R4623	Sub. Code 25LMB2C1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

MARINE ECOLOGY AND BIODIVERSITY

(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 of the following best defines ecology? (CO1, K2)

   (a) Study of ocean currents

   (b) Study of organisms and their interactions with the environment

   (c) Study of marine resources

   (d) Study of climate change only

2. Population density refers to: (CO1, K1)

   (a) Total number of species in an area

   (b) Total biomass of organisms

   (c) Number of individuals per unit area or volume

   (d) Age distribution of a population

3. The Importance Value Index (IVI) of a plant species is calculated using: (CO1, K2)

(a) Density alone

(b) Frequency and abundance

(c) Relative density, relative frequency, and relative dominance

(d) Basal area only

4. An ecotone is best described as: (CO2, K2)

(a) A stable climax community

(b) A transitional zone between two ecosystems

(c) A habitat with low species diversity

(d) A purely marine ecosystem

5. The final stable stage of ecological succession is known as: (CO2, K1)

(a) Nudation (b) Invasion

(c) Reaction (d) Climax

6. Which ecological pyramid is always upright in an ecosystem? (CO3, K2)

(a) Pyramid of numbers

(b) Pyramid of biomass

(c) Pyramid of energy

(d) Pyramid of productivity

7. Which of the following biodiversity indices accounts for both species richness and evenness? (CO4, K2)

(a) Simpson index

(b) Dominance index

(c) Shannon—Weiner index

(d) Similarity index

8. The International Code of Zoological Nomenclature (ICZN) primarily deals with: (CO4, K2)

(a) Classification of plants

(b) Naming of animal taxa

(c) Molecular taxonomy

(d) Biodiversity conservation

9. Which zone of a biosphere reserve permits limited human activities such as research and education? (CO5, K2)

(a) Core zone

(b) Buffer zone

(c) Transition zone

(d) Wilderness zone

10. Which of the following is a major marine biodiversity hotspot in India known for coral reefs and seagrass ecosystems? (CO5, K2)

(a) Sundarbans

(b) Gulf of Mannar

(c) Gulf of Kutch

(d) Gahirmatha Marine Sanctuary

Part B (5 × 5 = 25)

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

11. (a) Demonstrate the marine ecology and explain its concept and scope. (CO1, K3)

Or

(b) Solve the branches of ecology with emphasis on qualitative and quantitative ecology. (CO1, K3)

12. (a) Analyse the characteristics of a biological community and explain the classification of communities. (CO2, K4)

Or

(b) Outline the community structure with reference to quantitative and qualitative characteristics of plant communities. (CO2, K4)

13. (a) Assess the ecological succession, its causes, and main processes such as nudation, invasion, competition, reaction, and climax. (CO2, K5)

Or

(b) Justify the types and functional trends of succession with examples. (CO3, K5)

14. (a) Define taxonomy and explain biosystematics, classification, and modern trends such as chemo-, cyto-, and molecular taxonomy. (CO3, K6)

Or

(b) Compose the species concepts, infra-specific categories, reproductive isolation, and genetic incompatibility. (CO4, K6)

15. (a) Formulate the significance and zonation of biosphere reserves and distinguish them from national parks and wildlife sanctuaries. (CO4, K6)

Or

(b) Compose major marine biodiversity hotspots of India. (CO4, K6)

Part C (5 × 8 = 40)

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

16. (a) Conclude the population characteristics such as population size, density, age structure, natality, and mortality. (CO4, K6)

Or

(b) Evaluate the population dynamics in marine ecosystems. (CO5, K6)

17. (a) Classify the coastal and marine communities with reference to estuaries, mangroves, coral reefs, and marine angiosperms. (CO3, K4)

Or

(b) Outline the habitat and ecological niche, emphasizing spatial, trophic, and hyper volume niches. (CO4, K4)

18. (a) Develop the marine ecosystem structure and function. (CO4, K6)

Or

(b) Derive the energy flow with reference to ecological pyramids, energetics, free energy, and entropy. (CO4, K6)

19. (a) Evaluate the taxonomic procedures, types of keys, and their merits and demerits. Add a note on ICZN principles. (CO4, K5)

Or

(b) Defend the biodiversity and explain its levels, measurement ecological significance, and major threats, with reference to Indian and tropical regions. (CO5, K4)

20. (a) Argue the biodiversity balance in complex ecosystems, highlighting keystone species and niche complementarity. (CO4, K5)

Or

(b) Select and explain the various marine biodiversity conservation strategies. (CO5, K4)

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R4624

Sub. Code
25LMB2C2

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

FISHERY 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. Which of the following fishes belongs to the class Chondrichthyes? (CO1, K1)

   (a) Rohu

   (b) Catla

   (c) Shark

   (d) Seer fish

2. Which Indian major carp is mainly a bottom feeder? (CO1, K1)

   (a) Catla catla

   (b) Labeo rohita

   (c) Cirrhinus mrigala

   (d) Hypophthalmichthys molitrix

3. Which hormone is mainly responsible for final maturation and ovulation in fishes? (CO1, K2)

(a) Prolactin

(b) Gonadotropin

(c) Cortisol

(d) Thyroxine

4. Cryopreservation in fish reproduction is primarily used for the storage of: (CO2, K2)

(a) Fish eggs

(b) Fish larvae

(c) Fish gametes

(d) Fish hormones

5. Which structure is most commonly used for age determination in fishes? (CO2, K1)

(a) Scales (b) Fins

(c) Otoliths (d) Gills

6. The main objective of a fishing ban is to: (CO3, K2)

(a) Increase export value

(b) Reduce spoilage

(c) Protect breeding stock and ensure recruitment

(d) Promote fish processing industries

7. CPUE (Catch Per Unit Effort) is an important indicator of: (CO4, K1)

(a) Fish growth rate

(b) Fish fecundity

(c) Fish stock abundance

(d) Fish spoilage

8. HACCP in fishery products primarily ensures: (CO4, K2)

(a) Increased fish production

(b) Export promotion

(c) Food safety through hazard control

(d) Disease treatment

9. Which of the following is a major pelagic fish resource of India? (CO5, K2)

(a) Pomfret

(b) Sardine

(c) Catfish

(d) Prawn

10. Coldwater fisheries in India are mainly associated with: (CO5, K2)

(a) Deccan Plateau

(b) Indo-Gangetic plains

(c) Himalayan region

(d) Coastal plains

Part B (5 × 5 = 25)

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

11. (a) Apply the general morphology of fishes and its adaptive significance. (CO1, K3)

Or

(b) Outline the classification of fishes, mentioning the major groups and their key features. (CO1, K3)

12. (a) Analyse the role of hormones in fish reproduction with reference to maturation and spawning. (CO2, K4)

Or

(b) Diagram the maturity stages of fish gonads based on morphological and histological features. (CO2, K4)

13. (a) Measure the length—weight relationship in fishes and factors affecting growth and condition factor. (CO2, K5)

Or

(b) Justify the tagging and marking methods in fishes and their role in migration and population studies. (CO3, K5)

14. (a) Evaluate the theory of fishing with reference to unit stock, recruitment, mortality, and CPUE. (CO3, K5)

Or

(b) Argue on indigenous and modern crafts and gears used in marine fisheries. (CO4, K5)

15. (a) Compose the marine fishery resources of India, with reference to the East and West Coasts. (CO4, K6)

Or

(b) Develop a note on fishery resources of Tamil Nadu, highlighting major landing centres and important fish groups. (CO4, K6)

Part C (5 × 8 = 40)

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

16. (a) Classify the major groups of world fishes with their distinctive characters and examples. (CO1, K4)

Or

(b) Categorise the bionomics of fishes with reference to Indian major carps and three exotic fishes. (CO1, K4)

17. (a) Outline the sex determination in fishes and explain monosex production using hormonal and chromosomal methods. (CO2, K4)

Or

(b) Justify the fish immune system and describe hybridization, androgenesis, and gynogenesis in aquaculture. (CO2, K5)

18. (a) Evaluate the age determination and fecundity estimation in fishes and explain the role of fish conservation in fisheries management. (CO3, K5)

Or

(b) Compose the post-harvest technology of fish, including spoilage and processing and marketing of fish by-products. (CO3, K6)

19. (a) Develop a population dynamics in fisheries with reference to recruitment, mortality, and CPUE and their management importance. (CO4, K6)

Or

(b) Conclude the fish and public health and role of MPEDA, FSSAI, HACCP, and NABI on it. (CO4, K6)

20. (a) Convince the major pelagic fish resources of India, including sardines, mackerel, anchovies, Leiognathus, tuna, and seer fish. (CO5, K6)

Or

(b) Assess the major demersal and benthic fishery resources of India. (CO5, K5)

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R4625

Sub. Code
25LMB2C3

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

BIOCHEMISTRY AND 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. Which amino acid is most likely to disrupt an α-helix when present internally? (CO1, K1)

   (a) Alanine

   (b) Leucine

   (c) Proline

   (d) Glutamate

2. Immunoglobulins are structurally classified under (CO1, K2)

   (a) Fibrous proteins

   (b) Lipoproteins

   (c) Globular proteins

   (d) Glycolipids

3. Which thermodynamic parameter determines reaction spontaneity under constant temperature and pressure? (CO2, K1)

(a) ΔH (b) ΔS

(c) ΔG (d) ΔE

4. Which step of glycolysis yields ATP by substrate-level phosphorylation? (CO2, K1)

(a) 1,3 -bisphosphoglycerate $\rightarrow$3-phosphoglycerate

(b) Fructose-6-phosphate $\rightarrow$ Fructose-1 ,6-bisphosphate

(c) Glucose $\rightarrow$ Glucose-6-phosphate

(d) Pyruvate $\rightarrow$ Lactate

5. Which immune component evolved earliest phylogenetically? (CO3, K1)

(a) Antibodies

(b) T-cell receptors

(c) MHC molecules

(d) Innate immune receptors

6. NK cells recognize target cells mainly by (CO3, K2)

(a) Antigen specificity

(b) Absence of MHC I

(c) Antibody binding

(d) Complement activation

7. Antigenic determinants are also known as (CO4, K1)

(a) Paratopes (b) Isotypes

(c) Idiotypes (d) Epitopes

8. The pentameric immunoglobulin is _____. (CO4, K2)

(a) IgG (b) IgA

(c) IgM (d) IgE

9. Class switching in antibodies occurs due to changes in (CO4, K1)

(a) Variable region genes

(b) Constant region genes

(c) Antigen specificity

(d) Light chain genes

10. Pathogens evade humoral immunity by all, except (CO5, K2)

(a) Antigenic variation

(b) Intracellular survival

(c) Capsule formation

(d) Increased antibody binding

Part B (5 × 5 = 25)

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

11. (a) Examine the functions of proteins and amino acids. (CO1, K3)

Or

(b) Determine the role of enzymes in regulating metabolic pathways. (CO1, K3)

12. (a) Illustrate the concept of energy flow in biological systems. (CO2, K4)

Or

(b) Outline the process of oxidative phosphorylation. (CO2, K4)

13. (a) Evaluate the history and scope of immunology. (CO3, K5)

Or

(b) Assess the structure and functions of T lymphocytes. (CO3, K5)

14. (a) Outline the forces involved in antigen-antibody interactions. (CO4, K4)

Or

(b) Illustrate the basic structure of an immunoglobulin molecule. (CO4, K4)

15. (a) Justify the mechanisms of antibody formation in humoral immunity. (CO4, K5)

Or

(b) Assess the role of adaptive immunity in infectious diseases. (CO5, K5)

Part C (5 × 8 = 40)

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

16. (a) Classify hormones into steroid and peptide hormones with examples. (CO1, K4)

Or

(b) Infer the relationship between vitamin deficiency and metabolic disorders. (CO1, K4)

17. (a) Develop an essay on the bioenergetic reactions into exergonic and endergonic types. (CO2, K6)

Or

(b) Compose a concise explanation on the importance of bioenergetics in living systems. (CO2, K6)

18. (a) Justify the importance of innate and acquired immunity. (CO4, K5)

Or

(b) Compare natural killer cells and lymphokine-activated killer cells. (CO4, K5)

19. (a) Analyze the concepts of affinity, avidity, and valency in antigen-antibody reactions. (CO3, K4)

Or

(b) Classify immunoglobulins based on structure and function. (CO3, K4)

20. (a) Support the role of humoral immunity in protection against extracellular pathogens. (CO5, K5)

Or

(b) Evaluate the causes and consequences of immunodeficiency diseases. (CO5, K5)

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R4626

Sub. Code
25LMB2C4

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

MARINE MICROBIOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A 10 × 1 = 10)

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

1. Which of the following techniques is most suitable for isolating anaerobic marine bacteria? (CO1, K2)

   (a) Aerobic culture in open petri dishes

   (b) Anaerobic jars with nitrogen flushing

   (c) Shaking culture in liquid broth

   (d) Culture in static liquid media

2. The primary importance of sterilization in marine microbiology is to (CO1, K1)

   (a) Enhance microbial growth rate

   (b) Eliminate contaminants and ensure pure cultures

   (c) Increase nutrient availability

   (d) Reduce the cost of culture media

3. Which marine microorganism is characterized by branching filaments and aerial mycelium? (CO2, K2)

(a) Vibrio species

(b) Actinomycetes

(c) Bacillus species

(d) Salmonella

4. Morphological identification of marine bacteria based on Gram staining primarily distinguishes (CO2, K1)

(a) Cell wall composition and shape

(b) Metabolic capabilities

(c) Antibiotic resistance

(d) Pathogenic potential

5. The occurrence of actinomycetes in marine environments is significant because (CO3, K1)

(a) They cause only pathogenic infections

(b) They produce secondary metabolites with biotechnological applications

(c) They cannot survive in salt water

(d) They reduce biodiversity

6. Which of the following represents a mutualistic relationship between microbes and marine organisms? (CO3, K2)

(a) Parasitism in fish diseases

(b) Bacterial symbiosis in marine sponges

(c) Microbial predation

(d) Competitive exclusion

7. The role of microalgae in aquaculture systems includes (CO4, K1)

(a) Disease causation only

(b) Oxygen production and nutrient cycling

(c) Toxin production

(d) Habitat destruction

8. Which pathogenic organism is primarily responsible for water-borne diseases in coastal areas? (CO4, K2)

(a) *Vibrio cholerae*

(b) *Streptococcus pyogenes*

(c) *Clostridium botulinum*

(d) *Bacillus anthracis*

9. Indicator organisms for water quality assessment are used to: (CO5, K1)

(a) Enhance microbial growth

(b) Detect fecal contamination and assess sanitary quality

(c) Reduce pollution

(d) Increase nutrient availability

10. In microbial biotechnology, element recovery primarily focuses on: (CO5, K2)

(a) Waste generation

(b) Extraction of valuable elements from industrial waste and water

(c) Pollutant accumulation

(d) Habitat degradation

Part B (5 × 5 = 25)

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

11. (a) How would you demonstrate isolation of microorganisms from marine environment? (CO1, K3)

Or

(b) Elucidate the methods of studying marine microorganisms including collection, isolation, identification based on morphological and biochemical characteristics. (CO1, K3)

12. (a) Discuss the occurrence and distribution of marine fungi and actinomycetes in oceanic environments. What are their morphological features and ecological roles? (CO2, K4)

Or

(b) Provide specific examples of microbial adaptations to extreme marine conditions. (CO2, K5)

13. (a) Describe the relationships between microbes and marine animals, including commensals, symbionts, and parasites. (CO3, K5)

Or

(b) How do surface growth communities and biofilms influence the health of cultured aquatic animals? What control methods are employed? (CO3, K4)

14. (a) Explain the distribution and pathogenic potential of waterborne microorganisms in polluted aquatic environments. How do indicator organisms help assess water quality? (CO4, K5)

Or

(b) Describe the various microorganisms involved in water contamination and their prevention strategies in both natural and treated water systems. (CO4, K5)

15. (a) How are microbes utilised in the degradation of various compounds, and what is their application in food microbiology? (CO5, K5)

Or

(b) Explain microbial biotechnology applications including bioremediation of pollutants, biodegradation of aromatic compounds and pesticides, and the production of food-grade products. (CO5, K4)

Part C (5 × 8 = 40)

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

16. (a) What are the applications of marine microbiology? Explain sterilization techniques and culture media selection. (CO1, K3)

Or

(b) Describe bacterial enumeration methods. Explain marine culture techniques and identification processes. (CO1, K5)

17. (a) Explain marine fungi and actinomycetes adaptations. Discuss their ecological roles in nutrient cycling. (CO2, K4)

Or

(b) How do environmental factors affect microbial metabolism? Describe extremophile adaptations in marine niches. (CO2, K5)

18. (a) What are microbe-marine animal symbioses? Explain biofilms in aquaculture disease dynamics. (CO3, K3)

Or

(b) Discuss microbes in marine ecology. Explain live feed culture and aquaculture disease management. (CO3, K4)

19. (a) Describe waterborne pathogens and indicator organisms. Explain international water quality standards. (CO4, K4)

Or

(b) Explain microbial ecology of pollution. Discuss biomarkers and biological water treatment methods. (CO4, K5)

20. (a) What is microbial fermentation technology? Explain biodegradation processes and food-grade product development. (CO5, K4)

Or

(b) Describe bioremediation mechanisms. Explain engineered microbes and probiotics applications. (CO5, K3)

R4627	Sub. Code 25LMB2E2

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

Elective – BIOLOGICAL OCEANOGRAPHY

(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. Plankton that spend their entire life cycle in the planktonic form are called: (CO1, K2)

   (a) Meroplankton (b) Holoplankton

   (c) Pleuston (d) Nekton

2. Which method is commonly used for the estimation of plankton volume? (CO1, K1)

   (a) Wet weight (b) Displacement method

   (c) Dry weight (d) Filtration

3. The phenomenon of "Red Tide" is primarily caused by an explosion in the population of: (CO2, K2)

   (a) Diatoms (b) Dinoflagellates

   (c) Green algae (d) Brown algae

4. Which of the following is a structural adaptation for flotation in plankton? (CO2, K1)

(a) Increased oil droplets

(b) Heavy shells

(c) Reduced surface area

(d) Muscle development

5. The total amount of organic matter produced by autotrophs is known as: (CO3, K1)

(a) Net Primary Production

(b) Secondary Production

(c) Gross Primary Production

(d) Tertiary Production

6. Which nutrient is often a limiting factor for primary production in the open ocean? (CO3, K2)

(a) Sodium

(b) Nitrogen

(c) Chloride

(d) Magnesium

7. Mangroves are characterized by specialized breathing roots called: (CO4, K1)

(a) Prop roots

(b) Pneumatophores

(c) Stilt roots

(d) Haustoria

8. Which seaweed is a major source of Agar-Agar? (CO4, K2)

(a) Sargassum

(b) Gracilaria

(c) Ulva

(d) Enteromorpha

9. Salt marshes are typically found in which type of coastal environment? (CO5, K1)

(a) High energy rocky shores

(b) Low energy sheltered coasts

(c) Deep sea trenches

(d) Desert coastlines

10. The primary ecological role of mudflats is: (CO5, K2)

(a) High speed water runoff

(b) Feeding grounds for birds

(c) Timber production

(d) Commercial mining

Part B (5 × 5 = 25)

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

11. (a) Classify plankton based on their size categories. (CO1, K3)

Or

(b) Explain the methods for estimating the standing crop of plankton using wet and dry weight. (CO1, K3)

12. (a) Discuss the physiological mechanisms used by plankton for flotation. (CO2, K4)

Or

(b) Describe the causes and ecological effects of the Red Tide phenomenon. (CO2, K5)

13. (a) Distinguish between primary and secondary production in the marine environment. (CO3, K5)

Or

(b) List and briefly explain the factors affecting primary production in the ocean. (CO3, K4)

14. (a) Describe the morphological adaptations of Seaweeds. (CO4, K6)

Or

(b) Explain the ecological role and distribution of Seagrasses. (CO4, K5)

15. (a) Write a short note on the vegetation and features of Sand Dunes. (CO5, K5)

Or

(b) Discuss the importance of Mudflat ecosystems and their conservation needs. (CO5, K4)

Part C (5 × 8 = 40)

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

16. (a) Provide a detailed account of the classification of plankton based on mode of life and habitat. (CO1, K3)

Or

(b) Elaborate on the various methods used for the collection and estimation of plankton in oceanographic studies. (CO1, K5)

17. (a) Analyze the structural adaptations in plankton that facilitate an increase in surface area and buoyancy. (CO2, K5)

Or

(b) Examine the interrelationship between phytoplankton and zooplankton in the marine food web. (CO2, K5)

18. (a) Describe the various methods used for the estimation of primary production in the sea. (CO3, K3)

Or

(b) Discuss the regional differences in primary and secondary production across the global oceans. (CO3, K4)

19. (a) Explain the distribution and economic importance of seaweeds in India. (CO4, K4)

Or

(b) Provide a comprehensive essay on the Coral Reef ecosystem, focusing on its distribution and conservation. (CO4, K5)

20. (a) Discuss the anatomical and physiological features of Mangroves that allow them to survive in saline environments. (CO5, K5)

Or

(b) Elaborate on the conservation and management strategies required for coastal ecosystems like salt marshes and sand dunes. (CO5, K3)

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R4628

Sub. Code
25LMB2S1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Marine Biology (Lateral Entry)

LIVE FEED CULTURE

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

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

1. Which instrument is commonly used for microscopic identification of microalgae? (CO1, K1)
   (a) Spectrophotometer
   (b) pH meter
   (c) Compound microscope
   (d) Autoclave

2. Stock cultures of microalgae are usually maintained at (CO1, K2)
   (a) High light intensity
   (b) Low light and controlled temperature
   (c) Continuous shaking at 40°C
   (d) Complete darkness

3. Daphnia belongs to the group of _____. (CO2, K1)
   (a) Cladocera (b) Copepoda
   (c) Rotifera (d) Ostracoda

4. Common feed used for rotifer culture is (CO2, K1)

(a) Rice bran (b) Chlorella

(c) Fish meal (d) Soybean cake

5. Decapsulation of Artemia cysts is mainly for which purpose? (CO3, K1)

(a) Increase cyst size

(b) Remove chorion

(c) Increase salinity tolerance

(d) Reduce temperature requirement

6. Enrichment of Artemia is mainly carried out to increase _____. (CO3, K1)

(a) Water stability (b) Protein solubility

(c) HUFA content (d) Shell thickness

7. Zooplankton nets are generally made of which material? (CO4, K1)

(a) Cotton cloth (b) Nylon mesh

(c) Silk paper (d) Rubber membrane

8. Optimal temperature for marine copepod culture is usually _____. (CO4, K2)

(a) 5–10°C (b) 15–20°C

(c) 25–30°C (d) 40–45°C

9. Complete metamorphosis in Tenebrio molitor includes (CO4, K1)

(a) Egg–Larva–Pupa–Adult

(b) Egg–Nymph–Adult

(c) Egg–Zoea–Adult

(d) Egg–Nauplius–Adult

10. The ideal substrate for Tubifex culture is _____. (CO5, K2)

(a) Dry sand (b) Gravel

(c) Organic-rich mud (d) Plastic sheet

Part B (5 × 5 = 25)

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

11. (a) Determine the important physical factors affecting microalgal growth. (CO1, K3)

Or

(b) Illustrate the components of BG-11 culture medium. (CO1, K3)

12. (a) Analyze the differences between Moina and Daphnia. (CO2, K4)

Or

(b) Outline the water quality parameters needed for marine rotifer culture. (CO2, K4)

13. (a) Evaluate the ecological distribution of *Artemia*. (CO3, K5)

Or

(b) Assess the steps involved in Artemia enrichment. (CO3, K5)

14. (a) Illustrate the structure and function of a zooplankton net. (CO4, K4)

Or

(b) Infer the nutritional advantages of copepods in larval fish culture. (CO4, K4)

15. (a) Justify the biological importance of mealworms in aquaculture feed. (CO4, K5)

Or

(b) Evaluate the basic requirements for culturing polychaetes. (CO5, K5)

Part C (5 × 8 = 40)

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

16. (a) Illustrate the different methods of collection and preservation of microalgae from natural habitats. (CO1, K4)

Or

(b) Infer the indoor microalgal culture techniques with advantages and limitations. (CO1, K4)

17. (a) Assess the structural organization and feeding mechanism of rotifers. (CO2, K5)

Or

(b) Compare general culture conditions required for freshwater and marine rotifers. (CO2, K5)

18. (a) Develop the hatching techniques of *Artemia* cyst from decapsulation to harvesting. (CO3, K6)

Or

(b) Formulate a report on the role of Artemia in sustainable aquaculture and disease management strategies. (CO3, K6)

19. (a) Evaluate the different techniques used for collection of wild zooplankton for copepod culture. (CO4, K5)

Or

(b) Justify the nutritional quality of copepods and their importance in marine hatcheries. (CO4, K5)

20. (a) Illustrate the life cycle and reproductive biology of *Tenebrio molitor*. (CO5, K4)

Or

(b) Analyze the culture techniques of mealworms for large-scale production. (CO5, K4)

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