of the primary lymphoid organ _____ (CO1, K1)
(a) Spleen (b) Lymph node
(c) Thymus (d) Tonsils
2. Complement proteins are mainly involved in (CO1, K1)
(a) Hormone secretion (b) Cell signalling
(c) Pathogen lysis (d) Antibody synthesis
3. Hematopoiesis occurs primarily in the _____ (CO2, K1)
(a) Thymus (b) Bone marrow
(c) Spleen (d) Lymph node
4. Innate immunity is _____ (CO2, K1)
(a) Antigen specific
(b) Acquired after infection
(c) Non-specific
(d) Antibody mediated

5. The BCG vaccine is used against _____ (CO3, K2)
(a) Polio (b) Tuberculosis
(c) Malaria (d) HIV
6. Active immunity is produced by _____ (CO3, K1)
(a) Vaccination or infection
(b) Transfer of antibodies
(c) Antiserum injection
(d) Breast milk
7. Type II hypersensitivity reactions are mediated by _____ (CO4, K1)
(a) IgE antibodies
(b) Immune complexes
(c) IgG or IgM antibodies
(d) T lymphocytes
8. Autoimmune disorders occur due to _____ (CO4, K1)
(a) Strong immune response to pathogens
(b) Failure of immune tolerance
(c) Deficiency of antibodies
(d) Lack of immune memory
9. Which enzyme is most commonly used in ELISA? (CO5, K1)
(a) Amylase
(b) Catalase
(c) Horseradish peroxidase
(d) DNA polymerase
10. The selection medium used in hybridoma technology is _____ (CO5, K1)
(a) LB medium (b) RPMI medium
(c) HAT medium (d) DMEM

Part B

(5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain the scope of immunology. (CO1, K3)

Or

- (b) Describe about the antigen and antibody interaction with examples. (CO1, K4)

12. (a) Write an account on innate immunity and its components. (CO2, K3)

Or

- (b) Briefly discuss about Lymphocytes. (CO2, K4)

13. (a) Analyse the differences between humoral and cell mediated immune responses. (CO3, K4)

Or

- (b) Evaluate the impact of HIV infection on the immune system. (CO3, K5)

14. (a) Describe the immune response involved in graft rejection. (CO4, K3)

Or

- (b) Give an account on causes and consequences of autoimmune disorders. (CO4, K5)

15. (a) Design a comprehensive diagnostic strategy using immune techniques for the detection and confirmation of AIDS. (CO5, K6)

Or

- (b) Evaluate the usefulness of immunofluorescence microscopy in clinical diagnosis. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Analyse the cells, tissues and organs of the immune system with reference to structure and function.

(CO1, K4)

Or

- (b) Evaluate the structure and functions of antibodies.

(CO1, K4)

17. (a) Critically evaluate the elements of the immune system with reference to hematopoiesis and immune cell differentiation.

(CO2, K5)

Or

- (b) Examine cell mediated immunity and its role in host defense.

(CO2, K4)

18. (a) Write an essay on innate and acquired immunity.

(CO3, K4)

Or

- (b) Analyse immune response during tuberculosis infection.

(CO3, K4)

19. (a) Discuss the impact of immunodeficiency diseases on human health.

(CO4, K5)

Or

- (b) Analyse the mechanisms involved in the four types of hypersensitivity reactions.

(CO4, K4)

20. (a) Give an account on principles, procedures, and applications of ELISA, RIA and Western blot in biomolecule detection.

(CO5, K4)

Or

- (b) Evaluate hybridoma technology as a method for monoclonal antibody production.

(CO5, K5)

R 4558

Sub. Code

25MZO2C3

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

DEVELOPMENTAL BIOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Stem cells are best defined as cells that_____

(CO1, K1)

- (a) Have a fixed function
- (b) Can divide only once
- (c) Can self-renew and differentiate
- (d) Are found only in embryos

2. If adult stem cells stop functioning properly, the most affected process would be_____ (CO1, K2)

- (a) Fertilization
- (b) Tissue regeneration
- (c) Cleavage
- (d) Gastrulation

3. The acrosome of a sperm contains_____ (CO2, K1)
- (a) Mitochondria
 - (b) Genetic material
 - (c) Enzymes for egg penetration
 - (d) Centrioles
4. Spermatogenesis produces motile gametes mainly because_____ (CO2, K2)
- (a) They lack yolk
 - (b) They have flagella
 - (c) They are diploid
 - (d) They contain acrosomes
5. The cells formed during cleavage are called _____ (CO3, K1)
- (a) Blastomeres
 - (b) Morula
 - (c) Germ cells
 - (d) Somites
6. If gastrulation is incomplete, the embryo will mainly fail to _____ (CO3, K2)
- (a) Undergo cleavage
 - (b) Form tissues and organs
 - (c) Produce gametes
 - (d) Implant in uterus
7. Dictyostelium is commonly known as a _____ (CO4, K1)
- (a) Green alga
 - (b) Slime mould
 - (c) Fungus
 - (d) Protozoan parasite

8. The gray crescent plays a crucial role in frog development because it_____ (CO4, K2)
- (a) Forms yolk
 - (b) Marks the site of gastrulation
 - (c) Prevents polyspermy
 - (d) Produces hormones
9. Differential gene activation means_____ (CO5, K1)
- (a) Loss of genes during development
 - (b) Different genes expressed in different cells
 - (c) Genes changing their sequence
 - (d) Genes becoming inactive permanently
10. Apoptosis is essential in development because it_____ (CO5, K2)
- (a) Causes tissue damage
 - (b) Removes unwanted cells in shaping organs
 - (c) Stops growth completely
 - (d) Produces energy

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) How would you demonstrate induction and competence work together during tissue differentiation, giving suitable examples. (CO1, K3)

Or

- (b) Analyze the role of imprinting in normal development. (CO1, K4)

12. (a) How would you show sperm structure is adapted for its physiological function. (CO2, K3)

Or

- (b) Categorize the primary, secondary and tertiary egg envelopes in terms of origin and function. (CO2, K4)

13. (a) Analyze the factors affecting cleavage in amphibians, birds, and mammals. (CO3, K4)

Or

- (b) Assess the role of germ cell migration in ensuring proper gametogenesis and fertility. (CO3, K5)

14. (a) Examine the role of inductive signalling in vulva formation in *C. elegans*. (CO4, K4)

Or

- (b) Evaluate the significance of cell aggregation in *Dictyostelium* as a model for studying multicellularity and differentiation. (CO4, K5)

15. (a) Compare differential gene activation in embryonic vs. differentiated cells. (CO5, K4)

Or

- (b) Evaluate the importance of understanding teratogenic factors in preventive medicine. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Analyze the relationship between egg activation and zygote formation. (CO1, K4)

Or

- (b) Evaluate the adaptive significance of different egg types in relation to reproductive strategies. (CO1, K5)

17. (a) Describe the sequence of events during spermatogenesis and oogenesis, emphasizing regulatory differences. (CO2, K3)

Or

- (b) Evaluate the sperm structure and its physiology. (CO2, K5)

18. (a) Compare gastrulation in invertebrates and vertebrates with respect to morphogenetic movements and germ layer formation. (CO3, K2)

Or

- (b) Outline the sequence of morphogenetic movements (epiboly, emboly, invagination and involution) in chick gastrulation. (CO3, K4)

19. (a) Critically assess sex determination mechanism and the evolutionary significance of environmental system. (CO4, K5)

Or

- (b) Evaluate the molecular and cellular mechanisms of organogenesis, including lens induction, and limb development. (CO4, K5)

20. (a) Evaluate the molecular and environmental factors contributing to teratogenesis and strategies for prevention. (CO5, K5)

Or

- (b) Formulate an experimental approach to compare developmental outcomes of embryos generated by IVF versus natural fertilization. (CO5, K6)
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R4559

Sub. Code

25MZO2C4

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

MICROBIOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The scientist who developed the germ theory of disease_____ (CO1, K1)
(a) Leeuwenhoek (b) Pasteur
(c) Beijerinck (d) Waksman
2. The Gram stain technique helps to classify bacteria based on differences in_____ (CO1, K2)
(a) Nucleus structure (b) Cell wall composition
(c) DNA sequence (d) None of the above
3. The culture medium commonly used for general bacterial and fungal growth_____ (CO1, K1)
(a) Nutrient agar
(b) MacConkey agar
(c) Potato Dextrose Agar (PDA) media
(d) Sabouraud agar

4. Lag phase is also known as _____ (CO1, K2)
- (a) Period of initial adjustment
 - (b) Transitional period
 - (c) Generation time
 - (d) Period of rapid growth
5. Which disease is caused by a Morbillivirus and affects sheep and goats? (CO2, K1)
- (a) Foot and Mouth Disease
 - (b) Peste des Petits Ruminants (PPR)
 - (c) Bluetongue
 - (d) Bovine Tuberculosis
6. A major viral disease in poultry _____ (CO4, K2)
- (a) Coccidiosis
 - (b) Newcastle Disease
 - (c) Foot Rot
 - (d) Caseous Lymphadenitis
7. Algal poisoning in livestock is most commonly caused by _____ (CO4, K1)
- (a) Blue-green algae (cyanobacteria) toxins
 - (b) Fungal spores
 - (c) Viral particles
 - (d) Bacterial endotoxins

8. A common symptom of protozoan infections like coccidiosis is _____ (CO4, K2)
- (a) Respiratory distress
 - (b) Diarrhea and weight loss
 - (c) Neurological paralysis
 - (d) Hoof deformities
9. _____ bacteria responsible for curd formation (CO5, K1)
- (a) Lactobacillus
 - (b) Pediococcus
 - (c) Zymomonas
 - (d) Acetobacter
10. Which of the following is a common spoilage organism in milk? (CO5, K3)
- (a) *Pseudomonas spp.*
 - (b) *Listeria monocytogenes*
 - (c) *Clostridium botulinum*
 - (d) *Norovirus*

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Interpret the impact of virus life cycle (lytic vs lysogenic) on disease progression. (CO1, K3)

Or

- (b) Analyze the morphological features protozoa. (CO1, K4)

12. (a) Assess the different types of culture media and explain their uses in microbiology. (CO2, K5)

Or

- (b) Categorize the phases of microbial growth in a batch culture and discuss two factors that influence the growth rate. (CO2, K4)

13. (a) Assess the infectious bacterial diseases in terms of clinical signs and diagnostic methods. (CO3, K5)

Or

- (b) Give an account on symptoms and control measure of Anthrax. (CO3, K3)

14. (a) Evaluate the challenges and limitations of controlling zoonotic diseases. (CO4, K5)

Or

- (b) Outline the causes, symptoms and control measure of fungal pathogens in small ruminants. (CO4, K4)

15. (a) Analyze the role of beneficial microbes in milk fermentation and explain how these microbes influence product quality and safety. (CO5, K4)

Or

- (b) Evaluate how microbial interactions affect food spoilage. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Write the special staining techniques for microscopic identification of Microorganisms. (CO1, K3)

Or

- (b) Critically analyze the virus replication cycle and discuss how different stages of the cycle can be targeted by antiviral drugs. (CO4, K4)

17. (a) Discuss in detail the classification of culture media and explain how they are used for isolation and preliminary identification of microorganisms. (CO2, K3)

Or

- (b) Analyze the different methods of sterilization highlighting their principles involved. (CO1, K4)

18. (a) Evaluate about the common bacterial disease in poultry. (CO3, K5)

Or

- (b) Assess the causes, symptoms, diagnosis and control of foot and mouth disease in pigs. (CO3, K5)

19. (a) Evaluate current zoonotic disease control measures in livestock production systems, focusing on strategies for mitigating emerging and reemerging zoonoses. (CO4, K5)

Or

- (b) Outline the causes, symptoms and control measure of protozoan disease in poultry. (CO4, K4)

20. (a) Analyze the microbiological ecology of milk and food, focusing on spoilage microorganisms. (CO5, K5)

Or

- (b) Investigate the impact of a novel probiotic strain on improving safety and shelf life of a dairy product. (CO5, K5)
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R4560

Sub. Code

25MZO2E1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

Elective – ANIMAL BIOTECHNOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which macromolecule forms the structural framework of cell membranes? (CO1, K1)
(a) Proteins (b) Phospholipids
(c) Polysaccharides (d) Nucleotides
2. Restriction enzymes used in genetic engineering were originally isolated from (CO1, K1)
(a) Viruses (b) Plants
(c) Fungi (d) Bacteria
3. The most commonly used yeast cloning vector is (CO2, K1)
(a) pUC19 (b) YAC
(c) BAC (d) pBR322

4. Which enzyme synthesizes complementary DNA (cDNA)?
(CO2, K1)
- (a) DNA polymerase III
 - (b) RNA polymerase
 - (c) Reverse transcriptase
 - (d) DNA ligase
5. Nick translation uses which enzyme for probe labeling?
(CO3, K1)
- (a) DNA ligase
 - (b) DNA polymerase I
 - (c) Taq polymerase
 - (d) Reverse transcriptase
6. DNA fingerprinting is primarily based on variations in
(CO3, K2)
- (a) SNPs
 - (b) VNTRs / STRs
 - (c) Exons
 - (d) Promoters
7. Who is considered the pioneer of animal tissue culture?
(CO4, K1)
- (a) Louis Pasteur
 - (b) Wilhelm Roux
 - (c) Robert Koch
 - (d) Edward Jenner
8. Tissue plasminogen activator (tPA) is primarily used for
(CO4, K2)
- (a) Cancer therapy
 - (b) Blood clot dissolution
 - (c) Insulin regulation
 - (d) Immune suppression

9. The hormone most commonly used to induce superovulation in cattle is (CO5, K1)
- (a) Estrogen
 - (b) Progesterone
 - (c) Follicle Stimulating Hormone (FSH)
 - (d) Oxytocin
10. Embryo splitting results in the production of (CO5, K2)
- (a) Transgenic embryos
 - (b) Genetically identical embryos
 - (c) Hybrid embryos
 - (d) Haploid embryos

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Describe the types and functions of macromolecules present in an animal cell. (CO1, K2)

Or

- (b) Write a short note on GEAC (Genetic Engineering Appraisal Committee) in India. (CO1, K1)

12. (a) Describe the structure and important features of pBR322 plasmid vector. (CO2, K4)

Or

- (b) Describe the process of restriction digestion and ligation in gene cloning. (CO2, K3)

13. (a) Define molecular probes. Describe the different types of molecular probes with examples. (CO3, K3)

Or

- (b) Explain the principle of DNA microarray technology. (CO3, K2)

14. (a) Explain the composition and role of animal cells culture media. (CO4, K4)

Or

- (b) Describe the different phases of cell growth kinetics with a neat sketch. (CO4, K3)

15. (a) Explain the principle and advantages of artificial insemination in cattle. (CO5, K4)

Or

- (b) Differentiate between knock-in and knock-out gene transfer technologies. (CO5, K4)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Describe the principles and steps involved in recombinant DNA technology with suitable diagrams. (CO1, K4)

Or

- (b) Discuss GMOs in agriculture. Mention their advantages, limitations, and biosafety concerns. (CO1, K5)

17. (a) Explain various cloning vectors for Gram-negative bacteria including plasmids, bacteriophages, cosmids and phagemids. (CO2, K4)

Or

- (b) Describe the construction of genomic and cDNA libraries, including vectors, enzymes and screening methods. (CO2, K3)

18. (a) Discuss second-generation (next-generation) DNA sequencing technologies and their advantages over first-generation methods. (CO3, K5)

Or

- (b) Describe site-directed mutagenesis and its applications in functional genomics. (CO3, K4)

19. (a) Discuss various types of animal cell culture methods. (CO4, K4)

Or

- (b) Discuss pharmaceutical products obtained from animal cell culture with special reference to: Vaccines, Humulin, Tissue plasminogen activator (tPA) and Blood clotting factors. (CO4, K5)

20. (a) Discuss embryo splitting and cryopreservation techniques with their applications in animal biotechnology (CO5, K4)

Or

- (b) Explain superovulation, embryo recovery and embryo transfer techniques used in livestock improvement. (CO5, K4)
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R4561

Sub. Code

25MZO2S1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Zoology

FOOD PROCESSING TECHNOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. Freezing milk primarily helps to_____ (CO1, K1)
 - (a) Sterilize it
 - (b) Preserve it for longer durations
 - (c) Evaporate water
 - (d) Increase fat content

2. Milk collection for processing plants should be followed immediately by_____ (CO1, K2)
 - (a) Fermentation
 - (b) Rapid cooling to prevent spoilage
 - (c) Adding preservatives
 - (d) Freeze-drying

3. The meat and poultry processing industry is important because it provides _____ (CO2, K1)
- (a) Only plant-based foods
 - (b) Safe, nutritious animal protein products
 - (c) Only spices
 - (d) Only refrigerated milk
4. Which preservation method exposes meat to wood smoke and adds flavor? _____ (CO1, K2)
- (a) Canning
 - (b) Smoking
 - (c) Refrigeration
 - (d) Fermentation
5. Quality assurance in seafood processing includes _____ (CO3, K1)
- (a) Only final inspection
 - (b) Managing safety and quality throughout production
 - (c) Ignoring hygiene
 - (d) Adding artificial flavors only
6. Freeze drying in fish processing helps to _____ (CO3, K2)
- (a) Add water
 - (b) Remove water while preserving nutrients
 - (c) Cook the fish
 - (d) Only color the product
7. One reason fruits and vegetables are processed is to _____ (CO4, K1)
- (a) Make them less safe
 - (b) Extend their availability year-round
 - (c) Only change their color
 - (d) None of the above

8. HACCP is a system used to _____ (CO4, K2)
- (a) Advertise processed food products
 - (b) Identify and control hazards in the food processing chain
 - (c) Increase water activity in food
 - (d) Only add preservatives
9. In India, the Food Safety and Standards Authority of India (FSSAI) was established under _____ (CO5, K1)
- (a) The Prevention of Food Adulteration Act
 - (b) The Food Safety and Standards Act, 2006
 - (c) The Essential Commodities Act
 - (d) the Agricultural Produce Act
10. Under Indian food laws, the Milk and Milk Products Order regulates _____ (CO5, K3)
- (a) Milk processing and distribution
 - (b) Fruit juice bottling
 - (c) Vegetable oil refining
 - (d) Ice manufacturing

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Categorize the effects of different pasteurization methods on the microbial safety and shelf life of milk. (CO1, K4)

Or

- (b) Give a outline of the role of QA (Quality Assurance) in ensuring consistent safety and quality of dairy products. (CO1, K4)

12. (a) Explain about meat and poultry pre-processing. (CO2, K3)

Or

- (b) Assess the advantages and limitations of traditional thermal processing. (CO2, K5)

13. (a) Evaluate the significance of nutritional standards in seafood processing. (CO3, K5)

Or

- (b) Demonstrate how individual Quick Freezing (IQF) differs from bulk freezing in seafood processing. (CO3, K3)

14. (a) Apply the principles of post-harvest handling to explain the sequence of steps followed from fruit collection to storage to minimize quality losses. (CO4, K5)

Or

- (b) Compare pre-processing requirements for fresh-cut vegetables versus whole vegetables before storage. (CO4, K4)

15. (a) Outline the basic principles of Good Manufacturing Practices (GMP). (CO5, K4)

Or

- (b) Defend the role of Quality Control (QC) roles in the food industry. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Evaluate in detail the processing steps involved in transforming raw milk different dairy products, focusing on the technological principles behind each products. (CO1, K4)

Or

- (b) Assess the impact of international quality standards and regulatory frameworks on dairy processing practices and trade. (CO1, K5)

17. (a) Apply processing principles to describe the step-by-step production of a value-added poultry product. (CO2, K4)

Or

- (b) Evaluate the effectiveness of different meat preservation techniques. (CO2, K5)

18. (a) Critically analyze the national and international status of the seafood processing industry, highlighting major export markets. (CO3, K5)

Or

- (b) Apply your understanding of seafood post-harvest processing to describe the complete sequence from landing/receiving of raw fish to ready-to-package product. (CO3, K4)

19. (a) Evaluate the role of Quality Assurance (QA) and Quality Control (QC) systems in fruits and vegetable processing plants, focusing on maintaining product safety, compliance and market competitiveness. (CO4, K5)

Or

- (b) Critically assess the adoption of HACCP in fruit and vegetable processing. (CO4, K4)

20. (a) Evaluate the strengths and limitations of the HACCP system. (CO5, K5)

Or

- (b) Assess the impact of Good Manufacturing Practices (GMP) on food safety culture. (CO5, K5)
-