

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -03, Semester-02, Final Examination' 2023
Course No: MBE-302 (T), Course Title: Molecular Biology and Embryology (Theory)
Total Marks: 70 Time: 3 hours

Answer any five (5) 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

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|-------|--|---|
| 1. a) | What is atom, molecule and molecular biology? | 3 |
| b) | What do you know about the small organic molecules in cells? | 4 |
| 2. a) | List the proteins and/or enzymes involved in the process of DNA replication. | 2 |
| b) | How are Okazaki fragments on the lagging strand joined into one continuous strand? | 2 |
| c) | 'DNA replication is directional' - explain. | 3 |
| 3. a) | Why are tRNA and rRNA important in the process of translation? | 2 |
| b) | Explain the mechanism of translation of gene in eukaryotes. | 5 |
| 4. a) | Differentiate between spontaneous and induced mutation. | 2 |
| b) | What do you know about silent, missense and nonsense mutation? | 2 |
| c) | Describe different types of mutagens with example. | 3 |
| 5. a) | Define embryology. How do you differentiate between embryo and larva? | 2 |
| b) | 'Organogenesis begins with the development of nervous system' – explain. | 2 |
| c) | What is the fate of germ layers after organogenesis? | 3 |
| 6. a) | Draw and describe a male gamete of a teleost. | 3 |
| b) | Describe the process of oogenesis in fish. | 4 |
| 7. a) | 'The physical contact of cell membrane of the egg with the acrosome of sperm defines fertilization' - Do you agree with the statement? Why or why not? | 2 |
| b) | Explain the mechanism of egg-sperm interaction in fish. | 5 |

Section-B

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|--------|--|-------------|
| 8. a) | What is "Chargaffs" rule? | 2 |
| b) | Enlist the chemical properties of DNA. | 3 |
| c) | What do you know about circular RNA? | 2 |
| 9. a) | Describe major causes of DNA damage. | 3 |
| b) | How DNA is repaired by homologous and non-homologous process? | 4 |
| 10. a) | Schematically show the process of gene expression. | 2 |
| b) | What do you understand by gene regulation? | 2 |
| c) | Narrate the regulation of gene expression in prokaryotes. | 3 |
| 11. a) | Compare and contrast between peptide and steroid hormone. | 3 |
| b) | Illustrate and explain the synthesis process of steroid hormones. | 4 |
| 12. a) | Briefly describe the urogenital systems of <i>Acipenser</i> and <i>Scoliodon sorrakowah</i> with diagrams. | 4 |
| b) | Explain the hormonal regulation of sperm motility in fish. | 3 |
| 13. a) | What are the key challenges in fish fertilization research? | 2 |
| b) | Enlist the role of Ca ²⁺ in fish fertilization. | 2 |
| c) | Illustrates the mechanism of prevention of polyspermy by slow block process. | 3 |
| 14. | Write short note on any two (02) of the following: | 3.5 × 2 = 7 |
| a) | Vitellogenesis, b) RNA interference, and c) Peptide hormone | |

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year- 3, Semester- 2; Final Examination, 2023
Course Code: AEN 302 (T), Course Title: Aquaculture Engineering (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. **Question no. 13 is compulsory for all***

Section-A

1. a) What is aquaculture engineering? 2
b) Why aquaculture engineering is important to develop climate resilient aquaculture systems in Bangladesh? 3
c) What are the basic differences between land based and water based aquaculture systems? 2
2. a) Write the basic fish hatchery components. 3
b) Design a marine fish cage farm for Blackspot Croaker culture at 20 nm South-East of Saint Martin's Island. Consider, cage volume 2100 m³, stocking density is 20/m³, feeding is automated, health and growth monitoring is AI based with automated harvesting and processing technologies. 4
3. a) How can aquaculture systems be designed to withstand extreme weather events? 3
b) What strategies are used to minimize environmental impacts in aquaculture engineering? 4
4. a) Classify pond based on water source with diagram. 3
b) Enumerate the application of different types of pumps and aerators in fish farm. 4
5. a) What engineering solutions are used to maintain dissolved oxygen levels in aquaculture systems? 2
b) Discuss the methods of managing waste and effluents in aquaculture systems. 5
6. a) Illustrate different types of inlets used in fish farm. 3
b) Briefly describe the hatchery operation of Giant Freshwater Prawn. 4
7. Write short notes on any 02 (two) of the following: 3.5x2
a) IPRS, b) Aquafarm planning, and c) Connection Analysis

Section B

8. a) Briefly describe water-based aquaculture systems with diagram. 4
b) Compare and contrast Recirculatory Aquaculture System with Raceway Aquaculture. 3
9. a) Write down the differences among Contact, Tender and Bid. 3
b) Explain the basic steps that should be followed during project costing. 2
c) How would you monitor your aquafarm construction site? 2
10. a) Briefly explain economic and social factors during pond based farm construction. 3
b) Enumerate series and parallel fish pond with illustration. 4
11. a) How would you select an ideal site for Tilapia cage culture? 3
b) Briefly describe Tilapia cage culture system in a riverine environment. 4
12. a) Discuss the common engineering challenges in large-scale aquaculture. 4
b) How can aquaculture engineering be adapted for offshore or open-sea aquaculture? 3
13. Suppose, you are going to design a marine fish farm that applies recirculatory aquaculture system for production. Consider, total area of the farm is 4.2 acres, production target is 250 tons Seabass and 75 tons Blackspot Croaker. Predicted FCR is 1.65 and production period is 160 days. Now, estimate the required investment, net profit, BCR, ROI, breakeven point and payback period of that farm. 7
14. Write short notes on any 02 (two) of the following: 3.5x2
a) Aquafarm outlet structures, b) Biofloc, and c) Offshore cage culture

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year-03, Semester-02; Final Examination, 2023
Course Code: ABC-302 (T), Course Title: Aquatic Biodiversity and Conservation (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 aquatic biodiversity. 2
b) How 'biodiversity' and 'ecosystem' are inter-linked? 2
c) Analyze how the loss of biodiversity can impact global food security. 3
2. a) Differentiate between species richness and evenness with examples. 3
b) "Estimating biodiversity using indices is an essential prerequisite for conservation."-Justify. 4
3. a) Define IUCN Red-list. 2
b) Why the Red-list program is important for biodiversity conservation? 3
c) Classify different categories of IUCN Red-list. 2
4. a) Define SIS. 2
b) Write down the reasons for declining SIS in the natural habitats. 3
c) Provide your possible recommendations to overcome the threats of SIS. 2
5. a) Discuss the coastal and marine fish biodiversity of Bangladesh. 3
b) "Bangladesh is considered one of the richest biodiversity hotspots in the world, particularly in aquatic habitats." What geological factors contribute to this exceptional aquatic biodiversity? -Explain 4
6. a) "Tanguar Haor is called an Ecologically Critical Area."- Explain. 3
b) Discuss the principal haor systems of Bangladesh. 4
7. a) Differentiate between a wildlife sanctuary and a national park. 3
b) Write down the primary rules and regulations governing the use of natural resources within the Wildlife sanctuaries of Bangladesh. 4

Section B

8. a) Define biodiversity hotspot. 2
b) Discuss the criteria for designating an area as hotspot. 5
9. a) Compare in-situ and ex-situ conservation of aquatic biota. 3
b) Describe different ex-situ conservation programs for fishes. 4
10. a) Analyze the possible human-oriented causes of the loss of biodiversity in the inland water bodies of Bangladesh. 3
b) Compare the "Reduction in population size" guidelines for assigning a species to CR and EN in the Red list. 4
11. a) State the objectives of fisheries conservation from both ecological and biological standpoints. 3
b) Examine the importance of conservation in the context of the Economics of Eco-Services and Environmental Indicators. 4
12. a) Define keystone species. 2
b) Illustrate how a keystone species disproportionately impacts the abundance and biomass within an ecosystem. 5
13. a) Enlist the ecological and biological concepts of fish conservation. 3
b) Is it possible to implement an Ecosystem-Based Management plan for Kaptai Lake? If so, what key steps would you implement? 4
14. Write down short notes on any 02 (TWO) of the following: 3.5x 2= 7
i) Cryopreservation; ii) ADMAs & iii) Biodiversity indices

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year- 3, Semester- 2; Final Examination, 2023
Course Code: FPH 302 (T), Course Title: Fish Pharmacology (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 pharmacology and fish pharmacology. 2
b) Briefly discuss the necessary of studying fish pharmacology. 5
2. a) Enlist the basic principles of pharmacology with short description. 2
b) What do you know about the scope of pharmacology in aquaculture? 5
3. a) What is drug? 2
b) Mention some factors that should be considered prior to select any aqua drug. 5
4. a) Why it is essential to study the basic principles of pharmacology? 1
b) Explain the following aspects of drug effects- 6
i) Potency, ii) Efficacy, and iii) Effectiveness
5. a) Which method should be followed to administer drugs in aquaculture? 2
b) What do you know about the "Drug-body interactions" in pharmacology? 2
c) Illustrate the mechanism of drug metabolism in "Pharmacokinetics". 3
6. a) Summarize briefly about the "drug-receptor combines" in the action of drugs. 3
b) What are the important implications of drug-receptor interaction? 4
7. Write short notes on any 02 (two) of the following: 3.5x2
a) AMR, b) Drug administration, and c) Drug resistance.

Section B

8. a) Define withdrawal period. 2
b) Enlist the significance of withdrawal period for the health safety of both fish and human. 5
9. a) Give the concept of drug toxicity and sensitivity. 2
b) Describe briefly about the principles for the selection of any aqua drugs. 5
10. a) What are the general considerations for fish anesthesia? 2
b) Name some commonly used anesthesia in fish with recommended dose per species. 5
11. a) What do you know about induced breeding in aquaculture? 2
b) Mention the advantage and disadvantages of using breeding inducing agents in aquaculture. 5
12. a) What are the organs involved in the osmoregulation in fish? 3
b) Discuss about the mechanism involved in osmoregulation in fish. 4
13. a) What are the advantages of single sex population in aquaculture? 2
b) Enlighten your understanding about the medicinal production of all male tilapia. 5
14. Write short notes on any 02 (two) of the following: 3.5x2
a) Therapeutics, b) Drug safety, and c) Environmental impact of aqua drugs.

Chittagong Veterinary and Animal Sciences University, Chittagong
Faculty of Fisheries
 B. Sc. Fisheries (Hons.) Year -03 Semester-02, Final Examination' 2023
 Course No: **MFM-302 (T)**, Course Title: **Marine Fisheries Management (Theory)**
 Total Marks: 70, Time: 3 hours

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

Section-A

1. a) What is off-shore fishing? Why is Bangladesh still far behind in exploiting offshore fisheries resources from the international water? 1+2
 b) Discuss how the 'marine fisheries sector' plays an important role in the emerging blue economy of Bangladesh. 4.0
2. a) Discuss the characteristics of major artisanal and industrial fishing gear used in the Bay of Bengal by mentioning their mesh size, target species, depth of operation and level of water column they operated. 3.0
 b) What do you know about ESNB? Discuss the major issues of ESNB in the coastal waters of Bangladesh. 1+3
3. a) Discuss how can you impose fishing efforts and catch management in marine fisheries. 3.0
 b) What problems exist with the application of fishing effort and catch management? How might they be circumvented? 2+2
4. a) Discuss the major features of the Hilsa Fisheries Management Action Plan 2003. 4.0
 b) What are the present constraints for the Jatka conservation in Bangladesh? Recommend your suggestions for the effective preservation of Jatka in Bangladesh 3.0
5. a) "EBFM is a comprehensive approach to marine fisheries" – Explain the statement. 2.0
 b) Summarize the major challenges of implementing EBFM in the coastal and marine fisheries of Bangladesh. 3.0
 c) Write down the name of 19 major fishing areas covering the world ocean? 2.0
6. a) Mention the general principles of the FAO code of conduct for responsible fisheries. 2.0
 b) Discuss the main features of the Marine Fish Ordinance 1983 to make provisions for the management and conservation of marine fisheries of Bangladesh. 5.0
7. Write short notes on any Two (02) of the following 3.5×2
 a) Pelagic fisheries resources of Bangladesh b) Meen Sandhani c) Virtual Population Analysis

Section-B

8. a) What are the diversified industrial fishing gears used in Bangladesh? Mention the major rules and regulations associated with industrial fishing in Bangladesh. 2+2
 b) What do you mean by by-catch? Which gears are contributing more to the by-catch in marine fisheries of Bangladesh? 1+2
9. a) Briefly mention the catch share data of Hilsa as a transboundary fish. 2.0
 b) Draw the life cycle of Hilsa fish as an anadromous fish. 2.0
 c) Properly mention the name, area boundary and ban periods of five nursery grounds of hilsa in Bangladesh. 3.0
10. a) Explain the term IUU fishing. Discuss the present status of IUU fishing in the Bay of Bengal. 1+3
 b) What do you know about the straddling stock? What are the issues and challenges of transboundary fish stock management? 1+2
11. a) What do you know about the ghost fishing? Discuss the various impacts of ghost fishing on marine fisheries and biodiversity conservation. 1+3
 b) Formulate preventive, mitigative and curative action plans to reduce ghost fishing in the Bay of Bengal. 3.0
12. a) Write down the name of MPAs of Bangladesh mentioning the acts under which they were declared, the year of declaration and the area boundary. 3.0
 b) Mention the zoning pattern of an MPA in terms of entry and restriction patterns. Mention the penalties associated with the violation of MPA rules and regulations of Bangladesh. 2+2
13. a) Mention the major laws and regulations for effectively managing marine fisheries in Bangladesh 1.0
 b) Discuss the laws and regulations on mesh size regulations, nets, equipment, and fishing vessels according to the Marine Fisheries Act 2020. 6.0
14. Write short notes on any Two (02) of the following: 3.5×2
 a) Gear selectivity b) Fisheries Survey c) MSY and MEY

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year-03, Semester-02; Final Examination, 2023
Course Code: CCF-302 (T), Course Title: Climate Change and Fisheries (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 climate change. 2
b) Relate between climate change and the greenhouse effect. 3
c) What would happen to the planet's rotation if all of Earth's ice melts and flows into the ocean? 2
2. a) Enlist the sources of CO₂ and N₂O in the environment. 2
b) Precisely describe the carbon sink process occurring in the environment. 5
3. a) Describe the expected changes in inland waters due to heat content and temperature changes. 2
b) Show a graphical representation of 'ocean heat content' over the years. 2
c) How ocean salinity, density and stratification are inter-linked with each other? 3
4. a) "Climate change can create cracks in the food chain"- Explain. 3
b) Discuss food-web impacts from plankton to fish due to climatic disorder. 4
5. a) Describe the impacts of extreme events on Bangladesh's emerging economy. 3
b) How can you suggest potential adaptive responses in meeting any climatic disorder in Asia with special emphasis in the context of Bangladesh? 4
6. a) Compare the Kyoto Protocol & Paris Agreement. 3
b) Give a brief outline of the formation and review process of the IPCC. 4
7. a) Write down the climatic variables that can affect the freshwater aquaculture systems in Bangladesh. 3
b) Discuss some harmful effects of climate change on freshwater aquaculture with its adaptive measures. 4

Section B

8. a) Mention some natural and anthropogenic causes of climate change. 3
b) Briefly describe how anthropogenic activities can cause climate change. 4
9. a) Differentiate between desertification and land degradation. 3
b) Write down the mechanism of land and land use contributing to climate change. 4
10. a) Define ocean acidification. 2
b) Illustrate the relation between climate change and ocean acidification. 3
c) Write down the effects of ocean acidification on marine life. 2
11. a) Write down the reasons behind the salinity intrusion into the coastal aquifer in Bangladesh. 3
b) Describe the salinity-mediated climate change impacts on coastal-marine fisheries in Bangladesh. 4
12. a) "Only temperature change alone can affect a wide range of physiological processes on fish"- Justify this statement. 2
b) Name the hypotheses that relate to marine fish recruitment. Illustrate Oscillating control hypothesis. 5
13. a) "Supply of different feed ingredients for preparing fish feed is decreased by climate change"- Explain. 3
b) Illustrate a conceptual diagram of the IMTA. 4
14. Write down short notes on any 02 (TWO) of the following: 3.5x 2= 7
i) Climate Diplomacy; ii) Aquaculture Zoning; iii) COP-29 & iv) Climate Change Adaptation

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B.Sc. Fisheries (Hons.) Year-3, Semester- 2; Final Examination, 2023
Course Code: ABM 302 (T), Course Title: Agribusiness & Marketing (Theory)
Full marks: 70 Time: 3 hours

*Answer **any 03 (three)** questions from each section where question no. **1 and 5** are mandatory. Figures in the right margin indicate full marks. Use separate answer script for each section.*

Section-A

1. a) Discuss the basic concept of Agribusiness. 2
b) Narrate the journey of agriculture towards Agribusiness. 3
c) Enumerate the challenges of Agribusiness with special reference to Fisheries sector. 6
2. a) Define marketing mix. Why is 'marketing mix' very important for the success of a marketing manager? 4
b) Describe some marketing opportunities for fisheries sector in Bangladesh. 4
c) Define marketing plan. What are the benefits of marketing plan? 4
3. a) Define marketing channel. 2
b) What are the different types of marketing channel? Describe them. 5
c) Write and explain any three functions of marketing. 5
4. a) Discuss various functions of controlling in agro based organization. 4
b) Point out and explain some of the characteristics of a successful leader. 4
c) Briefly discuss Maslow's Need Hierarchy Theory. 4

Section B

5. Suppose you want to start a new sea-food restaurant in Chattogram City. Prepare a lay out for business plan for the restaurant. What are your strengths and weaknesses for starting this business? What opportunities and threats you are assuming from the external environment? 11
6. a) Define agribusiness management. Explain basic functions of management. 4
b) List down 14 principles of management and describe any four principles. 4
c) Explain different elements of business and marketing. 4
7. a) What is aqua entrepreneurship? 2
b) Narrate the economic impact of entrepreneurial firms. 5
c) What are the problems and potentials of aqua entrepreneurship in Bangladesh? 5
8. a) Define marketing and marketing management. 3
b) Explain three core concepts of marketing. 3
c) Critically analyse the role of PPP in the development of Aqua Entrepreneurship. 6

Chattogram Veterinary and Animal Sciences University, Chattogram
Faculty of Fisheries
B. Sc. Fisheries (Hons.) Year-3, Semester-2, Final Examination 2023
Course Code: FPT-302 (T), Course Title: Fishery Products Technology (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) What are the differences among fishery products, by-products, and co-products? 2
b) What is by-catch? As overfishing and environmental changes continue to challenge marine ecosystems, what do you foresee as the future of by-catch management in the fishing industry? 5
2. a) "Value-added fish products development can open a new horizon in the fisheries sector in Bangladesh"-justify your answer. 3
b) Illustrate the layout of a modern fish products development plant. 4
3. a) What are the key chemical processes that occur during the fish smoking process? How do compounds formed by smoke contribute to flavor and preservation? 4
b) Briefly describe the factors that influence the quality of smoked products during storage. 3
4. a) What do you mean by fish curing? How does curing preserve the quality of fish? 2
b) What do you mean by freeze drying? Briefly describe the working mechanism of a vacuum freeze-dryer. 5
5. a) How does gel-forming ability influence surimi quality? 2
b) Mention the nutraceutical aspects of seaweeds. Enumerate your idea on RASFF. 5
6. a) "Surimi holds a vital position in value-added products development"-justify your answer. What are the prerequisites for surimi preparation? 3
b) Why cryoprotectants are used in surimi preparation? Write short notes on Katsuo-bushi. 4
7. a) What is isinglass? Give a flow-diagram on the production of isinglass from fish by-products. 3
b) Illustrate the production procedure of fish insulin. 4

Section B

8. a) Define and differentiate between fermented and semi-fermented fishery products. 3
b) Enumerate fish sauce production methods along with their characteristics. 4
9. a) Why do crab and prawn shells go red after they have been cooked? 2
b) Briefly describe the production procedure of canned tuna. 5
10. a) What do you mean by fabricated and imitated fish products? Describe with examples. 3
b) What measures are recommended to prevent rancidity during fish oil extraction? 2
c) Compare between chitin and chitosan. 2
11. a) Suppose you are a quality control officer in a food processing facility and testing the cans and canned products constitute a major portion of your responsibilities. Briefly discuss how you will maintain the quality of cans and canned products. 4
b) Write short notes on the followings associated with canned products: 3
(i) Hydrogen swell, (ii) Struvite formation, (iii) Honeycombing
12. a) What is fishmeal? Explain the pros and cons of fishmeal preparation by wet-rendering and dry-rendering methods. 4
b) Give a detailed flow-diagram on the production procedure of fishmeal by dry rendering method. 3
13. a) Illustrate the production procedure of agar from seaweed. 3
b) How can we leverage advancements in biotechnology to enhance the nutritional value and functional properties of seaweed-based products? 4
14. a) Why do fish insulin is better than cattle insulin? Write a brief note on mannitol. 4
b) Provide flow chart for algin and funoran extraction process from seaweed. 3