

University of Calicut

Model question Paper for Entrance examination

PhD programme in Aquaculture and Fishery Microbiology (Total marks 100)

Answer questions from both sections

Section A

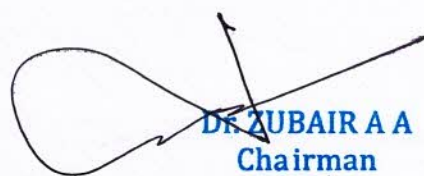
Aquaculture and Fishery Microbiology

Part-1

Time-2 hours

Answer any 10 questions (10X2=20)

1. Which aquaculture system is particularly advantageous for areas with limited water resources?
2. What is 'drip loss' in fish storage, and why is it significant?
3. Name a microorganism responsible for paralytic shellfish poisoning (PSP).
4. Which fish processing method is known for effectively retaining the highest amount of omega-3 fatty acids?
5. Why is otolith examination crucial in fish biology, and what information can it provide about a fish?
6. Which bacterial pathogen is often linked to epizootic ulcerative syndrome (EUS) in freshwater fish?
7. In fish processing, what is the primary role of 'cryoprotectants' during freezing?
8. What do siderophores in fishery microbiology primarily aid in?
9. Highlight a key challenge associated with Recirculating Aquaculture Systems (RAS).
Which fish species is anadromous?
10. Name the process in aquaculture ponds that converts toxic ammonia to less harmful nitrate.
11. How does eutrophication impact freshwater aquatic ecosystems, and what are its primary causes in aquaculture settings?
12. How does the rate of freezing influence the texture and overall quality of frozen fish?


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Chairman
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University Of Calicut

Part-2

Answer any 6 questions (6X5=30)

1. Describe the ecological implications of cage cultures in open water bodies. How do they impact the immediate aquatic environment?
2. Polyculture in aquaculture has gained attention for its efficiency. Describe its basic premise and the benefits it offers over monoculture systems
3. Explain the phenomenon of harmful algal blooms (HABs) and its implications for shellfish safety in fisheries.
4. Biofloc technology is emerging as a sustainable approach in shrimp farming. Explain its underlying principle and the advantages it offers in terms of water quality and feed efficiency.
5. Discuss the principle and importance of 'retort processing' in the canning of fish. How does it impact the product's nutritional and microbial profile?
6. Discuss the principle behind Modified Atmosphere Packaging (MAP) in fish processing. Why is it essential for extending shelf life?
7. Highlight the key benefits and potential risks of using probiotics in sustainable aquaculture systems.
8. What are the primary distinctions between inland and marine fisheries? Provide examples of commonly harvested species for each.

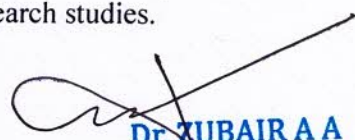
Section B

Research Methodology

Part-1

Answer any 10 questions (10X2=20)

1. Differentiate between qualitative and quantitative research methods. Give an example of each.
2. What is the purpose of a literature review in a research study?
3. Explain the difference between dependent and independent variables with an example.
4. Define "sampling error" and explain why it's significant in research studies.

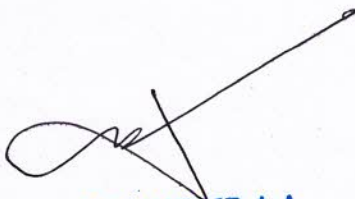

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5. What is a "null hypothesis" in the context of hypothesis testing?
6. Describe the concept of "external validity" in research.
7. What is meant by "research bias"? Provide an example.
8. Explain the importance of ethical considerations in research, especially when human participants are involved.
9. Describe the difference between cross-sectional and longitudinal research designs.
10. What is the primary purpose of "peer review" in the publication of research findings?
11. Explain the concept of "control group" in experimental research design.
12. Why is "replication" important in scientific research?

Part-2

Answer any 6 questions (6X5=30)

1. What is a hypothesis in a research study?
2. Explain the concept of "Open Access" in scientific publishing. What are the advantages for researchers and the general public, and what challenges does it pose for publishers?
3. Discuss the benefits and limitations of using "surveys" as a research tool. How do they contribute to gathering quantitative and qualitative data
4. List and briefly explain the main steps involved in conducting a research study.
5. Describe the components of a standard research article, such as "abstract," "methods," "results," and "discussion." Why this structure is commonly adopted in scientific publishing?
6. Why is ethical approval often needed before beginning a research study?
7. Explain the role and significance of databases in contemporary scientific research. How do they enhance data sharing and collaboration?
8. Define plagiarism and explain why it's considered unethical in academic and research contexts


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PhD programme in Aquaculture and Fishery Microbiology

Syllabus

Section A

Aquaculture and Fishery Microbiology

Basics of Aquaculture: History and global significance Types: Mari culture, Freshwater aquaculture, Brackish water aquaculture Major cultured species (both finfish and shellfish)

Aquaculture Systems and Operations: Pond systems: Earthen, Line Cage culture and Pen culture RAS (Recirculating Aquaculture Systems) Integrated aquaculture (e.g., rice-fish culture)

Aquaculture Nutrition and Feed Technology: Feed formulation and manufacturing, Nutrient requirements for various species, Role of probiotics and other feed additives

Health Management in Aquaculture and Fisheries: Common diseases and their causative agents (bacterial, viral, parasitic), Prevention and treatment methodologies, Biosecurity measures

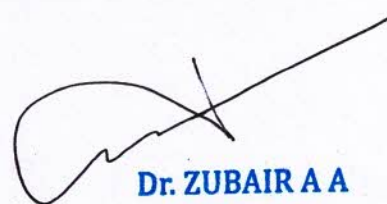
Genetics and Breeding in Aquaculture: Selective breeding and hybridization, Genetic improvement and biotechnologies, Molecular markers and their applications

Aquaculture Engineering Design: of aquaculture systems Water quality management, Aeration, filtration, and other tech applications

Fishery Microbiology: Beneficial and harmful microbes in fisheries and aquaculture, Role of microbes in nutrient cycling and pond dynamics, Pathogenic microbes and disease outbreaks, Microbiome of aquatic organisms

Processing and Value Addition: Post-harvest handling and processing of fish and shellfish, Fish preservation methods: Drying, salting, freezing, and canning, Value-added products: Fish fillets, fish oil, surimi, etc., Quality assurance and standards in seafood processing

Fisheries: Fisheries biology and ecology. Stock assessment and management, Capture fisheries vs. culture fisheries, Small-scale fisheries and their socio-economic importance, Fisheries governance and policy



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Section B

Research Methodology

Introduction to Research: Definition and significance. Types of research: Basic vs. applied, qualitative vs. quantitative

Literature Review: Purpose and sources, writing a literature review, Citation styles and reference management tools

Research Design: Experimental, quasi-experimental, and non-experimental designs, Sampling methods, Variables: Types and operational definitions

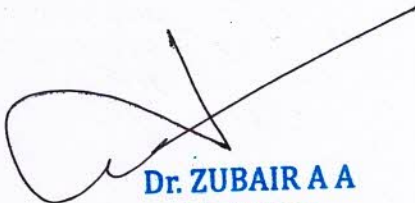
Data Collection Techniques: Surveys, questionnaires, and interviews, Observations and case studies
Experimental methods in aquaculture research

Statistical Analysis: Descriptive statistics, Inferential statistics: t-tests, ANOVA, regression, chi-square, etc. Software for statistical analysis (e.g., SPSS, R)

Research Ethics: Ethical considerations in research, Informed consent, confidentiality, and other ethical guidelines

Scientific Writing and Presentation: Structure of a scientific paper, Publishing in peer-reviewed journals, Presenting research findings

Research Funding and Grant Writing: Identifying funding sources, Components of a grant proposal, Evaluation of proposals



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