

**Chattogram Veterinary and Animal Sciences University, Chattogram**

**Faculty of Fisheries**

**Department of Fish Biology and Biotechnology**

MS in Fish Biology and Biotechnology, July-December Semester Final Examination' 2023

Course Code: **GBO-502(T)**, Course Title: **Genetics and Breeding of Ornamental Fishes**

Full Marks: 40

Time: 2 hours

Answer any **FIVE** questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. a. Enlist some potential indigenous ornamental fish species with their scientific name. 2  
b. Diagrammatically show the access pathway, distribution and marketing channel of aquarium fish in Bangladesh. 2  
c. Point out the economic contribution of ornamental fishes of Bangladesh. 2  
d. Mention some key challenges for the ornamental fish business in Bangladesh. 2
2. a. State the Mendel's Laws of independent assortment. 2  
b. Discuss the Mendel's Laws of independent assortment with appropriate example. 6
3. Explain the structural and pattern diversity of ornamental fish with examples and diagram. 8
4. a. What do you understand by sex-linked, sex-influences and sex-limited phenotype? 3  
b. Explain the sex-linked traits for the maculatus gene in guppy. 5
5. a. What are the precautions should be taken for an ideal aquarium preparation? 3  
b. What is the basic installation process of aquarium in household? 5
6. a. Enlist the basic selection criteria of ornamental fish for induced breeding? 2  
b. Point out some common inducing agent that are used for ornamental fish breeding with their doses. 3  
c. Diagrammatically show the mode of action of ovaprim hormone in reproductive cascade. 3
7. Briefly discuss about the embryonic development, larval development, morphological changes, feeding strategies and environmental influences on the embryonic development of ornamental fishes. 8
8. a. Discuss the role of photoperiod and temperature in the ornamental fish breeding. 4  
b. Enumerate the role of gonadotropin, dopamine and sex steroids in the regulation of ornamental fish breeding. 4

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Course Code: **EMF-502**, Course Title: **Embryology of Fishes**

Total Marks: 40

Time: 2 hours

Answer any **FIVE** questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. a) What do you know about Leydig cell and Sertoli cell? 4  
b) Briefly describe the urinogenital system of Teleost and Acipenser. 4
2. a) Briefly describe the spermiogenesis process in male. 5  
b) Diagrammatically show the neurohormonal control of gametogenesis. 3
3. a) What are the types of fertilization process observed in different animal groups? 3  
b) Illustrates and describe the fertilization process in fish. 5
4. a) What do you know about micropyle? 2  
b) Briefly describe the polyspermy block in the fish fertilization with diagram. 4  
c) What are the roles of calcium in egg activation? 2
5. a) What do you know about organogenesis and metamorphosis? 2  
b) Write down the hormonal impact on metamorphosis. 4  
c) Diagrammatically show the developmental modules in vertebrates. 2
6. a) What do you know about parental care and why it is important for low fecund fishes? 3  
b) Briefly describe the nest building behavior of different groups of fish. 5
7. a) What do you understand by sex determination and sex differentiation? 2  
b) Enlist different sex determination systems found in fishes with example. 2  
c) Briefly describe the role of genetics, environment and brain in sex determination. 4

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Course Code: **RPF-502**, Course Title: **Reproductive Physiology of Fishes**

Total Marks: 40

Time: 2 hours

Answer any FIVE questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. a. What do you understand by reproduction, parthenogenesis, gonochorism and hermaphroditism? 4
- b. Briefly describe different types of primary and secondary sexual characteristics in fish. 4
2. a. Draw and label the different component of HPG axis. 3
- b. Illustrates and describe the HPA axis in vertebrates. 5
3. a. What do you know about sperm motility and sperm viability? 2
- b. Diagrammatically show the process of sperm motility in fish. 3
- c. Write down the effect of temperature and osmotic pressure on sperm motility. 3
4. a. Briefly describe the consequences of puberty in fish. 4
- b. Enlist and describe the techniques for the control of puberty in fish farming. 4
5. a. What do you know about vitellogenin and vitellogenesis? 3
- b. Briefly describe the endocrine control of vitellogenesis process in fish. 5
6. a. What is pheromone? 2
- b. What do you understand by courtship and parental care behavior? 3
- c. Briefly describe the parental care behavior of Tilapia. 3
7. Briefly describe the environmental factors influencing the reproduction in fish. 8

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MS in Fish Biology and Biotechnology, July-December Semester Final Examination' 2023

Course Code: **MBI-502**, Course Title: **Molecular Biology**

Total Marks: 40

Time: 2 hours

Answer any **FOUR** questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. What do you know about molecules? Describe the basic properties, structure and functions of biomolecules. 3+7=10
2. What do you understand by mutation, mutant, mutagen and mutagenesis? Briefly describe the different types of mutation with appropriate example. 4+6=10
3. What do you mean by gene, operon, promoter, and gene expression? Briefly describe the gene expression regulation in eukaryotes. 4+6=10
4. Explain the following terms: DNA replication, replication fork, leading strand, lagging strand, and Okazaki fragment. Briefly describe the DNA replication process with diagram. 5+5=10
5. What do you understand by the term transcription and translation? Differentiate between them. Briefly describe the transcription process in eukaryotes. 2+2+6=10
6. What do you know about MHC? Classify MHC molecules with example. Enlist the role of MHC in vertebrates. Diagrammatically show the exogeneous processing pathway of MHC molecules. 2+2+2+4=10

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Course Code: AIC-502 (T), Course Title: **Advanced Ichthyology (Theory)**

Full Marks: 40

Time: 2 hours

Answer any FIVE questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. a. What do you understand by Ichthyology? 1  
b. Differentiate between taxonomy and systematics. 2  
c. Write down the basic objectives of ICZN. 2  
d. Describe the principles of ICBN. 3
2. a. Differentiate between Chondrichthyes and Osteichthyes. 3  
b. Draw the anatomical structure of Agnatha. 2  
c. Show the classification of fish with one example from each group. 3
3. a. What do you know about phylogeny, phylogenetic tree and cladistics? 3  
b. Phylogenetic tree is called the "tree of life"- explain. 3  
c. Construct a flow diagram showing the process of preparing a phylogenetic tree. 2
4. Describe the multiple factors affecting the feeding behavior of fish. 8
5. a. What do you mean by shoaling and schooling? 2  
b. Enlist the benefit of schooling in fish. 2  
c. Briefly describe the migratory pattern of Salmon. 4
6. a. What do you know about buoyancy? 2  
b. Classify fish locomotion strategies with appropriate diagram and example. 4  
c. How does lateral line help in regulating fish behavior? 2
7. a. What do you understand by zoogeography? 1  
b. List out the zoogeographic realms of the world with specific regions. 2  
c. Briefly describe the factors influence the fish distribution. 3  
d. What do you know about marine zoogeography? 2
8. a. Enlist some sensory organs in fish body with their function. 2  
b. Describe the light sensory mechanisms of different groups of fish with example. 6

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Course Code: BSI-502, Course Title: Fish Breeding and Stock Improvement

Total Marks: 40

Time: 2 hours

Answer any FIVE questions from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

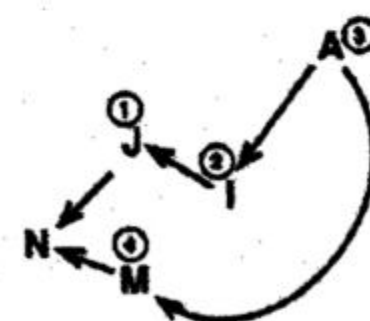
1. a) What do you understand by quantitative traits? 2  
b) Differentiate between quantitative and qualitative traits. 3  
c) "V<sub>D</sub> is not inherited" explain. 3
2. a) How you will mitigate the inbreeding depression in a fish population? 3  
b) In a given population of *Labeo bata*, the weight (gm) of the fishes was as follows. The underlined fishes are female and non-underlined fishes are male. 5  

739, 845, 670, 528, 776, 690, 591, 501, 790, 634, 492, 735, 809, 757, 591, 666, 739, 845, 549, 777, 689, 710, 812, 677, 603, 835, 1024, 705, 770, 690, 820, 703, 746, 956, 530, 724, 587, 659, 798, 655, 692, 995, 505, 800, 752, 616, 814, 802, 698 and 790 gm.

Calculate the inbreeding value from the above population.
3. a) What do you understand by interspecific and intergeneric hybridization? 3  
b) Suppose, a carp farmer decides to initiate a hybridization program using *Labeo rohita* (average weight 2530gm) and *Gibelion catla* (average weight 2640gm). The farmer found average offspring weight 2670 gm when mated with *Labeo rohita* male and *Gibelion catla* female. In another mating, the farmer found average offspring weight 2300 gm when mated with *Labeo rohita* female and *Gibelion catla* male. In which cases, hybrid vigor was produced? 5
4. a) "No selection is the best selection"- explain. 3  
b) In a given population of *Tor putitora*, the weight (gm) of the fishes was as follows- 5  

591, 677, 549, 677, 659, 501, 603, 692, 812, 770, 746, 666, 995, 776, 689, 587, 752, 805, 800, 698, 820, 528, 570, 835, 1004, 790, 634, 802, 798, 655, 591, 755, 809, 757, 690, 630, 724, 616, 814, 725, 845, 703, 692, 505, 756, 690, 739, 710, 845 and 597 gm.

Select 10 fishes for stabilizing selection program.
5. a) "Hybridization does not produce good broodstock"- explain. 3  
b) Calculate the inbreeding for the population N from the following path. Given that the common ancestor A have inbreeding value was 3.25. 5



6. a) What do you know about chromosome manipulation, monosex and YY supermale? 3  
b) Briefly describe the production of YY supermale with appropriate diagram. 5
7. a) What do you know about brood bank and why it is important for fish hatcheries? 3  
b) How you will plan and maintain a brood bank for the dissemination and aquaculture production as a fisheries officer? 5
8. a) Differentiate between heterosis and inbreeding depression. 3  
b) Suppose, a fish farmer decides to initiate a selection program for increased growth rate in the *Clarias batrachus*, which currently averages 780g. To implement his program, the farmer selects 30 females that average wt. 815g and 35 males that average wt. 860g. If the additive genetic variance was 40% and the phenotypic variance was 97% for the given population. What will be the predicted average weight in the next generation? 5