

Chittagong Veterinary and Animal Sciences University, Chittagong
Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018

Course No: **SEB-201 (T)**, Course Title: **Systematics and Evolutionary Biology (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) What do you mean by systematics and evolutionary biology? 2
b) Justify the importance of studying systematics and evolutionary biology in fisheries. 3
c) What are the basic differences between systematics and taxonomy? 2
2. a) What do you mean by taxonomic characters? 2
b) Enlist the taxonomic characters observed in fish. 3
c) What are the requirements for taxonomic description of a taxon? 2
3. a) Define molecular evolution. 2
b) Discuss the modes of molecular evolution. 5
4. a) What is meant by isolating mechanism? 2
b) Discuss the pre-mating and post-mating isolating mechanisms. 5
5. a) Define phylogenetics and cladistics. 2
b) Explain phylogenetic relationship with figure. 2
c) Compare between phylogenetic classification and Linnaean classification with example. 3
6. a) What is phylogenetic tree? 2
b) Describe different components of a phylogeny tree. 5
7. a) What are the major principles of ICZN? 2
b) Explain the principle of binomial nomenclature and principle of priority. 5

Section B

8. a) Define species, sub-species and sibling species. 3
b) What does biological species concept state? 2
c) Mention the limitations of biological species concept. 2
9. a) 'Phylogenetic tree is more informative and reliable than cladogram'-justify the statement. 2
b) How do morphometric and meristic characters help in taxonomic classification? 2
c) Compare among distance, maximum parsimony and maximum likelihood methods of phylogenetic tree construction. 3
10. a) What is International Code of Zoological Nomenclature (ICZN)? 2
b) Discuss synonym and homonym with example in zoological nomenclature. 5
11. a) What are the forces of evolution? 2
b) Briefly discuss how the evolutionary forces can increase and decrease genetic diversity. 5
12. a) What is Zoological nomenclature? 1
b) What does zoological nomenclature principally regulate? 2
c) What kinds of types method are used in ICZN? 4
13. a) What do you know about zoogeography of fishes? 2
b) Mention the zoogeographical regions of freshwater fishes. 2
c) Describe the oriental region mentioning its common fish fauna. 3
14. Write short notes on any **02 (Two)** of the followings: 3.5×2=7.0
a) Natural selection; b) Linnaean hierarchy; c) Darwinism;

Chittagong Veterinary and Animal Sciences University, Chittagong
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 B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018
 Course No: LIM 201 (T), Course Title: Limnology (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) Define Limnology. | 2 |
| | b) How will you utilize the knowledge of limnology in fisheries? | 5 |
| 2. | a) Define inland waters. | 2 |
| | b) What do you mean by causal factors? Describe the causal factors influencing biological productivity in inland waters | 5 |
| 3. | a) Define lake. | 1 |
| | b) Describe briefly the origin of lake basin. | 6 |
| 4. | a) What do mean by biogeochemical cycle? | 2 |
| | b) Describe briefly the nitrogen cycle in water. | 5 |
| 5. | a) Differentiate between lentic and lotic environment. | 3 |
| | b) What are the sources of stream water? | 1 |
| | c) Classify river based on their flow. | 3 |
| 6. | a) How do you enhance the production of zooplankton in fish ponds? | 2 |
| | b) Describe the food and feeding mechanism of rotifera and cladocera? | 5 |
| 7. | a) What is periphyton and where do they grow? | 2 |
| | b) What is the role of periphyton in aquaculture ponds? | 3 |
| | c) Why fish are attracted to periphyton? | 2 |

Section B

- | | | |
|-----|---|---|
| 8. | a) Why limnology is called a synthetic science? | 2 |
| | b) Who is called the father of limnology? | 1 |
| | c) Describe the kinds of free living copepods. | 4 |
| 9. | a) Define primary production. Why is it essential for life? | 2 |
| | b) Write down the classification of algae. | 5 |
| 10. | a) 'Nitrogen and phosphorus are the limiting nutrients for plants' - explain. | 2 |
| | b) Differentiate between eutrophic and oligotrophic lakes. | 3 |
| | c) What do you know about seasonal fluctuation of phytoplankton? | 2 |
| 11. | a) Define with example- i) Macronutrient ii) Micronutrient and iii) Limiting nutrient | 3 |
| | Write down the control and preventive measures of eutrophication. | 4 |
| 12. | a) Describe the life cycle of the copepods. | 5 |
| | b) Write short notes on i) Parthenogenesis and ii) Heterogony | 2 |
| 13. | a) Why is Si is a macronutrient for diatoms? | 2 |
| | b) Briefly describe the Si cycle in a waterbody? | 5 |
| 14. | a) Define benthos? | 1 |
| | b) Briefly describe the life cycle of chironomid larvae. | 6 |

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B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018

Course No: CAM-201 (T), Course Title: Coastal Aquaculture and Mariculture (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) Define Aquaculture. 2
b) Briefly describe the prospects and challenges of coastal shrimp culture in Bangladesh. 5
2. a) Differentiate between off bottom and on bottom culture. 2
b) Give your ideas to increase production of coastal fisheries. 2
c) Fouling is a great problem in coastal aquaculture –explain the statement. 3
3. a) Mention the suitable criteria for brood fish selection. 2
b) Differentiate between hatchery and natural seed. 2
c) Which technical issues are important for successful hatchery operation? 3
4. a) Illustrate the developmental stages of *Macrobrachium rosenbergii* in chronological order. 4
b) What are the main risks in larval rearing of crab in hatchery? 3
5. a) Give your recommendations to develop the seaweed culture in Bangladesh. 2
b) Briefly describe different culture techniques of seaweed. 5
6. a) Mention the major problems in coastal aquaculture development with its remedy. 4
b) Distinguish between the larval rearing techniques of shrimp and prawn. 3
7. Write short note on any two of the followings: 3.5×2=7
a) Attachment; b) Shelter area; c) Salvage zone.

Section B

8. a) Ornamental fishes are no longer a property of rich people – explain the statement. 3
b) Illustrate the process of setting of an aquarium. 4
9. a) How claw ablation can effectively reduce the molting duration of crab? 3
b) Polyculture of seabass with tilapia is a potential business – explain. 4
10. a) Write in brief importance of seabass seed production in our coastal region? 3
b) Explain the cage culture technique of seabass. 4
11. a) How do you culture prawn with IMCs in coastal region? 3
b) Summarize different hanging culture technique of scallop in coastal region. 4
12. a) Write down some commercially cultured marine fish and shrimp species in Bangladesh. 2
b) Write down the prospects of grouper culture in Bangladesh. 5
13. a) Why not much progress has made in marine fin fish culture in Bangladesh? 4
b) Mention the advantages and disadvantages of exotic species. 3
14. Write short notes on any two of the followings: 3.5×2=7
a) Blue economy ; b) Culture technique of lobster ; c) Live feed.

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B. Sc. Fisheries (Hons.), Year -02, Semester-01, Final Examination' 2018

Course No: 201 (T), Course Title: Marine Food Chemistry (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) "Fish and shellfishes are more perishable compared to other foodstuffs"-justify your answer. 2
b) Define marine food organisms. Give their classification and an example from each group. 2
c) Briefly describe the importance of chemical composition of fish to a fish processor. 3
2. a) Enumerate the role of p^H on the quality of fish muscle protein. 2
b) Schematically show the mechanism of fish muscle contraction and relaxation through actin-myosin filaments. 5
3. a) Differentiate between fat and oil. 2
b) Briefly describe the mechanisms of lipid metabolism in human body with necessary diagram. 5
4. a) Do you think marine fish is an important source of essential fatty acids? Justify. 2
b) Write down the role of omega-3 EFAs for human health. 2
c) How lipid oxidation occurs in fish and fishery products? How do you prevent such oxidation? 3
5. a) Classify fish on the basis of lipid content. 1
b) Briefly describe the factors influencing the lipid content in fish. 3
c) Briefly describe the role of lipid content on the palatability and processing of fish. 3
6. a) What is rigor mortis? Briefly describe the chemical causes of rigor mortis in fish. 4
b) What do you mean by gaping in fish? Why it occurs? How do you prevent it? 3
7. a) Write down the role of ATPase enzyme in post-mortem changes in fish. 2
b) Illustrate the changes in fish post-mortem. 5

Section B

8. a) Do you think marine fishes are more beneficial for human health compared to freshwater fish? Why? 2
b) Explain why protein quality is related to its essential amino acids composition and digestibility. 3
c) Define essential, semi-essential and non-essential amino acids with examples. 2
9. a) Write down the composition and properties of white and dark muscle of fish. 3
b) Why rigor starts from the the tail region of fish? Illustrate the structure of fish muscle. 4
10. a) Write down the physical and chemical properties of amino acids. 2
b) What is histamine poisoning? How does it take place? How do you control it? 2
c) Write down the role of NPN on the taste and spoilage of seafood. 3
11. a) Differentiate between food intoxication and food infection. 2
b) Define bioaccumulation. Illustrate the mechanism of TTX bioaccumulation. 3
c) Write down the source organisms, symptoms, and prevention of CFP. 2
12. a) Write down the stability of water soluble vitamins during cooking and processing. 1
b) Briefly discuss the sources, functions, and daily requirements of the following elements: 3×2
Phosphorus, iodine and fluorine. =6
13. a) What are carotenoids? Do you think aquatic organisms are rich in carotenoids? Justify your answer. 3
b) Briefly describe the available forms, source, functions, daily requirement and deficiency signs of vitamin A and D. 4
14. Write short notes on any two of the followings: 3.5×2=7
a) CLA b) Phospholipids c) Thaw rigor

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B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018
Course No: STA-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) Define Statistics. How can you relate Statistics in your discipline. 3.0
b) What do you mean by data? Classify the data according to variable. 3.0
c) Identify the scale of measurement: i) Fish color ii) Fish preservation temperature 1.0
2. a) What is variance? Why standard deviation is the best measure in absolute measures of dispersion? 3.0
b) Illustrate the limitations of absolute measures of dispersion? 3.0
c) What are the values of measures of skewness and kurtosis of normal distribution? 1.0
3. a) Name the measures of the central tendency with their uses in fisheries research. What are the characteristics of a good measure of central tendency? 4.0
b) Explain the uses of bar diagram and histogram in fisheries data presentation. Can you use the both for all types of variables? 3.0
4. a) Prove that for two positive non-zero quantities $A.M. \geq G.M. \geq H.M.$ 4.0
b) Show that the standard deviation of first n natural number is $\sqrt{\frac{n^2-1}{12}}$: 3.0
5. a) Calculate quartile deviation, arithmetic mean and median from the following length (cm) of Mrigel fish: 47, 41, 45, 37 and 39 4.0
b) Define skewness and kurtosis. How can you measure skewness and kurtosis of a series based on moments? 3.0
6. a) The sizes (in cm) of 10 small Tilapia fishes are 1.6, 1.8, 2.1, 2.3, 1.4, 1.9, 2.3, 2.0, 2.6 and 1.7. Test the hypothesis $H_0: \mu = 2.0$ against $H_A: \mu \neq 2.0$. Where μ refers to the population mean and $t_{0.025,9} = 2.262$. 4.0
b) What is a contingency table? Describe the test procedure to test the independence between two attributes. 3.0

Section B

7. a) What are the properties of correlation coefficient and regression coefficient? 4.0
b) Write down the difference between correlation and regression. 3.0
8. a) Define level of significance and power of a test. Given that $P[A]=0.6$, $P[B]=0.8$ and $P[AB]=0.50$. Find out i) $P[A/B]$ ii) Are the events A and B independent? 4.0
b) Write the concept of paired t-test. What are the different steps of the test? 3.0
9. a) Mention some differences between Poisson distribution and Normal distribution. 4.0
b) What is the functional form of Binomial distribution? Give some practical application of Binomial distribution. 3.0

10. a) What do you mean by experimental design and sampling design? Write down the principles of conducting of an experimental design? 3.0
b) Describe briefly the lay-out of Randomized Block Design (RBD)

11. a) Using the following data fit a linear regression line. 4.0

Feed in mg (X)	4	5	6	3	7
Weight in kg (Y)	1.0	1.5	2.0	1.5	2.3

Interpret the result. What will be the value of weight if the value of feed is 12 mg?

- b) When do you need factorial experiment? How is it different from Split Plot Design? 3.0

12. Answer the following questions: 1 x 7 = 7

i) For Binomial distribution the mean is-----

- a) np b) npq c) np

ii) For Bernoulli distribution the variance is-----

- a) npq b) np c) pq

iii) Arithmetic mean is 12 and number of observations are 20 then sum of all values is-----

iv) The measures of dispersion can never be----

- a) Positive b) Negative c) Zero

v) If the occurrence of one event means that another cannot happen, then the events are----

- a) Independent b) Mutually exclusive c) Bayesian

vi) Probability of Type I error is called-----

- a) Power of the test b) Rejecting H_0 when it is true c) Level of significance

vii) Test of significance of several mean test, then we use----

- a) T-test b) F-test c) χ^2 -test

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B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018

Course No: MBI-201 (T), Course Title: Marine Biology (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) What is Marine Biology? How will you apply your knowledge of Marine Biology in the field of marine sector in Bangladesh? 4.0
b) How marine archaea differ from bacteria? Write down the general characteristics of marine virus with their ecological roles. 3.0
2. a) Why is virus called both living and non-living organism? How marine bacteria contribute in nitrogen fixation and nitrification in marine environment? 3.0
b) Are marine protozoans autotrophic or heterotrophic? 1.0
c) Discuss the role of foraminifera in marine aquatic environment. 3.0
3. a) "Phytoplankton is the base of food chain"- explain the statement. 2.0
b) Differentiate between Calcareous and Siliceous phytoplankton 2.0
c) Briefly discuss the major factors affecting growth and distribution of phytoplankton in Oceans. 3.0
4. a) What is benthic community? Classify marine benthos with their role in EPS formation. 3.0
b) "Benthic organisms are important bio-indicator of estuarine system"-Explain the statement. 2.0
c) "Neritic zone is the productive oceanic zone"- briefly explain. 2.0
5. a) Define Seaweed and Sea grass. What are the potential seaweeds available in Bangladesh coast for commercial culture? 3.0
b) What is coral and coral reef? What are the probable causes of coral bleaching? 2.0
c) What are the ecological roles of algae in marine environment? 2.0
6. a) Describe the life cycle of Aurelia. 4.0
b) What is algal Bloom? Give a brief account of its impact on marine environment. 3.0
7. a) Why hagfishes are called slime eel? 2.0
b) What do you know about Ichthyoplankton? 1.0
c) Discuss the physiological mechanism of marine fishes for living in high saline water. 4.0

Section-B

8. a) What do you mean by the term "Purging"? 1.0
b) What are the different types of cephalopods found in ocean environment? 2.0
c) Describe the life cycle of oyster. 4.0
9. a) What is "Gemmules" and "Smoking" of sponge? 2.0
b) Why scyphozoans are called true jellyfish? 2.0
c) Illustrate the life cycle of marine protozoans. 3.0
10. a) Why plankton concentration is high in higher latitude and spring season in marine environment? 2.0
b) Briefly describe the theories to explain the apparent mutual explosion of the phytoplankton and the zooplankton. 5.0
11. a) What are the ecological roles of marine Arthropods? 2.0
b) How will you identify a healthy adult *Penaeus monodon*? 2.0
c) Illustrate the life cycle of shrimp. 3.0
12. a) How does seagrass reproduce? Briefly describe the structure of seagrass. 4.0
b) Describe the life cycle of seaweed which show alternation of generation. 3.0
13. a) List down ten scientific names and common names of commercially important marine fishes of Bangladesh. 3.0
b) Describe the life cycle of Hilsha fish in Bangladesh. 4.0
14. Write short notes on **any two** of the followings: 3.5×2
a) Marine reptiles and birds b) HNLC c) Redtide d) Marine mammals

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B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018

Course No: 201 (T), Course Title: **Fish Nutrition (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) What do you mean by nutrients? 1
b) Nutrients play an important role in commercial aquaculture-explain. 6
2. a) What are the factors affecting amino acid requirement in fish? 1
b) Describe the dose response curve used to determine quantitative amino acid requirement. 6
3. a) What is energy metabolism? 1
b) Describe the partitioning of biological energy. 4
c) What are the factors affecting energy requirements in fish? 2
4. a) Classify polysaccharides. 1
b) Write down the functions of carbohydrates. 2
c) Briefly explain carbohydrate digestibility in fish. 4
5. a) Write in brief nutritional disorders in fish. 5
b) How will you minimize the nutritional disorders in fish? 2
6. a) Define and classify vitamin. 2
b) Write down the sources and functions of two fat soluble vitamins. 5
7. Write short note on any two of the following: 3.5×2=7
a) Crude fibre; b) Cholesterol; c) ANPU.

Section B

8. a) Define fat and oil. 1
b) Classify unsaturated fatty acids. 2
c) Marine and cold water fishes require highly unsaturated fatty acids. Explain. 4
9. a) What is meant by SDA? 1
b) Write in brief energy balance equation in fish. 6
10. a) Define digestion. What are the factors affecting the rate of digestion? 2
b) Briefly describe the protein digestion in fish. 5
11. a) Differentiate between apparent nutrient digestibility and true nutrient digestibility. 2
b) Briefly describe digestibility determination by indirect method. 5
12. a) Classify proteins with examples. 2
b) Write down the functions of proteins. 2
c) What do you know about amino acid metabolism? 3
13. a) Distinguish between digestive fluid and enzyme. 2
b) Illustrate the major pathways of carbohydrate metabolism. 5
14. Write short notes on any two of the followings: 3.5×2=7
a) Microbial digestion ; b) Fatty acid biosynthesis ; c) Protein enriched fish feed ingredients.

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B. Sc. Fisheries (Hons.) Year -02 Semester-01, Final Examination' 2018

Course No: **MBI-201 (T)**, Course Title: **Marine Biology (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) What is Marine Biology? How will you apply your knowledge of Marine Biology in the field of marine sector in Bangladesh? 4.0
b) How marine archaea differ from bacteria? Write down the general characteristics of marine virus with their ecological roles. 3.0
2. a) Why is virus called both living and non-living organism? How marine bacteria contribute in nitrogen fixation and nitrification in marine environment? 3.0
b) Are marine protozoans autotrophic or heterotrophic? 1.0
c) Discuss the role of foraminifera in marine aquatic environment. 3.0
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b) "Benthic organisms are important bio-indicator of estuarine system"-Explain the statement. 2.0
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Section-B

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