

Khulna University

School: Life Science

Program: BSc in Fisheries

Course Code: 0331 06 FMRT 1201

Total Marks: 60

* The figures in the margin indicate full marks

Discipline: Fisheries and Marine Resource Technology

Examination: 1st Year 2nd Term **Session:** 2024-2025

Course Title: Estuarine and Marine Ecology

Time: 3.0 hours

Credit: 03

*Use separate answer script for each section

Section-A

There are FOUR questions in this section. Answer any THREE questions.

	Marks
Q.1 a) 'Estuary is a part of coastal zone'- Justify. [L1; CLO1]	03
b) Outline the expansion of ecological thoughts in early 20 th century. [L2; CLO2]	03
c) Distinguish between continental crust and oceanic crust. [L4; CLO2]	02
d) Explain the scope of marine ecology. [L5; CLO1]	02
Q.2 a) Draw a figure showing the major oceanic divisions. [L2; CLO3]	03
b) What is upwelling? Discuss the processes that induce upwelling in the ocean. [L1,6; CLO3]	1+4=5
c) Explain the decomposition process of organic matter in the ocean. [L5; CLO3]	02
Q.3 a) Write a short description about 'Karamjal Intertidal Zone'. [L5; CLO4]	02
b) Differentiate between the fine grained and coarse grained beaches. [L4; CLO4]	02
c) 'Sand particle size is important in sandy shore' – Justify. [L5; CLO4]	03
d) Write your own words about the deeper zone of the Bay of Bengal. [L6; CLO3]	03
Q.4 a) Describe the process of reef formation. [L1; CLO 4]	04
b) Narrate the food sources of benthic organisms in deep ocean. [L3; CLO4]	03
c) Write down the functions of decomposers in marine environment. [L2; CLO3]	03

Section-B

There are FOUR questions in this section. Answer any THREE questions.

Q.5 a) What is saltmarsh ecosystem? How does saltmarsh ecosystem play an important role for marine environment? [L3; CLO6]	1+3=4
b) Briefly describe the different types of estuary considering the geomorphology and geological history. [L2; CLO6]	06
Q.6 a) Discuss the effects of turbidity on estuarine ecosystem. [L3; CLO7]	03
b) 'True estuarine organisms are limited'- explain the statement. [L4; CLO7]	02
c) Briefly describe the adaptation technique of estuarine organisms. [L2; CLO8]	05
Q.7 a) What are the reasons behind the formation of Himalayan Mountains? [L2; CLO8]	02
b) 'The continents are slowly drifting across the globe' – prove the statement based on the idea of Alfred Wegener.[L3; CLO8]	05
c) Describe the different types of plate boundaries. [L2; CLO8]	03
Q.8 a) Write short notes on the followings [L2; CLO4, 5]	4 × 2.5=10
b) a) Bioluminescence	b) Ecological niche
c) Zoogeographical distribution	d) Hermatypic coral

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Program: BSc in Fisheries

Examination: 1st Year 2nd Term Session: 2024-2025

Course Code: 0831 06 FMRT 1203

Course Title: Planktology

Total Marks: 60

Time: 3.0 hours

Credit: 03

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*Use separate answer script for each section

Section-A

There are FOUR questions in this section. Answer any THREE questions.

	Marks
Q.1 a) Explain the crucial role of phytoplankton in aquatic food webs. [L2; CLO1]	03
b) Differentiate between prochlorophytes and true cyanobacteria. [L4; CLO1]	03
c) What is biological carbon pump? How does biological carbon pump regulate atmospheric carbon dioxide in marine ecosystems? [L1,4; CLO1]	1+3=4
Q.2 a) How do frustules aid in the taxonomic identification and classification of diatoms? [L3; CLO2]	03
b) Explain how silica availability in ocean water influences diatom productivity and bloom formation. [L3; CLO2]	03
c) Critically evaluate the Chromophyta evolved through secondary endosymbiosis. [L6; CLO2]	04
Q.3 a) What are aplanospores and zoospores? [L1; CLO2]	02
b) Discuss the significance of akinetes in the production and survival of phytoplankton? [L2; CLO3]	02
c) An axenic batch culture of <i>Chlorella vulgaris</i> produced a cell concentration of 8.4×10^6 cells/ml after 25 days, starting from an initial concentration of 6,000 cells/ml at the beginning of the exponential phase. Calculate the growth rate constant of <i>Chlorella vulgaris</i> . [L3; CLO2]	03
d) Provide a justification for the role of temperature as the primary factor controlling the seasonal succession of phytoplankton population. [L5; CLO3]	03
Q.4 a) Why do fatty acids derived from microalgae offer advantages over fish oil? [L1; CLO 4]	02
b) Briefly discuss the anti-oxidative roles of microalgae in protecting against oxidative radicals. [L4; CLO4]	03
c) How does microalgal biomass can enhance the immune responses of animals? [L2; CLO3]	02
d) Discuss the environmental and ecological impacts associated with phytoplankton blooms. [L6; CLO4]	03

Section-B

There are FOUR questions in this section. Answer any THREE questions.

Q.5 a) Describe the key morphological features of rotifers and explain their functions. [L2; CLO5]	05
b) How is a male <i>Artemia</i> distinguished from a female? [L3; CLO5]	02
c) Classify zooplankton according to lifecycle with example. [L4; CLO5]	03
Q.6 a) Describe the different modes of reproduction in daphnia. [L2; CLO6]	06
b) Explain how food habit and temperature affect the reproduction of rotifer. [L5; CLO6]	04
Q.7 a) Establish relationship between food intake and phyllopodia of <i>Artemia</i> . [L2; CLO7]	02
b) 'Light and predation coupling can influence the vertical and horizontal distribution of zooplankton'- discuss. [L4; CLO7]	08
Q.8 a) What are the common methods used to measure zooplankton productivity? Describe any two of them. [L2; CLO8]	2+4=6
b) Expound how do the changes in phytoplankton abundance affect zooplankton and fish growth? [L3; CLO8]	04

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Examination: 1st Year 2nd Term **Session:** 2024-2025

Course Code: 0831 06 FMRT 1205

Course Title: Fish Biochemistry

Total Marks: 60

Time: 3.0 hours

Credit: 03

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*Use separate answer script for each section

Section-A

There are FOUR questions in this section. Answer any THREE questions.

	Marks
Q. 1 a) Define fish biochemistry. How does biochemical knowledge contribute to fisheries and aquaculture development? [L1; CLO1]	1+2=3
b) 'Biochemical abnormalities can lead to disease conditions' - explain. [L2; CLO5]	04
c) Classify carbohydrates based on their molecular structure. [L2; CLO4]	03
Q. 2 a) Why are buffers most effective near their pKa values? Explain with reference to titration curves. [L2; CLO1]	03
b) 'Weak acids and bases have characteristic dissociation constants' - Justify the statement with suitable example. [L5; CLO1]	04
c) Explain the effects of hypertonic and hypotonic solutions on red blood cells with suitable illustrations. [L2; CLO1]	03
Q. 3 a) Why are amino acids called amphoteric compounds? [L1; CLO2]	03
b) Define α -helix. Why is it considered one of the most stable secondary structures? [L1,2; CLO2]	1+2=3
c) What is a zwitterion? Explain the mechanism of zwitterion formation. [L1,2; CLO2]	1+3=4
Q. 4 a) Assess the role of collagen as a connective tissue protein in fish muscle. [L5; CLO5]	03
b) Explain how phospholipids form bilayers. [L5; CLO3]	02
c) What are unsaturated fatty acids? Explain omega numbering in fatty acids with suitable illustrations. [L1,2; CLO3]	1+2=3
d) Design a dietary plan incorporating specific types of lipids to optimize fish health. [L3; CLO3]	02

Section-B

There are FOUR questions in this section. Answer any THREE questions.

Q. 5 a) What are the primary functional roles of membrane proteins within the fluid mosaic model. [L1; CLO6]	02
b) Differentiate between a channel protein and a carrier protein in facilitated diffusion. [L2; CLO6]	03
c) Defend the importance of 'Selective Permeability' as the primary mechanism for maintaining cellular homeostasis in aquatic organisms. [L3; CLO6]	05
Q. 6 a) Contrast and compare 'Cofactors' and 'Coenzymes'. [L3; CLO7]	02
b) Calculate the reaction velocity using the Michaelis-Menten equation if the substrate concentration is triple the value of Km. [L2; CLO7]	03
c) How do allosteric activators and allosteric inhibitors differ in their effect on an enzyme's conformation and activity? [L6; CLO7]	05
Q. 7 a) Mention the specific microalgae species known for its high hydrocarbon (botryococcene) production. [L2; CLO9]	02
b) " <i>Botryococcus braunii</i> oils cannot be directly converted to biodiesel via trans-esterification, unlike conventional vegetable oils" - Justify [L3; CLO9]	03
c) Assess the potential of marine bioactive compounds in addressing complex diseases like diabetes and obesity. [L5; CLO8]	05
Q. 8 a) Distinguish between 'nutrient' and 'bioactive compound' based on their primary roles in the human body. [L1; CLO10]	02
b) Discuss the concept of flavor as an integrated experience involving gustation, olfaction and somatosensory inputs. [L2; CLO10]	03
c) Evaluate the environmental impact of converting a coal-fired power plant to use liquid fuel derived from microalgae. [L5; CLO10]	05

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School: Life Science

Program: BSc in Fisheries

Course Code: 0831 06 FMRT 1207

Total Marks: 60

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Discipline: Fisheries and Marine Resource Technology

Examination: 1st Year 2nd Term **Session:** 2024-2025

Course Title: Ichthyology

Time: 3.0 hours

Credit: 03

*Use separate answer script for each section

Section-A

There are FOUR questions in this section. Answer any THREE questions.

	Marks
Q.1 a) What is Ichthyology? Mention the opportunities in the field of Ichthyology. [L1; CLO2]	1+2=3
b) Compare the general features of Agnatha, Chondrichthyes and Osteichthyes. [L4; CLO2]	03
c) Describe the effects of hypoxia on fish behavior. How can hypoxia be managed in a fish pond? [L2; CLO2]	2+2=4
Q.2 a) Describe the distinguishing characteristics of fusiform, compressiform and depressiform fishes, with one example of each type. [L2; CLO2]	03
b) Differentiate between the epidermis and dermis. [L2; CLO2]	02
c) Compare the identifying characteristics and shapes of different types of fish scales, providing one example of each type. [L2; CLO2]	03
d) Write short note on lateral line system in fishes. [L2; CLO2]	02
Q.3 a) Describe the different types of caudal fins with suitable diagrams and mention their functions. [L2; CLO2]	03
b) Differentiate the gill structures of lamprey, shark and bony fishes with appropriate diagrams. [L2; CLO3]	05
c) How can the sexes of <i>Clarias</i> species be identified based on the genital papilla? [L3; CLO3]	02
Q.4 a) What does 'adaptive radiation' imply to you? List the causes of adaptive radiation. [L1; CLO 4]	1+1=2
b) Explain how cichlid fishes in Lake Malawi developed diverse feeding habits through the process of adaptive radiation. [L3; CLO4]	03
c) Illustrate the major endocrine organs of fishes. [L2; CLO3]	05

Section-B

There are FOUR questions in this section. Answer any THREE questions.

Q.5 a) What is meant by integumentary system? [L1; CLO5]	02
b) Draw a labeled diagram of fish skin. [L2; CLO5]	03
c) Illustrate placoid and bony ridge scales in fish with their characteristics. [L5; CLO5]	05
Q.6 a) Define food habit and feeding habit. [L1; CLO6]	02
b) Depending on food habit describe the features of gill rakers and the digestive tract with figure. [L4; CLO6]	04
c) Describe the feeding habits that are found in fishes. [L4; CLO6]	04
Q.7 a) Give an account on various types of muscle that are found in fish. [L1; CLO7]	04
b) Draw and label the superficial muscles of head of a bony fish. [L2; CLO7]	03
c) Give an account on tail fin musculature of a bony fish. [L4; CLO7]	03
Q.8 a) What is meant by appendicular and axial firm skeleton? [L1; CLO7]	03
b) Draw and label a diagram of dorsal fin skeletal support of a bony fish. [L2; CLO7]	03
c) Write a short note on fin ray. [L3; CLO7]	04

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School: Life Science

Discipline: Fisheries and Marine Resource Technology

Program: BSc in Fisheries

Examination: 1st Year 2nd Term **Session:** 2024-2025

Course Code: 0811 06 Soil 1251

Course Title: Soil Science

Total Marks: 60

Time: 3.0 hours

Credit: 03

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Section-A

There are FOUR questions in this section. Answer any THREE questions.

	Marks
Q. 1 a) Define soil according to Kellogg. [L1; CLO1]	02
b) Establish that soil is the best medium of plant growth. [L3; CLO1]	04
c) Describe nutrients and water as the plant growth factors. [L3; CLO1]	04
Q. 2 a) Define weathering.[L1; CLO1]	02
b) Describe different process of chemical weathering. [L2; CLO1]	05
c) Explain that soil is a three phase disperse system. [L5; CLO2]	03
Q. 3 a) Explain Jenny's soil formation system. [L2; CLO1]	02
b) Discuss climate as soil forming factor.[L3; CLO1]	04
c) Illustrate the diagram of an ideal soil profile. [L2; CLO1]	04
Q. 4 a) Discuss the sources and functions of organic matter in soil.[L3; CLO3]	04
b) Write down the characteristics of different types of rocks. [L2; CLO1]	03
c) Bulk volume of 20g oven dried soil is 15.5 cm ³ . Calculate the bulk density of the soil. [L3; CLO1]	03

Section-B

There are FOUR questions in this section. Answer any THREE questions.

Q. 5 a) Narrate the importance of macro and micro pores in soil. [L2; CLO5]	04
b) Explain the various aspects of soil bulk density. [L4; CLO2]	03
c) Illustrate the various types of soil structures. [L2; CLO2]	03
Q. 6 a) Interpret the reasons behind variations of organic matter decomposition in soil. [L3; CLO3]	03
b) Identify the components of soil color notation. [L3; CLO2]	03
c) 'pH is the most important chemical property of soil'-Discuss. [L4; CLO4]	04
Q. 7 a) 'Soil colloids adsorb both nutrients and water for plant growth'- Justify. [L4; CLO3]	03
b) Organize the soil water constants with description? [L3; CLO5]	04
c) Evaluate organism diversity in soil. [L4; CLO6]	03
Q. 8 "Write short notes on the followings	2.5 x 4 = 10
a) Ecosystems services of soil [L4; CLO7]	b) Marshal's triangular coordinate [L3;CLO2]
c) Soil separates[L2;CLO2]	d) Soil Salinity [L4;CLO4]