

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 concepts of quality, quality control and quality assurance. 3
b) Discuss the importance of quality control program in the fish processing industries of Bangladesh. 4
2. a) Briefly describe the factors influencing the quality of fish. 3.5
b) What do you mean by quality deterioration? Discuss its various aspects. 3.5
3. a) What do you mean by quality attributes? Explain its different aspects. 3
b) Briefly describe the factors influencing the extrinsic quality defects in fish. 4
4. a) Describe in brief the FDA eight key sanitation conditions and practices in a fish processing establishment. 5
b) What kind of documents you will see on safety of water in a processing establishment. 2
5. a) Define quality standard and quality specifications with their main features. 3
b) Briefly describe the quality loss of shrimp at different stages of handling and transportation. 4
6. a) What do you mean by traceability? Write down its significance in fisheries sector. 2
b) Briefly describe the components of traceability with importance of each component. 2.5
c) Describe what kind of information is required for a farmer while selling their fresh fish/shrimp to the depot owners. 2.5
7. a) Write in brief the species and process related hazards in fish and fishery products. 2.5
b) Write in brief about intentionally/unintentionally added chemicals, naturally occurring biotoxin and aqua drugs in fish farms with their control measures. 4.5

Section B

8. a) "Fully active control over intrinsic quality is impossible"-justify the statement. 1
b) Discuss how different metals and elements, organic compounds and microorganisms affect the intrinsic quality of fish. 6
9. a) Why inspection program is essential for the utilization of fisheries resources? 2
b) Briefly describe different programs of FIQC with special emphasis on inspection program in Bangladesh. 5
10. a) List down different methods used for determining the quality of fish. 2
b) Discuss how you will assess the quality of fish using the following chemical methods: i) TVB-N 5
ii) K-value iii) TMA
11. a) What are the importances of HACCP system in a processing establishment? List down sequentially the seven principles of HACCP. 3.5
b) Briefly describe the preliminary steps in developing a HACCP plan. 3.5
12. a) What do you mean by hazards and critical limits? What are the sources of information on critical limits? 3
b) What is monitoring? How do you monitor the critical limit for pathogenic bacteria as hazard in cooking step of a product process flow? 4
13. a) Write down the quality management principles of ISO 9000 series. 3
b) Briefly describe the ethical attitudes towards fish and shellfish during their killing. 4
14. a) Write short notes on CODEX. 3.5
b) Prepare a risk based hazard analysis worksheet for IQF *Hilsa* in receiving and labeling steps where food allergen and histamine are potential hazards. 3.5

Chittagong Veterinary and Animal Sciences University, Chittagong

Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -04, Semester-01 Final Examination 2018

Course No: **FEX-401**, Course Title: **Fisheries Extension (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 extension and fisheries extension. 2.0
(b) Fisheries extension is a continuous non-formal educational process-justify the statement. 5.0
2. State the dimensions of fisheries extension with appropriate examples. 7.0
3. (a) Define communication. Enlist the different models of communication. 1+1
(b) Discuss the importance of communication in fisheries extension work. 3.0
(c) Criticize the Berlos' model of communication. 2.0
4. (a) Outline the procedure of conducting method demonstration regarding cage culture. 4.0
(b) Result demonstration is a good way of technology transfer. Explain. 3.0
5. (a) What is innovativeness and adopter categories? 3.0
(b) Explain the causes of discontinuance after technology adoption. 4.0
6. Write short note on the following-
(a) Problems of coastal aquaculture of Bangladesh. 3.5
(b) Public Private Partnership (PPP) 3.5

Section-B

7. State the qualifications and duties & responsibilities of Assistant Fisheries Officer of the Department of Fisheries. 7.0
8. Illustrate the scope of rural youth in fisheries for livelihood improvement. 7.0
9. (a) Classify extension teaching methods based on use. 3.0
(b) How ICT can enhance the fisheries extension services in Bangladesh? Explain. 4.0
10. (a) State the importance of local leaders in fisheries extension work. 3.0
(b) Briefly explain differentiation between professional leaders and local leaders. 4.0
11. Relate Maslow's need theory in fisheries extension work in Bangladesh condition. 7.0
12. State the principles of extension program planning. 7.0

Chittagong Veterinary and Animal Sciences University, Chittagong
Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -04 Semester-01, Final Examination' 2018

Course No: MGE-401 (T), Course Title: Molecular Biology and Genetic Engineering(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 molecular biology and genetic engineering. 2
b) Write the possible scopes and potential applications of genetic engineering and biotechnology in fisheries. 5
2. a) Outline the "Central Dogma" of molecularbiology. 2
b) Explain briefly how the information in DNA is converted into a protein product. 5
3. a) Why transgenic technology is useful for aquaculture? 2
b) Briefly describe the methods of gene transfer in fish. 5
4. a) Show the fine structure of a gene with a neat diagram. 2
b) What is recombinant DNA? 2
c) Discuss why and how you would create a recombinant DNA? 3
5. a) Polymerase chain reaction (PCR) is one of the most useful molecular tools- justify. 2
b) Describe how PCR operates. 5
6. a) Define microsatellite DNA marker. 1
b) Describe how microsatellite DNA markers are developed and used in fish. 6
7. a) What do you mean by DNA library? 1
b) Describe how you will prepare and screen cDNA library. 6

Section B

8. a) What is restriction endonuclease? 1
b) Explain the naming of restriction enzyme with example. 2
c) List four restriction endonucleases with their source, recognition and cutting sequence. 4
9. a) What do you mean by gene expression and regulation of gene expression? 2
b) Mention the major steps of gene regulation in eukaryotes. 2
c) Discuss how alternative RNA splicing regulates gene expression? 3
10. a) What is blotting? Mention the blotting techniques with their purpose. 2
b) Write the principle of Southern blotting. 3
c) Differentiate between Southern blotting and Western blotting. 2
11. a) What is meant by molecular marker? 1
b) Write the principle of RFLP marker. 2
c) Discuss RFLP as a molecular marker for fish genetic study. 4
12. a) What are the possible fates of a gene when it is transferred into a fertilized egg of fish? 3
b) Describe how you could confirm that the transgene has been integrated into the chromosome of the host fish. 4
13. a) What do you mean by bioethics and biosafety? 2
b) Discuss the bioethical and biosafety issues of biotechnological applications. 5
14. Write short notes on any 02 (Two) of the followings: 3.5×2=7
a) Mobile DNA b) Operon c) Transcription and translation

Chittagong Veterinary and Animal Sciences University, Chittagong
Faculty of Fisheries
 B. Sc. Fisheries (Hons.) Year -04 Semester-01, Final Examination' 2018
 Course No: **MRE-401 (T)**, Course Title: **Mangrove Resources(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 mangrove ecosystem services. 1.0
 b) Briefly discuss the occurrences of mangroves in Sundarbans. 3.0
 c) Explain the major functions of mangrove biodiversity. 3.0
2. a) List down the scientific names of six mangrove plants of Bangladesh. 2.0
 b) Write down the various adaptive characters found in mangrove plants. 3.0
 c) How do you recognize acid sulphate soil in mangrove area? 2.0
3. a) What do you know about mangrove restoration and regeneration? 1.0
 b) Why mangrove restoration and regeneration is important for Bangladesh? 2.0
 c) Formulate your own plan and recommendation for restoration of Chakaria Sundarban mangrove forest of Bangladesh 4.0
4. a) Discuss the hydrodynamics of a mangrove area. 3.0
 b) What are the characteristics of tide dominated mangrove? 2.0
 c) What are the prospects of non-wood forest resources of the Sundarbans? 2.0
5. a) "Mangrove habitats are the most productive habitats for fisheries" – Explain. 2.0
 b) "Sundarbans play a significant role in national economy and livelihood" –Justify the statement. 2.0
 c) Mention the mechanism of seed germination procedure of mangrove species. 3.0
6. a) Point out the major threats for mangrove forests. 2.0
 b) Explain the major causes of mangrove deforestation in Bangladesh. 3.0
 c) How do mangroves help in coastal land formation? 2.0
7. Write short notes on any Two (02) of the following 3.5×2
 a) Mangrove as carbon sink b) Red mangrove c) Top dying diseases d) Germination of halophytes

Section-B

8. a) Differentiate among the red, black and white mangroves. 3.0
 b) Mangrove forest act as a natural shield"- Justify the statement. 2.0
 c) "Viviparity is a special kind of adaptation possess by the mangrove"- Explain the statement. 2.0
 9. a) How do mangrove cope with salt ? 2.0
 b) Enlist the faunal biodiversity of Sundarban mangrove forest. 2.0
 c) Explain the relationship 3.0
- ```

 graph LR
 A[Aquaculture] --> M((Mangrove))
 B[Agriculture] --> M

```
10. a) Mangroves act as sinks to the suspended sediments and associated organic matters-Explain the statement. 2.0  
 b) Mangroves contribute significantly to the global carbon cycle-Justify the statement. 3.0  
 c) What are the different types of areal roots found in mangroves plants? 2.0
  11. a) What do you mean by forest policy? Write down the significance of forest policy in mangrove resources management. 4.0  
 b) "Planning is an important initial management tool"- Discuss the statement. 3.0
  12. a) Enlist different National Policies and guidelines related to coastal aquaculture and environmental protection. 2.0  
 b) Why active people participation is necessary for SRF management? 2.0  
 c) Develop your own plan and recommendation for sustainable management of Sundarban Mangrove forest. 3.0
  13. a) Draw a problem tree which represent a complete scenario of mangrove destruction and its effect. 3.0  
 b) Describe the ecological succession of mangrove forest. 4.0
  14. Write short notes on any Two (02) of the following: 3.5×2  
 a) Medicinal mangrove plants    b) Mangrove conservation strategy    c) Mangrove fisheries    d) Cyclones and mangroves

**Chittagong Veterinary and Animal Sciences University, Chittagong**  
**Faculty of Fisheries**

B. Sc. Fisheries (Hons.) Year -03 Semester-01, Final Examination' 2018  
Course No: FRP-401 (T), Course Title: **Fisheries Research and Planning (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 research. Depict the research process in a general way.               | 3 |
|    | b) | “Research generates new knowledge”- what is meant by <i>new</i> here?        | 4 |
| 2. | a) | Why using census is impractical in biological research?                      | 2 |
|    | b) | Why was Barnett’s schema developed?                                          | 2 |
|    | c) | What does the conceptual model lead to?                                      | 3 |
| 3. | a) | What is model formulation?                                                   | 3 |
|    | b) | List the elements of the step ‘Design’                                       | 4 |
| 4. | a) | What is socio-economic studies?                                              | 1 |
|    | b) | Describe different levels of stakeholder’s participation.                    | 3 |
|    | c) | Write down the potential cost of participation. Mention the obstacles to it. | 3 |
| 5. | a) | Differentiate primary and secondary publication with example.                | 2 |
|    | b) | How do you choose research hypothesis in fisheries research?                 | 3 |
|    | c) | Explain $Z_{\alpha}$ notation with examples.                                 | 2 |
| 6. | a) | Define scientific paper and review paper.                                    | 3 |
|    | b) | How do you use tense while you write a thesis?                               | 4 |
| 7. | a) | Define census, sampling and sampling error.                                  | 3 |
|    | b) | Give the interpretation of standard deviation. What is Z score?              | 4 |

**Section B**

- |     |    |                                                                                                                                                                                                                                                                                                                                                                |   |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 8.  | a) | What do you mean by experiment?                                                                                                                                                                                                                                                                                                                                | 2 |
|     | b) | Describe briefly an experiment for example to be set in a laboratory of FoF, CVASU                                                                                                                                                                                                                                                                             | 5 |
| 9.  | a) | Describe the sources of confusion in an experiment with minimizing measures.                                                                                                                                                                                                                                                                                   | 4 |
|     | b) | The mean of a random sample of 60 new mobile homes is 28.31 in thousand homes. Obtain a 99.74% confidence interval for the mean price of all new mobile homes. Assume the population standard deviation of the price is \$ 1300.                                                                                                                               | 3 |
| 10. | a) | Distinguish between null and alternative hypothesis.                                                                                                                                                                                                                                                                                                           | 3 |
|     | b) | Define mean and standard deviation of sample means with formulas.                                                                                                                                                                                                                                                                                              | 4 |
| 11. | a) | Define focus group discussion. Discuss its purpose.                                                                                                                                                                                                                                                                                                            | 3 |
|     | b) | Design the guidelines for FGD.                                                                                                                                                                                                                                                                                                                                 | 4 |
| 12. | a) | Define ‘Abstract’. What is covered in the section of a scientific write-up?                                                                                                                                                                                                                                                                                    | 3 |
|     | b) | Write down the ten commandments of good writing.                                                                                                                                                                                                                                                                                                               | 3 |
|     | c) | What is coefficient of determination?                                                                                                                                                                                                                                                                                                                          | 1 |
| 13. | a) | Define point estimate and confidence level.                                                                                                                                                                                                                                                                                                                    | 3 |
|     | b) | State Chebychev’s rule and empirical rule for normally distributed population.                                                                                                                                                                                                                                                                                 | 4 |
| 14. | a) | What do you know about normally distributed population?                                                                                                                                                                                                                                                                                                        | 1 |
|     | b) | Differentiate between normal curve and standard normal curve.                                                                                                                                                                                                                                                                                                  | 2 |
|     | c) | The recommended adequate intake (RAI) of calcium for adults is 24 g in the month of April, 2018. The mean calcium intake of 70 poor people near CVASU is 785 mg/day with a standard deviation of 262.3 mg. Now perform a hypothesis test at 5% significance level (critical value -1.645) to decide whether the poor gets less than RAI of 24 g/month (April). | 4 |

**Chittagong Veterinary and Animal Sciences University, Chittagong**  
**Faculty of Fisheries**

B. Sc. Fisheries (Hons.) Year -04 Semester-01, Final Examination' 2018

Course No: **FEN-401 (T)**, Course Title: **Fish Endocrinology (Theory)**

Total Marks: 70, Time: 3 hours

X

*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 endocrinology and endocrine system?                                 | 2 |
|    | b) | Write the importance of studying endocrinology in fisheries science.                    | 2 |
|    | c) | Localize the position of different endocrine gland found in fishes with diagram.        | 3 |
| 2. | a) | What do you mean by chemical messenger?                                                 | 2 |
|    | b) | “Hormone is a chemical messenger”- explain this statement.                              | 5 |
| 3. | a) | Define neurotransmitters and neurohormones.                                             | 1 |
|    | b) | Diagrammatically show the methods of intracellular communication by secreted molecules. | 3 |
|    | c) | How will you differentiate fat soluble hormone from water soluble hormone?              | 3 |
| 4. | a) | What do you know about steroid hormone?                                                 | 2 |
|    | b) | Briefly describe the steroid hormone synthesis and release with diagram.                | 5 |
| 5. | a) | Define gonadotropin.                                                                    | 1 |
|    | b) | “Pituitary gland is a master gland”- explain.                                           | 2 |
|    | c) | Discuss the role of FSH and LH in the fish body.                                        | 4 |
| 6. | a) | What do you mean about leydig cell and sertoli cell?                                    | 2 |
|    | b) | Briefly describe the endocrine control of oocyte maturation in teleosts.                | 5 |
| 7. | a) | What is hormone?                                                                        | 1 |
|    | b) | What are the classes of hormone?                                                        | 2 |
|    | c) | Mention the names of posterior pituitary hormones along with their functions.           | 4 |

**Section B**

- |     |                                                           |                                                                               |         |
|-----|-----------------------------------------------------------|-------------------------------------------------------------------------------|---------|
| 8.  | a)                                                        | How will you relate endocrine system with the nervous system?                 | 2       |
|     | b)                                                        | “Neurosecretory cells are one type of neuron”- explain your answer.           | 3       |
|     | c)                                                        | How do neurons communicate with each other?                                   | 2       |
| 9.  | a)                                                        | What do you understand by sperm motility and spermiation?                     | 2       |
|     | b)                                                        | Diagrammatically show the hormonal control of sperm maturation.               | 5       |
| 10. | a)                                                        | “Neuron is similar to other cells or not”- justify your answer.               | 3       |
|     | b)                                                        | How will you differentiate neurosecretory cell from other neuron.             | 2       |
|     | c)                                                        | How do excitatory neurotransmitters help our body?                            | 2       |
| 11. | a)                                                        | What do you mean by ovarian maturation and vitellogenesis?                    | 2       |
|     | b)                                                        | What are the different types of ovarian organization found in fishes?         | 2       |
|     | c)                                                        | Diagrammatically show the synthesis of egg yolk and egg precursor proteins.   | 3       |
| 12. | a)                                                        | “Growth hormone is both a tropic and non-tropic hormone”-explain your answer. | 2       |
|     | b)                                                        | Point out the reasons why pancreas is called as a heterocrine gland.          | 3       |
|     | c)                                                        | Is signal transduction possible without receptor? - justify your answer.      | 2       |
| 13. | a)                                                        | What do you know about biosynthesis of estrogen?                              | 2       |
|     | b)                                                        | Briefly describe the endocrine control on vitellogenesis in teleosts.         | 5       |
| 14. | Write short note on <u>any 02(TWO)</u> of the followings: |                                                                               | 3.5×2=7 |
|     | a) Ion Channel; b) HPG axis; c) Receptor                  |                                                                               |         |



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 epizootic and epizootiology? Discuss the interactions between human and pathogens in an aquatic environment. 3.0
- b) Mention the roles of epidemiology in aquatic animal health. 2.0
- c) What do you mean by the term SPF? How stocking SPF fish can be helpful to prevent an emerging disease in aquaculture? 2.0
2. a) What is transboundary disease? Discuss the issues vital for controlling the transboundary disease. 4.0
- b) Discuss how climate change influence the epidemiology of aquatic animal diseases. 3.0
3. a) What do you mean by prevalence of disease and how it is measured? Show the relationship between incidence rate and prevalence. 3.0
- b) Discuss about the current strategies being implemented by Asia Pacific region for combating diseases in Asian aquaculture. 4.0
4. a) What do you mean by surveillance and monitoring in terms of disease in populations? 2.0
- b) What is surveillance networking? Explain why do we need surveillance networking to control emerging diseases in aquaculture? 3.0
- c) Differentiate between apparent prevalence and true prevalence. 2.0
5. a) The results from surveys using non-probability sampling are likely to be biased, but still a very useful approach in epidemiological study—Justify the statement. 2.0
- b) Discuss the advantages and disadvantages of using one-stage and two-stage sampling. 3.0
- c) If you do not have any sampling frame, what kinds of random sampling you can use in aquatic epidemiological research and why? 2.0
6. a) Describe the investigation of disease outbreak in field level and collection of fish samples for laboratory analysis. 4.0
- b) What is Biosecurity? Describe the common biosecurity measures taken in a fish farm. 3.0
7. Write short notes on **any two** of the followings 3.5×2
  - a) Geospatial analysis
  - b) Competent authority
  - c) One Health
  - d) Geodatasets

**Section-B**

- 8 a) Define epidemiology. Explain the two basic epidemiological measures of disease frequency. 2.0
- b) Epidemiology for aquatic animal health is a new concept---Explain the statement. 2.0
- c) Discuss about the history of development of aquatic animal disease epidemiology. 3.0
9. a) What do you know about quarantine protocol for aquatic animals? How the quarantine of aquatic animals are actually performed? 2.0
- b) List down the major international codes and guidelines for health and movement of aquatic animals? 2.0
- c) Discuss about the standards of an approved quarantine premises for aquatic animals. 3.0
10. a) What are the importance of IRA? Discuss how can you conduct an IRA of fish and fisheries products? 4.0
- b) What are the major constraints of conducting an IRA? Discuss how can you overcome such constraints. 3.0
11. a) What do you mean by GIS, GPS, Geoid, Ellipsoid, Map Projections and Datum? 3.0
- b) What is information system and gDB? Which information is necessary for a database to be gDB? 3.0
- c) Differentiate among the terms epidemic and pandemic. 1.0
12. a) Differentiate between hazard and risk in disease epidemiology. 2.0
- b) What are the challenges faced by an emergency manager during hazard analysis and risk assessment? 2.0
- c) Discuss about the procedural steps of risk analysis in aquatic animal disease epidemiology. 3.0
13. a) Discuss when systematic sampling is used during epidemiological survey. 2.0
- b) Stratified sampling basically is not a sampling technique---Justify the statement. 2.0
- c) Why we do stratification during sampling? List down the steps of a prevalence survey of aquatic animals. 3.0
14. Write short notes on **any two** of the followings 3.5×2
  - a) GIS technology in fisheries
  - b) Incidence rate survey
  - c) Remote sensing in fisheries management
  - d) Disease reporting

Chittagong Veterinary and Animal Sciences University, Chittagong  
Faculty of Fisheries

B. Sc. Fisheries (Hons.), Year -04, Semester-01, Final Examination' 2018

Course No: ABT-401 (T), Course Title: Algal Biotechnology (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 algal biotechnology. What do you mean by algin? 3  
b) Discuss briefly the importance of studying "Algal Biotechnology" in fisheries. 4
2. a) What is macro-algae? How can algae derived products help our land and environment? 2.5  
b) Write down the general characteristics of phaeophyceae. 1.5  
c) How can you measure growth parameters of algae? 3
3. a) Enlist different products you can produce from macro-algae. 2  
b) Give the manufacturing procedure of any one product produced from red seaweed. 3  
c) Write short notes on "Algotherapy". 2
4. a) What do you mean by biofuel? What are the reasons behind all the recent interest in making fuels from algae? 1+2  
c) Give a schematic diagram of energy conversion process from micro-algae 4
5. a) Write down the general characteristics of Chlorophyceae. 4  
b) Write in brief the major application of commercially produced algae. 3
6. a) Why natural antioxidant is better than synthetic antioxidant? 2  
b) Briefly state the therapeutic, nutraceutical and cosmoceutical uses of algae. 5
7. a) Enlist some toxic compounds found in algae. "Algal toxin is not always harmful for mankind"- justify your answer. 2+2  
c) What will happen if certain area of the Bay of Bengal is affected by brevetoxin? Propose some recommendations to overcome the situation. 3

**Section B**

8. a) Write short notes on algal metabolites. 2  
b) List down bioactive compounds derived from algae. 2  
c) Diagrammatically show biosynthesis process of EPA and DHA. 3
9. a) What is schistosomiasis? How do microalgae prevent schistosomiasis? 3  
b) How can algae derived products help our land and environment? 3  
c) What is Phycoremediation? 1
10. a) Write in brief factors need to be considered in selecting algae for biofuels? 2.5  
b) How can algae help to reduce greenhouse gases? 2.5  
c) List down ten commonly available seaweeds in Bangladesh. 2
11. a) What is agar? 1  
b) Write down the characteristics and significance of agar. 3  
c) How agar is isolated from marine algae? 3
12. a) What is carrageenan? Illustrate production procedure of carrageenan from macro-algae? 6  
c) What makes red algae red? 1
13. a) What do you mean by 'Blue Nutraceutical'? 2.0  
b) Write down the importance of microalgae in pigmentation of marine organism. 2.5  
c) Differentiate natural antioxidant with synthetic antioxidant. 2.5
14. Write short notes on **any two** of the followings: 3.5×2  
a) Bioethanol production from algae      b) Micro-algal bioactive compounds      c) Prospects of seaweed culture in Bangladesh



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 molecular biology and biotechnology. 1  
b) Justify the significance of studying molecular biology and genetic engineering in fisheries. 2  
c) Explain how the knowledge of molecular biology and genetic engineering can enhance sustainability of Fisheries sector. 4
2. a) Describe the functions of restriction endonucleases. 2  
b) Enlist five restriction endonucleases with their source, cutting site with the indication of number of base cutter and cutting sequences. 5
3. a) What is PCR? Write the principle of PCR. 2  
b) Explain the procedural steps of PCR with example. 5
4. Discuss in details the construction and screening of cDNA library. 7
5. a) What is meant by dominant and co-dominant marker? 2  
b) Write the principle of RFLP marker. Mention advantages and disadvantages of RFLP marker. 5
6. a) What is recombinant DNA? Write the applications of recombinant DNA. 2  
b) Explain how would you create and screen recombinant DNA. 5
7. a) What is blotting? Mention the blotting techniques with their purpose. 2  
b) Write the principle of Western blotting. Mention its applications. 3  
c) Differentiate between Southern blotting and Western blotting. 2

**Section B**

8. a) What is molecular marker? Make a list of molecular markers widely used in fish genetic study. 2  
b) How will you use molecular markers in genetic study and conservation of fish population? 5
9. a) Define electrophoresis. Write the principle of gel electrophoresis. 3  
b) What are the factors affecting migration of nucleic acids during electrophoresis? 2  
c) Write the functions of agarose gel, sodium dodecyl sulphate, ethidium bromide in electrophoresis. 2
10. a) Differentiate transient transformation from stable transformation of gene. 2  
b) Explain the methods of bacterial transformation and retroviral transduction. 5
11. a) List the artificial methods of DNA transfer. 2  
b) Describe the principle of electroporation and microinjection with their advantages and disadvantages. 5
12. a) Define the following terms: exon; promoter and enhancer. 2  
b) Illustrate the general features of a eukaryotic protein coding gene. 5
13. a) What is meant by gene expression and why regulation of gene expression is necessary? 1  
b) Mention the steps at which expression of a gene is regulated. 2  
c) Explain the mechanism of post-transcriptional regulation of gene expression. 4
14. Write down short notes on any 02 (Two) of the following: 3.5 × 2 = 7  
i) Mobile genetic elements; ii) Cloning vectors; iii) Southern blotting