

Chattogram Veterinary and Animal Sciences University

Faculty of Fisheries

Department of Fish Biology and Biotechnology

Master of Science in Fish Biology and Biotechnology, July-December Semester Final Examination' 2020

Course Code: AIC-502, Course Title: Advanced Ichthyology

Total Marks: 40, Time: 2 hours

Answer any **FOUR (04)** from the following. Illustrate your answer wherever necessary. Figure in the right margin indicates full marks.

1. (a) Define homeostasis. "Thermal regulation is a homeostasis process"-explain. 3
(b) Discuss the behavioral and physiological thermoregulation of big-eye tuna. 4
(c) Illustrate the structure of the lateral line system in teleost. 3
2. (a) Write the primitive characteristics of agnathans. Compare the variations of respiratory system of primitive hagfish and advanced hagfish. 3
(b) Write the characters, biological significance, and affinities of ostracoderms. 4
(c) Tabulate the primitive, specialized, and degenerate characteristics of cyclostomata. 3
3. (a) Explain the different theories of the source and origin of fins in fishes. 4
(b) Give an account of the evolutionary history of accessory respiratory organs in teleost. 3
(c) Classify placoderms. What kind of exoskeleton was found in placoderms? 3
4. (a) What is your perspectives on the leadership pattern of fish school? 2
(b) Describe fish schooling as social behavior in the marine ecosystem. 4
(c) Define migratory behavior. Explain the different forms of fish migration based on their needs. 4
5. (a) What is reproductive adaptability and how does it work? Explain how does deep-sea creatures adapt to severe water pressure. 5
(b) What do you know about the distinction between open and closed swim bladder? Give an explanation of the modifications of physostomous condition in fishes. 5
6. (a) Make notes on the **Any two (02)** of the followings: 2×5=10
 - I. Methods of phylogenic tree construction
 - II. Living coelacanth
 - III. Ampullae of Lorenzini

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

Total Marks: 40, Time: 2 hours

*Answer **any FOUR (04)** from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.*

1. (a) When does the life of animal start? 2
(b) Briefly describe the sperm-egg interaction and gamete fusion process. 5
(c) "Calcium signaling plays a central role in the activation of the egg by the sperm."- explain this. 3
2. (a) Explain the following terms: cleavage, blastodisc, gastrula, and emboly. 3
(b) Briefly describe the embryonic and larval development of Zebrafish. 5
(c) Differentiate between organogenesis and metamorphosis? 2
3. (a) What is the germ layer? Prepare a list of organs that are formed from ectoderm and mesoderm. 3
(b) How many types of cleavage patterns are observed in animals? 5
(c) What will happen if there is no cleavage? 2
4. (a) "Organogenesis begins with the development of the nervous system"- give your explanation. 2
(b) How will you prevent polyspermy in animals? 4
(c) Shortly describe the egg envelop formation process. 4
5. (a) Classify eggs based on the amount and distribution of yolk. 3
(b) Show the cleavage pattern in a different group of fishes. 3
(c) Explain some physicochemical parameters which affect embryonic development. 4
6. (a) Explain parthenogenesis as an adaptive strategy. 3
(b) How will you classify parthenogenesis? 4
(c) Differentiate between fertilization and parthenogenesis. 3

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Course No. BSI- 502 (T), Course Title: Fish Breeding and Stock Improvement

Time: 2 hours

Full Marks: 40

*Answer **any five (05)** questions from the followings. Figures in the right margin indicate full marks. Split answer is not acceptable.*

1. a. Justify the importance of brood stock improvement in fish hatcheries. 2.0
b. Outline the existing brood stock management scenario in the fish hatcheries of Bangladesh. 3.0
c. Give your suggestions to develop quality brood stocks in hatcheries. 3.0
2. a. Define selective breeding for quantitative traits. 2.0
b. Develop a suitable model of selective breeding for Indian major carps. 6.0
3. a. Explain the terms: cross breeding, gene introgression and heterosis. 3.0
b. 'Hybridization does not produce good brood stock'- justify the statement with example. 3.0
c. Explain the effect of unplanned hybridization. 2.0
4. a. What do you mean by effective breeding number and inbreeding co-efficient? 2.0
b. How will you minimize the rate of inbreeding in hatchery populations for executing stock improvement programme? 6.0
5. a. Why selective breeding is important for aquaculture? 2.0
b. Explain family selection with example from fish. 4.0
c. Distinguish between inbreeding and hybridization. 2.0
6. a. How is inbreeding and effective breeding number related? 3.0
b. How will you calculate average inbreeding value in hatchery populations? 5.0
7. a. What is chromosome manipulation? Mention the techniques used to assess the success of chromosome manipulation. 2.0
b. How will you produce androgenetic fish by chromosome manipulation? 4.0
c. Mention the importance of triploid organisms. 2.0

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Masters in Science in Fish Biology and Biotechnology, July-December Semester Final Examination' 2020

Course No. MBI- 502 (T), Course Title.: Molecular Biology

Time: 2 hours

Full Marks: 40

*Answer **any five (05)** questions from the following. Figure in the right margin indicates full marks. Split answer is not acceptable.*

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| 1. | a. | Define chromatin, nucleosome and genome. | 2.0 |
| | b. | Explain the process of DNA packaging in chromosome with figure. | 6.0 |
| 2. | a. | Explain the following terms: genetic code, codon and anticodon. | 2.0 |
| | b. | Explain the translation process of protein synthesis in eukaryotes. | 6.0 |
| 3. | a. | What is mutation and mutagenesis? Mention the importance of mutation. | 2.0 |
| | b. | Differentiate between germinal mutation and somatic mutation. | 2.0 |
| | c. | Briefly describe the gene mutation process with appropriate figures. | 4.0 |
| 4. | a. | What is gene mapping? What are the major types of gene mapping? | 2.0 |
| | b. | Construct and explain genetic mapping of chromosomes with example. | 6.0 |
| 5. | a. | What is MHC? Write a short note on major histocompatibility complex in fishes. | 3.0 |
| | b. | How does fish immune system work? | 5.0 |
| 6. | a. | Why is gene regulation necessary? | 2.0 |
| | b. | Mention the regulatory stages of gene expression. | 1.0 |
| | c. | Explain the transcriptional regulation of gene expression. | 5.0 |
| 7. | a. | What are mobile genetic elements and promoter? | 2.0 |
| | b. | Illustrate different types of mobile genetic elements. | 6.0 |

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Course Code: **GBO-502**, Course Title: **Genetics & Breeding of Ornamental Fishes**

Total Marks: 40, Time: 2 hours

Answer any **FOUR (04)** from the following. Illustrate your answer wherever necessary. Figure in the right margin indicates full marks.

1. (a) What do you know about qualitative and quantitative phenotypes? 2
(b) Describe the basic rules that govern the selection of qualitative phenotypes in aquarium hatchery. 3
(c) Schematically show the common pathway of selective breeding for desired phenotypes of goldfish. 3
(d) Compare selective breeding with line breeding. 2
2. (a) Enlist the primary and secondary sexual characteristics of fish. 2
(b) Discuss the X-linked gene action for caudalis pigmentation and transparent tail in the guppy fish. 6
(c) Give an account of the anal fin as an accessory reproductive organ. 2
3. (a) State the Mendel's laws of inheritance. 2
(b) What are the different modes of reproduction found in ornamental fishes? - discuss with example. 4
(c) "Gold body coloration of *Poecilia* controlled by complete dominant gene action"- explain. 4
4. (a) Describe the major steps of setting up aquarium for breeding of angel fish and molly. 6
(b) Enlist the optimal water quality parameters for a typical larval rearing aquarium. 2
(c) Write the selection criteria for choosing the right pair before conducting the breeding program. 2
5. (a) What are the special requirements for the reproduction of discus fish? 3
(b) Design an aquarium for neon tetra (*Paracheirodon innesi*). 4
(c) Give an account of the breeding behavior of three spine stickleback. 3
6. Make a short note on (Any two) from the following: 2×5=10
 - I. Hybridization and its consequences
 - II. Current Predicament of ornamental fishery of Bangladesh
 - III. Aqua spacing

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

Total Marks: 40, Time: 2 hours

Answer any FOUR (04) from the following. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. (a) What is reproductive physiology? 2
(b) "Reproductive physiology drives the reproductive cycle and influence sex cell production and maturation"- explain this statement. 4
(c) Gonad is a gland or not? - explain your answer. 4
2. (a) "All recent Chondrichthyes fish employ internal fertilization"- justify this statement 2
(b) Differentiate between the patterns of viviparity in Osteichthyes and Chondrichthyes. 3
(c) Discuss the maternal-embryonic relationship observed in different groups of fishes. 5
3. (a) "Primordial germ cells are the precursor of gametes"- discuss your opinion. 2
(b) What do you know about the functional morphology of fish testes? 4
(c) Briefly discuss the urogenital system in female fishes. 4
4. (a) What is puberty? What are the determinants for the timing of the onset of puberty? 2
(b) Discuss the role of the Brain-Pituitary-Gonad axis on the onset of puberty in fish. 5
(c) How can you control the puberty of aquaculture species? 3
5. (a) Diagrammatically show the process of vitellogenesis. 2
(b) Explain the hormonal regulation of spermatogenesis. 5
(c) Write down the effects of high temperature on egg incubation and larvae. 3
6. (a) Briefly discuss the breeding behaviour of three spine stickleback. 6
(b) How does pollutant affect fish reproduction? 4