

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

B. Sc. Fisheries (Hons.) Year -04, Semester-01, Final Examination' 2022  
Course No: **MRM-401 (T)**, Course Title: **Mangrove Resources Management (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 mangrove by mentioning its distinct characteristics. 3  
b) Describe the ecological and economical functions of mangrove. 4
2. a) Briefly describe the classification of mangrove forests on the basis of physiognomy. 4  
b) Define: Red, Black and White Mangrove. 3
3. a) "Mangrove acts as carbon reservoir" – explain the statement. 2  
b) Describe the different physiological and anatomical adaptation of mangrove species. 5
4. a) What do you mean by mangrove regeneration? 2  
b) Explain the management approaches to conserve mangrove resources using logical framework. 5
5. a) Mention the laws and policies taken by the Bangladesh Government to conserve the Sundarban mangrove forests resources. 2  
b) "Coastal pollution is a serious threat to Sundarban mangrove resources" – explain the statement . 5
6. a) What is deterioration? Illustrate the causes of deterioration of Sundarban Mangrove Forest. 4  
b) "Sundarban Mangrove is a natural reservoir of biodiversity" – explain 3
7. Write short notes on any 02 (Two) of the following: 3.5×2 = 7  
a) Forest Encroachment; b) Top dying disease and c) World mangrove conservation

**Section-B**

8. a) Describe the major floral resources of the Sundarban mangrove forest including their characteristics and distribution. 3  
b) "Mangrove act as a natural shield and economic trump card" – explain the statement. 4
9. a) Briefly describe the major stressors of the Sundarban mangrove. 5  
b) "Tidal influence and salinity play a crucial role in mangrove distribution" – explain the statement. 2
10. a) Briefly describe the present climatic condition and future environmental risk of the Sundarban mangrove forest system. 5  
b) Mention the present floral and faunal biodiversity of the Sundarban mangrove using references. 2
11. a) Illustrate the major root systems of mangrove species. 4  
b) Briefly describe the reproduction process of mangrove species. 3
12. a) Briefly describe at least three successful mangrove conservation approaches practiced in the world. 4  
b) "World mangrove forest gradually turned into time bomb" – explain the statement. 3
13. a) Discuss the control regime system of fisheries management system in Sundarban including the limitations of the legislative responses. 5  
b) "Sundarban mangrove has a great research potential" – justify the statement. 2
14. Write short notes on any Two (02) of the following: 3.5×2 = 7  
a) Sundarban plant succession      b) Mangrove restoration      and      c) Conflict in Mangrove management

**Chattogram Veterinary and Animal Sciences University, Chattogram**  
**Faculty of Fisheries**  
**B. Sc. Fisheries (Hons.) Year-4, Semester-1, Final Examination' 2022**  
**Course No: FEX-401 (T), 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) Differentiate between extension and fisheries extension. 3  
b) Discuss the scope of extension for fisheries development in Bangladesh perspective. 4
2. a) Differentiate between formal education and extension education. 3  
b) Extension education is a non-formal type of education. Explain. 4
3. a) Enlist the extension organizations related to fisheries development in Bangladesh. 2  
b) State the role of the Department of Fisheries (DOF) as an extension organization. 5
4. a) Classify the extension teaching methods based on use. 3  
b) Discuss how you will arrange a 'field day' as an Upazila Fisheries Officer. 4
5. a) What is innovation? Enlist the perceived attributes of fisheries innovation. 3  
b) Describe the consequences of adoption in the innovation decision process with examples. 4
6. a) Define learning. List the elements of learning process. 3  
b) Describe the characteristics of most important element in the learning process. 4

**SECTION- B**

7. a) Enlist the elements of communication process. 2  
b) State the Berlo's model of communication with its implication in fisheries extension work. 5
8. a) Illustrate leadership. 2  
b) Discuss the role of professional leaders in fisheries extension work. 5
9. a) Suppose you are an Upazila Fisheries Officer. In you upazila there is a technology transfer project in fisheries (Suborno Rui). What steps will you follow to monitor project activities? 7
10. a) Illustrate extension program planning. 2  
b) Discuss the steps of extension program planning with examples. 5
11. a) State the qualities of a good local leader. 2  
b) Describe the types of people's participation in extension work. 5
12. Write short notes on **any two** of the following: 3.5x2=7  
a) Participatory Rural Appraisal (PRA)  
b) Adopter categories and  
c) Motivation cycle.

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

**B. Sc. Fisheries (Hons.) Year-4, Semester-1, Final Examination' 2022**

**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) Write down the importance of studying Algal Biotechnology in Fisheries Science. 2.0  
b) "Algae are not classified as plant" – Justify. 2.0  
c) Classify macroalgae based on pigmentation and differentiate among them. 3.0
2. a) What are the top three environmental factors that macroalgae require to thrive, and how do they work together to create the perfect home for microalgae? 2.0  
b) How do algae's beneficial uses impact society and marine biology? As an undergraduate, how can you contribute to this field of research? 5.0
3. a) What do you mean by phycoremediation? 1.0  
b) Explain the factors responsible for bioremediation process. 2.0  
c) Write short notes on "Great Atlantic Sargassum Belt". 4.0
4. a) Explain one bioethanol production method from algae. 3.0  
b) Differentiate between plant-based biofuel and algae-based biofuel. 2.0  
c) Briefly discuss the quantification methods required for algal lipid characterization 2.0
5. a) Importance of algae culture in fisheries science. 3.0  
b) Discuss different types of microalgae culture systems with their advantages and disadvantages. 4.0
6. a) What is algal toxin? Enlist 5 (five) toxic compounds derived from algae. 3.0  
b) Discuss some important toxin producing groups of algae and their toxins. 4.0
7. a) What do you mean by algal metabolites? 2.0  
b) How critical is the selection of extraction method when it comes to isolating algal metabolites, and what specific factors should be taken into account when choosing the most suitable extraction method for a particular type of algal metabolite? 5.0

**Section-B**

8. a) a) List down 6 (six) important seaweed species (scientific name) commercially cultured in seaweed producing countries. 2.0  
b) Explain the status and prospect of algal culture in Bangladesh. 2.5  
c) Describe some of the primary challenges and limitations associated with the commercial cultivation of macroalgae, including issues related to scalability, efficiency, and environmental impact. 2.5
9. a) Draw the chemical structure of saxitoxins and anatoxins. 2.0  
b) Discuss different types of algal metabolites with their health benefit. 5.0
10. a) Draw a schematic diagram of an ideal seaweed with a label. 2.0  
b) What are seaweed-based products and what makes them unique? What are the potential health benefits of incorporating seaweed or its derivatives into products such as food, cosmetics, and pharmaceuticals? 5.0
11. a) What is the functional significance of metabolites for algae, and how do these compounds play a critical role in the physiology, growth, and survival of these organisms? 3.5  
b) Could you provide a list of several algal metabolites and explain their relevance to the field of fisheries science? 3.5
12. a) Differentiate between open pond and closed culture system of microalgae. 2.0  
b) Define axenic culture and describe a technique to separate tissue from an axenic culture. 3.0  
c) Write short notes on blue-green algae. 2.0
13. a) What do you mean by bioaccumulation, biotransformation and biomagnification of algal toxins? 3.0  
b) Briefly discuss the scope of research area on algal toxins in fisheries science. 4.0
14. Write down short notes any 2 (TWO) of the following: 3.5 x 2 = 7  
a) Microcystins; b) Blue economy; and c) Prospects of dietary supplement of microalgae.

**Chattogram Veterinary and Animal Sciences University, Chattogram**  
**Faculty of Fisheries**  
 B. Sc. Fisheries (Hons.) Year -04, Semester-01, Final Examination' 2022  
 Course No: **GRS-401 (T)**, Course Title: **GIS and Remote Sensing (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 GIS metadata? Explain why metadata is important to GIS.                     | 4 |
| b)    | List three common elements of geospatial metadata.                                  | 3 |
| 2. a) | What are various steps in remote sensing?   | 2 |
| b)    | What is the difference between Stefan Boltzmann law and Wien's law?                 | 2 |
| c)    | "Electromagnetic radiation is must for remote sensing"-explain the Statement.       | 3 |
| 3. a) | Give an extended definition of RS.  | 2 |
| b)    | Briefly describe the importance of remote sensing in Fisheries Oceanography.        | 5 |
| 4. a) | What is map? What are the basic types of maps?                                      | 3 |
| b)    | What do you mean by gDB? Briefly explain three main components of geodatabase.      | 4 |
| 5. a) | What are the applications of GIS?   | 2 |
| b)    | What are the advantages of using GIS in habitat mapping?                            | 5 |
| 6. a) | How can the scale be represented in map?  | 2 |
| b)    | Explain the importance of map projections for users of GIS.                         | 5 |
| 7. a) | Explain image enhancement and image filtering.                                      | 2 |
| b)    | Differentiate between vectoral and cell based objects.                              | 2 |
| c)    | Describe the geodatasets used in GIS. What are the sources of data for geodatasets? | 3 |

**Section-B**

- |        |   |           |
|--------|---|-----------|
| 8. a)  | What is the difference between a GIS and geographical information science?              | 3         |
| b)     | How to use GIS for coastal zone management application?                                 | 4         |
| 9. a)  | What is a model? Which types of methods you can use in spatial referencing?             | 4         |
| b)     | The earth's shape is irregular-positioning needs Simplification- explain the statement. | 3         |
| 10. a) | What are Active and Passive RS? Briefly describe the energy sources in RS.              | 3         |
| b)     | Briefly describe data collection techniques in RS.                                      | 4         |
| 11. a) | Name the open source remote sensing software.   | 1         |
| b)     | Differentiate land cover and land use.  | 2         |
| c)     | Describe the process of image classification using supervised and unsupervised types.   | 4         |
| 12. a) | How do you get access to remote sensing data and what are the costs?                    | 2         |
| b)     | Briefly describe the application of remote sensing in marine sector of Bangladesh.      | 5         |
| 13. a) | Define digital image processing   | 2         |
| b)     | Give an overview about the pre-processing methods of digital image.                     | 5         |
| 14.    | Write short notes on any 02 (Two) of the following:                                     | 3.5×2 = 7 |
|        | a) Ground trothing      b) Geoid vs Elipsoid      and      c) DEMs                      |           |

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

B.Sc. Fisheries (Hons.) Year - 4 Semester - 1 (January-June), Final Examination' 2022  
**Course No: FIH401 (T), Course Title: Fish Immunology & Health 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 separate answer script for each section.*

**Section-A**

1. a. Define immunology and serology. 2  
b. Briefly discuss impact of diseases in aquatic animals. 5
2. a. Discuss specific immunity of fish. 3  
b. Briefly explain the factors responsible for disease development in aquaculture. 4
3. a. Define and classify immune responses of fish. 3  
b. What are the characteristics of innate and adaptive immune responses? Discuss humoral components of innate immunity of fish 4
4. a. Distinguish immune response between fish and shrimp. 2  
b. Discuss the mechanisms of immunoglobulin production in fish. 5
5. a. Define aqua-drug, probiotics and antibiotic. 2  
b. Discuss aqua-drug selection criteria for fish disease treatment. 3  
c. Write down the characteristics of adaptive immunity. 2
6. a. Distinguish immune response between fish and shrimp. 2  
b. Discuss different aspects of shrimp immunity. 5
7. Write short notes on **any 02 (two)** of the following: 3.5x2=7  
i) Polyclonal antibody; ii) Phagocytosis and iii) Prophylaxis.

**Section B**

8. a. Write down the reason why monoclonal antibodies are powerful immunological tools? 1  
b. How will you prepare the monoclonal (Mabs) and Polyclonal antibodies (Pabs)? 2  
c. Explain in details the procedure for production of Mabs. 4
9. a. Name the major sources of drugs. 3  
b. Would you suggest vaccines or chemotherapy for fish health management? Justify your answer. 4
10. a. Write down the physical barrier of non-specific immunity. 2  
b. Explain in details five major factors which are responsible for the immune protection. 5
11. a. Write down the disadvantages of chemical treatment during aqua-drug administration. 4  
b. Discuss in details the route of aqua-drug administration. 3
12. a. Differentiate between vaccination and chemotherapy. 2  
b. Illustrate the types of vaccines and discuss the methods of vaccine delivery. 5
13. a. Write down the function of fish blood. 2  
c. Discuss first line defenses of immune response of fish. 5
14. Write short notes on **any 02 (two)** of the following: 3.5x2=7  
i) Lectins; ii) Macrophage and iii) Lymphocytes.

# Chattogram Veterinary and Animal Sciences University, Chattogram

## Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -4, Semester-1 (January-June), Final Examination' 2022

Course No: FGB-401 (T), Course Title: **Fish Genetic Engineering and Biotechnology (Theory)**

Total Marks: 70

Time: 3 hours

Answer any 5 (five) 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 understand by genetic engineering, biotechnology, GMO and LMO? 2  
b) How genetic engineering correlates with the biotechnology? 2  
c) Mention important applications of genetic engineering and biotechnology in fish. 3
2. a) What do you mean by rDNA and rDNA technology? 2  
b) Differentiate between blunt end and sticky end. 2  
c) If the following DNA is cut with EcoRI, how many DNA fragments would you expect? Write down the sequence of the double-stranded DNA fragments that will be produced. 3  
5' ATTGAATTCGGATCCGTAATGTGTCCTGAATTCACGCTCCACG 3'  
3' TAACTTAAGCCTAGGCATTACACAGGACTTAAGTGCGAGGTGC5'
3. a) How you will prepare agarose gel for 250bp DNA product? 2  
b) Differentiate between zone electrophoresis and moving boundary electrophoresis. 2  
c) Explain the principles of electrophoresis. 3
4. a) What do you understand by gene cloning and transformations? 2  
b) Describe the essential steps for obtaining the clone of a specific gene in bacteria. 5
5. a) What do you understand by marker, SNP, and minisatellite? 2  
b) Briefly describe the principles, procedure, applications and limitations of RFLP marker. 5
6. a) What is chromosome manipulation? Enlist the techniques used for chromosome manipulations. 2  
b) Develop a plan for the production of *Heteropneustes fossilis* through meiotic gynogenesis. 5
7. Write short note on **any 02 (two)** of the following: 3.5 × 2 = 7  
a) Agarose gel electrophoresis, b) Transgenesis, and c) Southern blotting

### Section-B

8. a) What are the characteristics you will choose for genetic engineering in fish and why? 3  
b) Assess the impact of genetically engineered product in human and social life. 4
9. a) What do you know about SDS and polyacrylamide? 2  
b) Why two separate gel layers are used in SDS-PAGE? 2  
c) How you will stain and visualize nucleic acids in gels? 3
10. a) What do you know about T<sub>m</sub>, nucleotide, primer and probe? 2  
b) Point out the advantage and disadvantage of polymerase. 2  
c) List down the basic constituents of PCR with their functions. 3
11. a) What do you know about the enzyme reverse transcriptase? 2  
b) Briefly describe the procedure for the construction of genomic DNA library. 5
12. a) What do you understand by hybridization and blotting? 2  
b) How the hybrids can be detected from a mixture of molecule? 2  
c) Briefly describe the principles of blotting. 3
13. a) Explain the following terms: bioethics, biosafety, biopolicy, biosecurity and bioeconomy. 3  
b) Briefly describe the autonomy and legal rights principles in bioethics. 4
14. Write short note on **any 02 (two)** of the following: 3.5 × 2 = 7  
a) rDNA construction, b) Electroporation, and c) Triploids

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

B. Sc. Fisheries (Hons.) Year -04 Semester-01, Final Examination' 2022  
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) | What is research?   | 1 |
| b)    | Why does research need?   | 2 |
| c)    | Write down the scope of research project for the development of fisheries sector.         | 4 |
| 2. a) | Distinguish between Basic and Applied research.   | 2 |
| b)    | Describe the characteristics of research.   | 5 |
| 3. a) | Distinguish between research aims and objectives with example.                            | 3 |
| b)    | Explain each of your research objectives should be SMART.                                 | 4 |
| 4. a) | What do you mean by experimental design?  | 3 |
| b)    | Explain the phases of project lifecycle.  | 4 |
| 5. a) | What is scientific manuscript?  | 2 |
| b)    | List down the components of a journal article chronologically.                            | 2 |
| c)    | What types of information in introduction part should contain in a scientific manuscript? | 3 |
| 6. a) | List down the advantages of using the Gantt chart.  | 2 |
| b)    | Sketch a Gantt chart with an example.   | 5 |
| 7. a) | Define sample size with an example.   | 2 |
| b)    | Enlist common sampling methods used in the biological research field.                     | 2 |
| c)    | Write down the pros and cons of cluster sampling.   | 3 |

**Section B**

- |        |   |         |
|--------|---|---------|
| 8. a)  | What is data interpretation?  | 2       |
| b)     | Discuss the steps of data interpretation.   | 5       |
| 9. a)  | What characteristics should you consider to write an ideal title for your article?                | 1       |
| b)     | Give example of an ideal abstract mentioning the elements.  | 3       |
| c)     | Summarize the components of result section of a scientific article.                               | 3       |
| 10. a) | What is plagiarism?   | 1       |
| b)     | What is secondary data and why it needs to use in sector?   | 3       |
| c)     | Breakdown the information of writing a reference of scientific article with example.              | 3       |
| 11. a) | Enlist data analysis software.  | 1       |
| b)     | Discuss different levels of stakeholder participation with examples.                              | 3       |
| c)     | Why keeping replications is important for biological research?                                    | 3       |
| 12. a) | What are the constraints of participatory-based research?   | 2       |
| b)     | How will you keep tense accurate throughout the different parts of a scientific research paper?   | 2       |
| c)     | Develop a sample monitoring plan for a research project.  | 3       |
| 13. a) | What is socioeconomic assessment?   | 1       |
| b)     | List down the guiding principles for field data collection.                                       | 3       |
| c)     | What is sampling error? How you will design a sampling method to avoid them?                      | 3       |
| 14.    | Write short notes on <b>any two</b> of the following:   | 3.5x2=7 |
|        | i) Monitoring and Evaluation; ii) Stratified sampling; iii) Data analysis; iv) Conference report. |         |

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

**B. Sc. Fisheries (Hons.) Year-4, Semester-1, Final Examination' 2022**

**Course No: QCF-401 (T), Course Title: Quality Control of Fish and Fishery Products (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 Quality, Quality Assurance, Quality Control, Inspection, and Audit. 3  
b) What is the concept of quality? What are the objectives/purpose of a quality system and how to fulfil the objectives? 4
2. a) What kind of autolytic changes take place in fish during rigor mortis? 3  
b) What kind of bacterial changes occur in fish during post-mortem changes in fish? 4
3. a) Why fish species is considered a factor that affect the intrinsic quality? How size of the fish affects the intrinsic quality of the fish? 4  
b) How condition and composition of the fish affect the intrinsic quality of the fish? 3
4. a) Why fish spoils more quickly than cereals, nuts and grains? What kind of physical and sensory changes occur during post-mortem changes? 4  
b) What do you mean by sensory assessment? Describe how do you assess the quality by determining the defects points in fresh fish. 3
5. a) Write down briefly one biochemical method to assess the quality of a fishery product. 4  
b) List down some quality problems commonly associated with dried fish products. 3
6. a) List down quality problems in salted fish and fish roe. 3  
b) List down quality problems of smoked fish and shrimp products. 4
7. a) Discuss briefly major food safety issues in fish and fishery products. 4  
b) List down three important text books on quality control of fish and fishery products. 3

**Section-B**

8. a) List down FDA eight key areas of sanitation. How to control and monitor the condition and cleanliness of food contact surfaces including utensils, gloves, and outer garments in the food industry (FDA Key Sanitation Condition No. 2)? 4  
b) How to control and monitor the prevention of cross-contamination in food industry (FDA Key Sanitation Condition No. 3)? 3
9. a) Define species related hazards and process related hazards with examples. 3  
b) Briefly write down the history of the concept and introduction to practice of HACCP system in food industry. 4
10. a) What is HACCP? Briefly describe the principles of HACCP. 3  
b) Develop a process flow chart for raw frozen shrimp (Farmed, *P. monodon*) for hazard analysis. 4
11. a) How to assess the significance of the identified hazards? Prepare a risk-based hazard analysis worksheet for IQF hilsha fish in receiving where histamine is a potential hazard. 4  
b) Write in brief where CCPs can be steps in the process flow where hazards can be prevented, eliminated and reduced to acceptable level. 3
12. a) What is CCP? Give an example of single hazard with ~~single~~ <sup>multiple</sup> CCP and ~~single hazard~~ <sup>multiple</sup> with ~~single~~ <sup>multiple</sup> CCPs in a process flow of a fishery product. 3  
b) Write in brief control measures of pathogenic bacteria, chemicals, parasites and physical hazards in fishery products. 4
13. a) Why FIQC wing of the DOF is called as the Competent Authority (CA) for fish and fishery Products? List down some legal relevant background legislation under which this authority is conferred for fish and fishery products production. 3  
b) Show the organogram of competent Authority of Bangladesh for fish and fishery products. 4
14. Write down short notes any 2 (TWO) of the following: 3.5 x 2 = 7  
a) CODEX; b) Layout of fish processing plant; and c) RASFF.



# Chattogram Veterinary and Animal Sciences University, Chattogram

## Faculty of Fisheries

B. Sc. Fisheries (Hons.) Year -04, Semester-01, Final Examination (Make up)' 2022

Course No: FGB-401 (T), Course Title: Fish Genetic Engineering and Biotechnology (Theory)

Total Marks: 70

Time: 3 hours

Answer any 5 (five) 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 know about GMO and LMO? 2  
b) Differentiate genetic engineering from biotechnology. 2  
c) Discuss the disadvantage of fish in genetic engineering research. 3
2. a) Explain the following terms: host, vector, plasmid and restriction enzyme. 4  
b) If EcoRI cuts the marked position, what will be the results? 3  

$$\begin{array}{c} 5' \text{GAATTC} 3' \\ 3' \text{CTTAAG} 5' \end{array}$$
3. a) Explain the principles of electrophoresis. 3  
b) Discuss the factors that are related to the migration of nucleic acid in gel. 4
4. a) Distinguish between a cDNA library and a genomic DNA library. 2  
b) Describe the steps of preparing and screening a genomic DNA library. 5
5. a) "PCR is called the molecular photocopier"- explain. 2  
b) What do you know about DNA polymerase? 2  
c) Enlist the basic criteria for the selection of best quality primer. 3
6. a) What do you understand by bioethics and biosafety? 2  
b) How bioethics can be helpful in regulating the genetically engineered product for the welfare of human being? 5
7. a) What happens when a gene is transferred to a fish embryo? 3  
b) Discuss how Southern blotting technique is used to analyze chromosomal integration of a transgene. 4

### Section-B

8. a) Do you think genetic engineering is necessary for the field of fisheries? Explain. 3  
b) What are the sources of engineered genes in fish? 2  
c) What are the characteristics of fish that will be chosen for genetic engineering? 2
9. a) What do you understand by recombinant DNA, blunt end and sticky end? 3  
b) How you will create a recombinant DNA molecule? 4
10. a) How you will prepare agarose gel for 500 bp DNA sequence? 2  
b) Briefly describe the process of agarose gel electrophoresis. 5
11. a) What do you understand by cloning? 2  
b) What are the basic components of PCR? Explain with example. 3  
c) Point out the major fields where PCR technology is used. 2
12. a) What is molecular marker? 1  
b) Describe the methods of Random Amplified Polymorphic DNA (RAPD) marker analysis. 4  
c) What are the disadvantages of RAPD markers? 2
13. a) What do you mean by chromosome manipulation? 2  
b) Briefly describe the androgenesis process of chromosome manipulation for the production of all male population. 5
14. Write short note on any two (02) of the following: 3.5 × 2 = 7  
a) Transgenesis, b) Microinjection, c) Tetraploids, and d) SDS PAGE

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b) What are the sources of engineered genes in fish? 2  
c) What are the characteristics of fish that will be chosen for genetic engineering? 2
9. a) What do you understand by recombinant DNA, blunt end and sticky end? 3  
b) How you will create a recombinant DNA molecule? 4
10. a) How you will prepare agarose gel for 500 bp DNA sequence? 2  
b) Briefly describe the process of agarose gel electrophoresis. 5
11. a) What do you understand by cloning? 2  
b) What are the basic components of PCR? Explain with example. 3  
c) Point out the major fields where PCR technology is used. 2
12. a) What is molecular marker? 1  
b) Describe the methods of Random Amplified Polymorphic DNA (RAPD) marker analysis. 4  
c) What are the disadvantages of RAPD markers? 2
13. a) What do you mean by chromosome manipulation? 2  
b) Briefly describe the androgenesis process of chromosome manipulation for the production of all male population. 5
14. Write short note on **any two (02)** of the following: 3.5 × 2 = 7  
a) Transgenesis, b) Microinjection, c) Tetraploids, and d) SDS PAGE

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

**B. Sc. Fisheries (Hons.) Year -04, Semester-01, Final Examination (Make up) 2022**  
**Course No: FGB-401 (T), Course Title: Fish Genetic Engineering and Biotechnology (Theory)**  
**Total Marks: 70                      Time: 3 hours**

*Answer any 5 (five) 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 know about GMO and LMO? 2  
b) Differentiate genetic engineering from biotechnology. 2  
c) Discuss the disadvantage of fish in genetic engineering research. 3
2. a) Explain the following terms: host, vector, plasmid and restriction enzyme. 4  
b) If EcoRI cuts the marked position, what will be the results? 3  

$$\begin{array}{c} 5' \text{GAATTC} 3' \\ 3' \text{CTTAAG} 5' \end{array}$$
3. a) Explain the principles of electrophoresis. 3  
b) Discuss the factors that are related to the migration of nucleic acid in gel. 4
4. a) Distinguish between a cDNA library and a genomic DNA library. 2  
b) Describe the steps of preparing and screening a genomic DNA library. 5
5. a) "PCR is called the molecular photocopier"- explain. 2  
b) What do you know about DNA polymerase? 2  
c) Enlist the basic criteria for the selection of best quality primer. 3
6. a) What do you understand by bioethics and biosafety? 2  
b) How bioethics can be helpful in regulating the genetically engineered product for the welfare of human being? 5
7. a) What happens when a gene is transferred to a fish embryo? 3  
b) Discuss how Southern blotting technique is used to analyze chromosomal integration of a transgene. 4

**Section-B**

8. a) Do you think genetic engineering is necessary for the field of fisheries? Explain. 3  
b) What are the sources of engineered genes in fish? 2  
c) What are the characteristics of fish that will be chosen for genetic engineering? 2
9. a) What do you understand by recombinant DNA, blunt end and sticky end? 3  
b) How you will create a recombinant DNA molecule? 4
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