Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year-02, Semester-01(January- June) Final Examination' 2022
Course Code: **LIM-201(T)**, Course Title: **Limnology (Theory)**
Full marks: 70; Time: 3 hours

*Answer **any 05 (five)** questions from each section. Figures in the right margin indicate full marks. Use separate answer script for each section.*

Section-A

1.	a)	Define limnology.	2
	b)	Differentiate between Limnology and Oceanography.	2
	c)	Write down the scope of studying Limnology in fisheries science.	3
2.	a)	"Biogeochemical cycles are essential for exchanging chemical elements between living and non-living components of an aquatic ecosystem" Justify with an example.	3
	b)	Describe the nitrogen cycle in water body.	4
3.	a)	Define haor. Enlist major haors of Bangladesh.	2
	b)	Why baor is called oxbow-lake? Explain.	2
	c)	Discuss the limnology of the Kaptai lake ecosystem.	3
4.	a)	Define primary productivity.	2
	b)	Enlist factors affecting primary productivity.	2
	c)	Distinguish between NPP and GPP.	3
5.	a)	"Eutrophication in a waterbody is undesirable for fish culture"- Justify.	2
	b)	Differentiate between oligotrophic and eutrophic lakes.	2
	c)	Write down the preventive and control measures of eutrophication.	3
6.	a)	Why Halda river is called the "gene bank"for IMC?	2
	b)	Write down the significance of Halda river in fisheries sectors.	1
	c)	Discuss the threats and mention the ways out to protect and save the Halda river from the threats.	4
7.	a)	Differentiate between periphyton and benthos.	2
	b)	Classify benthos based on size and mobility.	2
	c)	Write down the role of benthos organism in fish production.	3

Section B

8.	a)	Differentiate among the three suborders of free-living freshwater copepods.	3
	b)	Discuss the life cycle of Rotifer.	4
9.	a)	"Carbon is considered as the basis of life"- explain.	2
	b)	Briefly describe the carbon cycle in an aquatic system.	5
10.	a)	Define earthen pond.	1
	b)	Discuss the process of origin of the lake basin.	3
	c)	"Nitrogen and phosphorus are the limiting nutrients for plants"-Explain.	3
11.	a)	Discuss the interaction between phytoplankton and zooplankton.	3
	b)	Sketch and discuss the reproduction cycle of Cladocerans.	4
12.	a)	Differentiate between lentic and lotic water bodies.	2
	b)	Kaptai lake is a valuable inland water body for fisheries- justify.	2
	c)	Outline the significant contribution of major rivers to the national economy of Bangladesh.	3
13.	a)	Describe the seasonal succession of phytoplankton.	2
	b)	Write down the names of four zooplankton important for aquaculture.	2
	c)	How do you enhance the production of phytoplankton in fish ponds?	3

14. Write short notes on any **2 (two)**of the following: $3.5 \times 2 = 7$

a) Algal bloom; b) Cyclomorphosis of zooplankton; c) Periphyton; and d) Hakaluki haor.

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year - 2 Semester - 1 (January-June), Final Examination, 2022
Course No: FNU201 (T), Course Title: Fish Nutrition (Theory)
Full Marks: 70; Time: 3 hours

*Answer **any 5 (five)** questions from each section. Figures in the right margin indicate full marks. Use separate answer script for each section.*

Section-A

1.	a.	Define fish nutrition. Classify nutrients based on their origin and requirements.	2
	b.	Describe in details the role of different nutrients in aquaculture practices.	5
2.	a.	What are proteins? Illustrate the functions of fish protein.	2
	b.	Explain in details the protein metabolism process in fish body.	5
3.	a.	Classify amino acids base on their R-group, nutrition and catabolism.	3
	b.	Write down the factors affecting the amino acid requirements.	4
4.	a.	Write down the general functions of lipid in fish nutrition.	2
	b.	Write down the name, structure and shorthand abbreviation of essential fatty acids required by fish.	5
5.	a.	Classify minerals. Write down the general functions of minerals.	4
	b.	Describe dietary source, biochemical functions and deficiency syndromes of Ca, P, and Mg in fish.	3
6.	a.	What is energy balance equation?	3
	b.	What is nutritional disorder? Identify the deficiency disorders of fatty acid and vitamin C in cultured fish	4
7.		Write short notes on **any 02 (two)** of the following: i) Fat soluble vitamins; ii) energy portioning model and iii) HUFA and PUFA	3.5x2=7

Section B

8.	a.	Summarize the importance of amino acid profiles in fish nutrition.	2
	b.	What are the methods used to determine whether an amino acid is essential or non-essential for the fishes.	3 2
9.	a.	What are the factors affecting fatty acid composition of fish?	3
	b.	Importance of fatty acid profiles in fish nutrition.	4
10.	a.	Write down the general function of minerals.	5
	b.	Explain in details the structure, biological function, deficiency syndrome and dietary sources of pyridoxine and pantothenic acid.	2
11.	a.	What is broodstock nutrition? Why is it important?	4
	b.	Discuss the effects of nutritional level on broodstock.	3
12.	a.	Classified protein according to their form, physical properties and structure.	3
	b.	What are the basic methods used to measure the rate of digestion?	4
13.	a.	Classify carbohydrate based on their chemical structure.	2
	b.	Write down the major steps for carbohydrate metabolism.	5
14.		Write short notes on **any 02 (two)** of the following: i) Biochemical functions of zinc; ii) Specific Dynamic Action and iii) Metabolism of fatty acid	3.5x2=7

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B. Sc. Fisheries (Hons.) Year -02, Semester-01, Final Examination' 2022
Course No: **SEB-201(T)**, Course Title: **Systematics and Evolutionary Biology (Theory)**
Total Marks: 70 Time: 3 hours

*Answer <u>any **5 (five)**</u> questions from each section. Illustrate your answer wherever necessary. Figures in the right margin indicate full mark. Use separate answer script for each section.*

Section-A

1.	a)	What do you mean by systematics and evolutionary biology?	2
	b)	Develop relationship of systematics with other branches of biology?	2
	c)	Enumerate the application of systematics in Fisheries Science.	3
2.	a)	Define species, sub-species and sibling species.	2
	b)	How will you describe the concept of species in terms of biological and ecological perspectives?	5
3.	a)	What is evolution and evolutionary biology?	2
	b)	Explain molecular evolution with example.	5
4.	a)	Define clade, cladogram and cladistics.	3
	b)	What are the basic assumptions of cladistics?	2
	c)	Write down the importance of studying phylogeny.	3
5.	a)	Define isolation with types.	2
	b)	Explain how reproductive isolation mechanism occurs?	5
6.	a)	What is phylogenetics and phylogenetic tree?	2
	b)	Describe the basic principles of constructing a phylogenetic tree of vertebrates.	5
7.		Write short note on **<u>any 02 (two)</u>** of the following:	3.5 × 2 =7
		a) Typification, b) Lamarck's theory of evolution, c) Genetic drift, and d) Co-evolution.	

Section-B

8.	a)	Differentiate between classification and identification.	2
	b)	How morphometric and meristic characters are significant in Fisheries? Explain with examples.	2
	c)	Why nomenclature may change?	3
9.	a)	What does Weismann's germ plasm theory state?	1
	b)	Write the postulates of germ plasm theory.	2
	c)	Justify the significance of germ plasm theory in modern science.	4
10.	a)	What do you know about zoogeography of fishes?	2
	b)	Mention the zoogeographical region of freshwater fishes.	2
	c)	Describe the oriental region with its common fish population.	3
11.	a)	Enlist the different principles of nomenclature.	1
	b)	What is law of priority?	2
	c)	Describe the principle of priority with examples.	4
12.	a)	Define speciation.	1
	b)	Write the forces that affect the speciation process.	2
	c)	Explain sympatric and allopatric speciation with examples.	4
13.	a)	What is synonymy and homonymy? Differentiate between them.	4
	b)	Explain different type synonymy with example.	3
14.		Write short note on **<u>any 02 (two)</u>** of the following:	3.5 × 2 =7
		a) Natural selection, b) Chemical evolution, c) Ethological species concept, and d) ICZN.	

Chattogram Veterinary and Animal Sciences University, Chattogram
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B. Sc. Fisheries (Hons.) Year-02, Semester-01, Final Examination' 2022
Course No: **MBI-201 (T),** Course Title: **Marine Biology (Theory)**
Full Marks: 70; Time: 3 hours

*Answer any **5 (five)** questions from each section. Figures in the right margin indicate full mark. Use separate answer script for each section.*

Section-A

1.	a)	Write down the scope of marine biology in the field of marine sector in Bangladesh.	2
	b)	How the Voyage of Challenger contributed in the development of marine biology?	3
	c)	Sea creatures are extremely diverse- explain.	2
2.	a)	What are the major groups of marine fishes?	2
	b)	Describe the migration patterns in marine fishes.	3
	c)	Differentiate between bony and cartilaginous fishes.	2
3.	a)	Differentiate between sea grass and seaweed.	2
	b)	Write down the adaptations of salt marsh.	2
	c)	How does seaweed reproduce?	3
4.	a)	Sharks have a variety of tail patterns- explain.	2
	b)	Explain the larval nutrition modes in marine organisms.	3
	c)	What do you know about shark reproduction?	2
5.	a)	Draw and describe the stages of ichthyoplankton.	4
	b)	Describe the ichthyoplankton collection methods.	3
6.	a)	What is tidal pool? Differentiate between soft and rocky bottom communities.	3
	b)	How diverse marine benthic habitats are?- explain with appropriate diagram.	4
7.	Write short notes on <u>any 02 (two)</u> of the following: b) Horseshoe crab; b) Buccal pumping ; and c) The biological pump.		3.5 x 2 = 7

Section-B

8.	a)	How marine bony and cartilaginous fishes maintain internal balance of salt?	3
	b)	Differentiate between synchronous and simultaneous hermaproditism in fish.	1
	c)	Why "ovoviviparity' should not be used in marine fishes?	3
9.	a)	Draw the external morphology of a barnacle.	2
	b)	Describe a mussel's life cycle.	3
	c)	Enlist the common and scientific names of the turtles found in the marine waterbody of Bangladesh.	2
10.	a)	Draw the life cycle of a turtle species found in Saint Martin's Island.	3
	b)	Echinoderm shows an evolution of diverse life forms- explain.	4
11.	a)	Differentiate between marine archae and bacteria.	2
	b)	Classify marine viruses and write down their role in marine ecosystem.	2
	c)	How does dinoflagellate reproduce?	3
12.	a)	Define and classify plankton.	4
	b)	Explain cyclomorphosis in marine zooplankton.	3
13.	a)	Write down the scientific name of the horseshoe crab species found in the world.	2
	b)	Why horseshoe crab blood is important for human health?	2
	c)	Write down the life cycle of a horseshoe crab.	3
14.	Write short notes on <u>any 02 (two)</u> of the following: b) HNLC; b) The Voyage of Beagle; and c) Marine mammals.		3.5 x 2 = 7

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
Sc. Fisheries (Hons.) Year -2 Semester-1, Final Examination' 2022
Course No: 201 (T), Course Title: Statistics (Theory)
Total Marks: 70, Time: 3 hours

*Answer any **5 (five)** questions from each section. Figures in the right margin indicate full mark. Use separate answer script for each section.*

Section-A

1. a) Explain the term "Statistics". Give two related examples in the field of Fisheries where you can use statistical methods. 3.0
   b) Distinguish between: 4.0
      (i) Discrete and continuous variables
      (ii) Histogram and Bar diagram
2. a) What are the important graphs for representing a frequency distribution of quantitative data? 3.0
   b) Describe the different scales of measurement with example. 4.0
3. a) What is arithmetic mean (A.M.)? Why A.M. is the best measure among all measures? 4.0
   b) Show that some of deviations of all observations from their A.M. is zero. 3.0
4. a) What is Z-score? A fish farm cultivates shrimp and recorded the shrimp weight (gm) as below after one month. Test whether the value of 15 is an outlair or not. 4.0
   80, 85, 70, 60, 55, 45, 15
   b) Discuss how you test the shape of data? 3.0
5. a) What is normal distribution? Show that the mean and variance of standard normal variate is zero and unity. 4.0
   b) How can you test a data is symmetric or not? 3.0
6. a) Explain the types of variables according to origin. 3.0
   b) Identify the scale of measurement on which the following bolded variables are measured 4.0
      i) **Quality** of fish ii) **Types of hatcheries** for fish iii) Body**temperature** of patient iv) **Protein content** of 100 gm tuna fish

Section B

7. a) Define correlation coefficient. Write down the properties of correlation coefficient. 4.0
   b) Compare between correlation and regression. 3.0
8. a) Define Poisson distribution. Show that mean and variance of a Poisson variable is equal. 4.0
   b) The weight variables for selling fish is 300 gm. A random sample of 25 large fishes mean weight is known and variance is estimated. How can you test the above claim of fish weight variation? Write down the test procedure. 3.0
9. a) Describe the analysis of variance of completely randomized design. 4.0
   b) Explain the layout of Randomized Block Design (RBD). 3.0
10. a) Show that P(AUB) = P(A) +P(B) -P(AB); when A and B are not mutually exclusive events. 4.0
    b) Define sure event, sensitivity, and conditional probability. 3.0
11. a) What is sampling? Explain systematic random sampling method. 4.0
    b) Estimate the parameters of a simple linear regression model. 3.0
12. a) The mean fat contents (per 100 gm) of 15 randomly selected shrimp were measured. The variance in fat content was known. How can you test that the average fat content of 100 gm of shrimp was 0.15 at a 5% level of significance? Write the test procedure based on this information. 4.0
    b) Write down the application situation of F-test. 3.0

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year - 2 Semester - 1 (January-June), Final Examination, 2022
Course No: CAM201 (T), Course Title: Coastal Aquaculture &Mariculture (Theory)
Full Marks: 70; Time: 3 hours

*Answer **any 5 (five)** questions from each section. Figures in the right margin indicate full marks. Use separate answer script for each section.*

Section-A

1.	a.	Define coastal aquaculture? Classify coastal aquaculture on the basis of culture system and species types.	4
	b.	Write down the regional, national and global importance of coastal aquaculture.	3
2.	a.	Discuss coastal aquaculture ecosystems with concern of fish production.	3
	b.	Write down the present status of coastal aquaculture in Bangladesh.	4
3.	a.	Illustrate the criteria of suitable species selection for aquaculture.	2
	b.	Write down the selection criteria for fish, shrimp, mollusk and seaweed culture.	5
4.	a.	Define mariculture for the development of aquaculture production.	2
	b.	Discuss the prospects and limitations of mariculture sector.	5
5.	a.	Describe the life cycle of *Mytilusedulis*.	3
	b.	Discuss the techniques of *Mytilusedulis* culture.	4
6.	a.	Discuss the biological characteristics for species selection for marine aquaculture.	2
	b.	Write down the technique of larval rearing of *Penaeus monodon*.	5
7.		Write short notes on **any 02 (two)** of the following: i) Climate change and aquaculture; ii) Induced breeding and iii) Culture Technique Yellowtail Fish	3.5x2=7

Section B

8.	a.	Write down the Habitat and distribution of Mud crab.	2
	b.	Explain in details the pond culture techniques of mud crab	5
9.	a.	Write down the prospects and problems of Oysters culture in Bangladesh	2
	b.	Describe the culture techniques of Oyster.	5
10.	a.	Write down the characters and importance of flat fish.	2
	b.	Explain in details the culture techniques of Seabass culture.	5
11.	a.	Write down the advantages and disadvantages of off-bottom, raft and longline seaweed culture.	3
	b.	Explain in details the production techniques of *Porphyra*.	4
12.	a.	Why prawn culture is suitable in Bangladesh? Write down the importance and constrain of prawn culture.	3
	b.	Explain in details different types of prawn culture techniques.	4
13.	a.	"There are three species of lobsters"- give their scientific name and how do you differentiate them.	2 5
	b.	Discuss the farming system of lobster.	
14.		Write short notes on **any 02 (two)** of the following: i) Culture of Mullet; ii) utilization of seaweedand iii) culture techniques of Milkfish	3.5x2=7

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B. Sc. Fisheries (Hons.), Year-02, Semester-01 (January-June), Final Examination' 2022
Course No. MFC- 201(T), Course Title: Marine Food Chemistry (Theory)
Total Marks: 70, Time: 3 hours

*Figures in the right margin indicate full mark. Answer any **5 (five)** questions from each section. Use separate answer script for each section.*

Section-A

1.	a)	Define marine food organism. Classify marine food organisms and give two common, local and scientific names from each class.	3
	b)	What are the basic characteristics of seaweeds? Write down the economic importance of seaweed in Bangladesh.	2
	c)	What is by-catch? How can you reduce the by-catch?	2
2.	a)	What do understand by *n*-6 and *n*-3 fatty acids? Give example from each group.	2
	b)	What is lipid metabolism? Diagrammatically illustrate the steps of mechanism of lipid metabolism.	5
3.	a)	"Dietary deficiency of vitamin **K** usually does not occur in adult but occurs in infants"- justify the statement.	1
	b)	What are the major available forms of vitamin **D**? Mention the major deficiency syndromes caused by vitamin **E** and **K**.	2
	c)	Write down the name of 5 (five) carotenoids from marine organisms. Briefly discuss the industrial applications of carotenoids derived from marine sources.	4
4.	a)	What is skeletal muscle? Discuss the development and growth of muscle in a demersal fish.	3
	b)	What is the role of ATP in muscle contraction and relaxation through actin-myosin filaments?	2
	c)	Differentiate between white and dark muscles with example.	2
5.	a)	What do you know about allergen in seafood?	3
	b)	What are the essential amino acids found in fish protein? Write down the benefits of essential amino acids (EAA) on human health.	2
	c)	Outline the factors that affecting the gel formation in myofibrillar proteins.	2
6.	a)	Differentiate between fats and oils.	3
	b)	Classify fish based on lipid content.	2
	c)	List down the factors influencing lipid content in fish.	2
7.	a)	How do toxins accumulate into seafood? Differentiate between food born infection and intoxication.	3
	b)	Write down some practical means of detoxifying shellfish poison. Discuss the toxin name, source organisms, symptoms and prevention of STX.	4

Section-B

8.	a)	What is vitamin? Classify vitamins on the basis of solubility.	2
	b)	Enumerate the fat-soluble vitamins with their chemical name. Discuss the importance of fat-soluble vitamins.	4
	c)	Do you think fish lipid is superior to other lipids? Why?	1
9.	a)	What is flavor? Briefly describe the available compounds responsible for flavor development in fish and other seafood.	4
	b)	Discuss the causes of development of undesirable fishy flavors in fish and seafoods.	3
10.	a)	What kind of vitamins are easily destroyed during food processing?	1
	b)	Differentiate between bulk and trace elements with examples.	2
	c)	Briefly describe the sources, functions and daily requirements of the following elements: Iron, Potassium and Copper.	4
11.	a)	Describe the factors influencing chemical composition of fish.	3
	b)	Write down the present status of commercially important crustaceans available in the coastal belt of Bangladesh.	4
12.	a)	What kind of fishes generally contain higher content of sarcoplasmic proteins? Explain briefly the myofibrillar fraction of fish muscle protein.	5
	b)	Write down the impact of algal toxins on human health.	2
13.	a)	What is the difference between bioaccumulation and biomagnification process of toxins in seafood chain?	3
	b)	Draw and label a section of fish muscle cell.	4
14.		Write down short notes any 2 (TWO) of the following: a) Nori; b) Stroma protein; and c) CLA.	3.5 x 2 = 7