5th Semester B. Sc. (Honours) | Paper 5A | Full marks: 75, Time: 3 hours

Fish Technology, Pathology and Extension Education (Theory)

Unit 1: Fishing Gears and Crafts:
Types of fishing gears and crafts. Mechanized boats and trawlers. Traditional fishing gears and crafts. Design and manufacture of fishing gears.

Unit 2: Post-harvest Technology and By-products:
Quality maintenance in post-harvest technology. Causes of fish spoilage. Types of fish preservation: Short term and long term preservation (freezing, drying, smoking and canning). Fish by-products and value added products.

Unit 3: Microbiology and Pathology:
Concepts of microbiology. Bacteria: Types, shapes, reaction and growth curve. Viruses.
Parasitic diseases: Viral, bacterial, fungal, crustaceans, and helminths.. Non-parasitic diseases: Nutritional and intrinsic. Therapeutic measures: Anti-microbial agents (antiseptics and antibiotics). Vaccines for fish diseases.

Unit 4: Fishery Extension Education:
Extension education: Concepts, teaching methods and aids, Participatory Rural Appraisal (PRA), programme planning, adoption and diffusion of technology, communication models and development of leadership.

Unit 5: Fisheries Organizations in India:
Fishery Institutes of India. Objectives of Krishi Vigyan Kendra (KVK), Fish Farmers Development Agency (FFDA), Brackish Water Fish Farmer's Development Agency (BFDA) and Agricultural Technology Management Agency (ATMA). Fishery Cooperative Societies: Role and prospects.

Suggested Reading:

1. Balachandran, (2001). Post Harvest Technology of Fish and Fish Products. Daya Publishing House, Delhi-35.
2. Biswas, K. P. (1999). Text Book of Fish, Fisheries and Technology. Narendra Publishing House, Delhi-6.
3. Biswas, K. P. (2004). Industrial Fisheries. Daya Publishing House, Delhi – 35.
4. Cappuccino. 2007.Microbiology, A Laboratory Manual, Pearson Education, Delhi-110092, India
5. Cutting, C. L. (2007). Fish processing and preservation. Agro-Bios, Jodhpur.
6. Egusa, S. (2001). Infectious diseases of fish. Oxon Ian press Pvt. Ltd. New Delhi.
7. Hameed, M. S. (2002). Modern Fishing Gear Technology. Daya Publishing House, Delhi-35.
8. Khuntia, B. K. (2009). Postmortem changes in fish. Daya Publishing House, Delhi-35.
9. Kothari, C. R. (2001). Research Methodology, Methods and Technique. Wishwa Prakashan. 4835/24, Ansari Road, New Delhi-2.
10. Parihar, R. P. (2000). A Text Book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad.
11. Rao. A. S. (1999). Introduction to Microbiology. Prentice-Hall of India, NewDelhi-110001
12. Robert, R. J. (2006). The pathology of fishes. University of Wisconsin press.
13. Shafi, S. M. (2003). Applied Fishery Science. Vol-1 & 2 Atlantic Pub, New Delhi.
14. Srivastava R. C. (2009). Fish Mycopathology. Today & Tomorrow printers & publishers, New Delhi
15. Winton, A. L. (1998). Fish and Fish Product. AGRO Publication.

5th Semester B. Sc. (Honours) Paper 5B

Full marks: 25
Time: 4 hours

Fish Technology, Pathology and Extension Education (Practical)

1. Study of fishing gears and crafts.
2. Whole mount preparation of fish parasites
3. Histology of fish tissues (liver, intestine and gonads).
4. Preparation of bacterial smears and identification of bacterial strains.
5. Preparation of interview schedule/questionnaires for village survey.
6. Visits to fish markets to study fish landing and preservation.

DISTRIBUTION OF MARKS:

1. Study of Fishing gears and crafts
2. Whole mount preparation of fish parasites/Histology of fish tissue.
3. Preparation of bacterial smears and identification of bacterial strains.
4. Preparation of interview schedule/questionnaires and reports on fish market visits
5. *Viva voce*
6. Laboratory Record

5th Semester B. Sc. (Honours) Paper 6A

Full marks: 75
Time: 3 hours

Fish Physiology, Biochemistry and Applied Genetics

Unit 1: Biochemistry:

Chemical constituents of fish: Carbohydrates, proteins, lipids, minerals & Vitamins. Enzymes: Nature, classification and regulation. Glycolysis, TCA cycle and lipid metabolism.

Unit 2: Physiology I:

Physiology of digestion in fish. Gas exchange across the gills, effects of various factors in gas exchange. Osmoregulation in freshwater, brackish water and marine fishes.

Unit 3: Physiology II:

Circulation: Blood Composition, haemoglobin and mechanism of circulation. Excretion: ultra filtration, reabsorption, secretion and formation of urine.

Unit 4: Endocrine System:

Structure and function of major endocrine glands in fishes (hypothalamus, pituitary, thyroid, Islets of Langerhans, inter-renal tissue, gastro-intestinal tract, Corpuscles of Stannius, pineal body and gonads)

Unit 5: Applied Genetics:

Introduction to fish genetics. Applied genetics: Hybridization, selective breeding, inbreeding depression, genetic drift, concept of genetic engineering, androgenesis, gynogenesis, triploidy, tetraploidy and transgenic fish. Cryopreservation of gametes. Conservation of fish genetic resources: *In situ* and *ex situ*. Concept of live gene bank.

Suggested Readings:

1. Atre, P. K. (2008). Fish Genetics and Aquatic Environment. Navyug publishers, New Delhi.
2. Bansal P. B. (2006). Biotechnology and its application in agricultural science. Daya Publishing House, Delhi -35
3. Colin Ratledge and Bjorn Kristiansen. (2006). Basic Biotechnology - 3rd ed
4. Conn & Stumf. (2001) Outline of Biochemistry. Wiley Eastern Ltd
5. Das, P. and Jhingran A. G. (2005). Fish Genetics in India. Today & Tomorrows Printers & Publishers. New Delhi.
6. Hoar, W. S. & Randal, D. J. (1996). Fish Physiology (Volumes I - XI). Academic Press.
7. Kamler, E. (1992). Early Life History of Fish, an Energetics Approach. Chapman & Hall.
8. Kumar, S. &Tembhre, M. (2006). Anatomy and Physiology of Fishes. Vikash Publishing house Pvt. Ltd. New Delhi – 14.
9. Lagler, K. F. *et.al* (1992). Ichthyology. John Wiley & Sons Inc. New York – 10016.
10. Lehninger, A. (2000). Biochemistry. Academic Press Inc.
11. Nair, P. R. (2008). Biotechnology and Genetics in Fisheries and Aquaculture. Daya Publishing House, Delhi -35.
12. Parihar, R. P. (1992). A Text Book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad.
13. Saxena, Amita. (2006). Text book of Biochemistry. Books & pechas, Delhi.
14. Singh, H. R. (2008). Animal physiology and related biochemistry. Shobanlal N Chand & Co.

5th Semester B. Sc. (Honours) Paper 6B

Full marks: 25
Time: 4 hours

Fish Physiology, Biochemistry and Applied Genetics (Practical)

1. Estimation of protein and carbohydrates in fish tissues (muscles and liver).
2. Estimation of oxygen consumption in fishes.
3. Counting of RBC and WBC in fish blood.
4. Preparation of haemin crystals of fish blood.
5. Estimation of haemoglobin content in fish blood.
6. Preparation of fish chromosomes.

DISTRIBUTION OF MARKS:

1. Estimation of protein/carbohydrates
2. Haemin crystals and haemoglobin content/ Oxygen consumption in fishes.
3. Counting of RBC / WBC
4. Preparation of fish chromosomes
5. *Viva voce*
6. Laboratory record