:Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – I Semester
Paper 1.1 : Marine Ecology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account of distribution of light in the sea.

2. Discuss the role of salinity in the marine environment.

3. Write an essay on the fauna of rocky shores.

4. Describe the fauna of Indo-west Pacific region.

5. Give an account of the special features of coral reefs.

6. Describe the adaptations of deep sea organisms.

7. Write an essay on the larvae of marine invertebrates.

8. Give an account of commensalisms and parasitism.

9. Write short notes on:
- **a. Tides**
- **b. Nutrients**
- **c. Hadal region**
- **d. Symbiosis**

:Department of Marine Living Resources
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M.Sc. Marine Biology & Fisheries – I Semester
Paper 1.2 : Biological Oceanography -I

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss "Sea is a Biological Environment".

2. Describe the general characteristics of plankton.

3. Write an essay on the floating adaptations of plankton.

4. Give an account of the relationship between plankton and fisheries.

5. Write an essay on indicator species in the marine environment.

6. Briefly describe phytoplankton and zooplankton inter-relations.

7. Give an account of methods of fixation of plankton.

8. How do you estimate phytoplankton standing crop?

9. Write short notes on:
- **a. Meroplankton**
- **b. Plankton diurnal migration**
- **c. Seasonal changes in plankton**
- **d. Macroplankton**

:Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – I Semester
Paper 1.3 : Biology of Marine Organisms - I

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the food and feeding habits of marine organisms.

2. Give an account of digestion in marine organisms.

3. Write an essay on excretion in marine organisms

4. Describe the factors affecting respiration in marine organisms.

5. Write an essay on osmo-regulation in marine organisms.

6. Briefly describe the pigments present in marine organisms.

7. Describe the luminescent organs and glands in marine fauna.

8. Give an account of respiratory mechanisms in marine organisms.

9. Write short notes on:
- **a. Transport of food in the gut**
- **b. Cold light**
- **c. Excretory organs**
- **d. Respiratory pigments**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – I Semester
Paper 1.4 : Biostatistics

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the sampling and its design.

2. How do you collect the primary data?

3. Define mean. How do you measure it?

4. Describe the methods of representing the data graphically.

5. Define standard error. Give an account of measures of dispersion.

6. Define correlation. Describe the method of determining correlation.

7. Define ANOVA. How do you measure it

8. Give an account of computer applications in processing data.

9. Write short notes on:

- **a. t test**
- **b. Probability**
- **c. Mode**
- **d. Tabulation of data.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – II Semester
Paper 2.1 : Estuaries & CZM

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Define estuary. Give an account of the types of estuaries.

2. Describe the physico-chemical parameters of the estuary.

3. Write an essay on estuarine plankton.

4. Give an account of the finfish in estuaries.

5. Describe the distribution of mangrove ecosystems in India.

6. Write an essay on the estuarine foodweb.

7. Give an account of remote sensing applications in CZM.

8. Describe the shellfish resources in coastal habitat.

9. Write short notes on:
- **a. CRZ**
- **b. Negative estuary**
- **c. Estuarine birds**
- **d. Estuarine benthos**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – II Semester
Paper 2.2 : Biological Oceanography - II

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the methods for measuring primary productivity in the sea.

2. Write an essay on the secondary production in the sea.

3. Give an account of phytoplankton and zooplankton interrelations.

4. Define food chain. Describe the pelagic food chain.

5. Write an essay on benthic food chain.

6. Give an account of mass-mortality in the sea.

7. Discuss the role of bacteria in the sea.

8. Write an essay on the distribution of bacteria in the sea.

9. Write short notes on:

- **a. Standing crop**
- **b. Nutrients in the sea**
- **c. Grazing**
- **d. Temperature**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – II Semester
Paper 2.3 : Biology of Marine organisms - II

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account of biological clocks in marine organisms.

2. Describe the different types of sense organs in marine fauna.

3. Give an account of functions of nervous system in marine animals.

4. Describe the neuro-hormones and their functions.

5. Write an essay on the sexual reproduction in marine animals.

6. Describe the crustacean larvae with illustrations.

7. Give an account of larvae of echinoderms.

8. Explain lunar periodicity with suitable examples.

9. Write short notes on:

- **a. Veliger**
- **b. Finfish larvae**
- **c. Tactile organs**
- **d. Asexual reproduction.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – II Semester
Paper 2.4 : Biochemistry & Physiology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe structure of proteins. Add a note on fish proteins.

2. Write an essay on fish lipids.

3. Give an account on the classification of enzymes.

4. Discuss briefly the metabolism of carbohydrates.

5. Write an essay on the physiology of digestion.

6. Give an account of neuro-secretions in finfish.

7. Discuss the regulating factors for moulting and growth in crustaceans.

8. Describe the endocrine organs of finfish.

9. Write short notes on:

a. Shellfish neuro-hormones
b. Biological oxidation
c. Factors influencing enzyme activity
d. Denaturation of proteins.

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – III Semester
Paper 3.1 : Fishery Science

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account of systematic classification of finfish.

2. Write an essay on the economically important finfish.

3. Discuss "Natural stocks as Biological Entities".

4. Give an account of population dynamics of finfish.

5. Describe the life history of oil sardine.

6. Give an account of food and feeding habits of finfish.

7. How do you determine the age of finfish?

8. Write an essay on migration of finfish.

9. Write short notes on:
- **a. Marking of finfish**
- **b. Length-weight relationship**
- **c. Indian shad**
- **d. Malabar sole life history**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – III Semester
Paper 3.2 : Aquaculture

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the criteria for selection of species for aquaculture.

2. Give an account on the construction of a pond for aquaculture.

3. Write an essay on the management of cages in sea.

4. Describe the technical considerations in aquaculture site selection.

5. How do you select material for aquaculture activities?

6. Write an essay on polyculture.

7. Describe seed production in a crustacean hatchery.

8. Describe the types of equipment employed in aquaculture.

9. Write short notes on:
- **a. Monoculture**
- **b. Finfish hatchery**
- **c. Mullets**
- **d. Integrated farming.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – III Semester
Paper 3.3 : Biotechnological Applications in Aquaculture
Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the role of biotechnology in aquaculture.

2. Give an account of artificial feeds in aquaculture.

3. Describe the endocrine control in reproduction of finfish.

4. Write an essay on induced breeding.

5. Give an account on genetic selection of species in aquaculture

6. How do you produce disease-resistant strains ?

7. Describe the methods employed in transgenesis.

8. Give an account of larval rearing in aquaculture.

9. Write short notes on:
- **a. Sex Control**
- **b. Live feeds**
- **c. In-breeding**
- **d. Cryopreservation**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – III Semester
Paper 3.4 : Marine Pollution & Biodeterioration

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the sources of pollution in marine environment.

2. Describe the composition, fate and effects of sewage pollution in sea.

3. Write an essay on industrial pollution in the sea.

4. Give account of the sources and treatment of oil pollution in sea.

5. Write an essay on thermal pollution in the sea.

6. Discuss the impacts of dredging in marine habitats.

7. Discuss the role of biotechnology in controlling marine pollution.

8. Give an account of biodeterioration in marine environment.

9. Write short notes on:
- **a. Radioactive pollution**
- **b. Agricultural pollutants in the sea**
- **c. Biofouling in sea**
- **d. Environment monitoring methods.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – IV Semester
Paper 4.1 : Fishing Technology & Fisheries Management
Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the evolution of fishing craft.

2. Write an essay on the classification of fishing gear.

3. Describe design and fabrication of trawl net.

4. Discuss the effect of temperature on fishes.

5. How do you assess the fish stocks?

6. Write an essay on the fishing regulations.

7. Discuss the impacts of exploitation on fisheries.

8. Describe the development and management strategies for fisheries.

9. Write short notes on:
- **a. Salinity effect**
- **b. Boats used in India**
- **c. Indiscriminate exploitation**
- **d. Purse-seine**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – IV Semester
Paper 4.2 : Fish Processing Technology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the chemical composition of finfish and shellfish.

2. Give an account on the microbiology of processed fish.

3. Write an essay on the spoilage of fish and its control.

4. Describe the canning methods in fish processing.

5. Discuss the role of curing in fish preservation.

6. Describe the methods employed for freezing the fish for preservation.

7. Write an essay on the by-products of finfish and shellfish.

8. Discuss the significance of fish processing for preservation of fish.

9. Write short notes on:
- **a. Harmful bacteria in fish products**
- **b. Chemical preservatives**
- **c. Spoilage of cured fish**
- **d. Alginates**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biology & Fisheries – IV Semester
Paper 4.3 : Management of Aquaculture Systems

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the management of aquaculture ponds.

2. Give an account on the management of shrimp hatchery.

3. How do you manage the water quality in culture systems?

4. Describe the viral diseases of aquaculture organisms.

5. Write an essay on bacterial pathogens of cultivable fish.

6. Describe the regulations of CRZ.

7. Write an essay on the eco-friendly aquaculture practices.

8. Discuss the extension activities in aquaculture.

9. Write short notes on:
- **a. Nutritional diseases**
- **b. Disease prevention methods**
- **c. Finfish hatchery**
- **d. Artificial feeds**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – I Semester
Paper 1.1 : Oceanography & Marine Biology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the role of light in the marine environment

2. Give an account of salinity distribution in the sea.

3. Write an essay on the nutrients in the sea.

4. Give an account on the classification of marine habitats

5. Describe the adaptations in planktonic organisms.

6. Write an essay on the ecology of coral reefs.

7. Describe the laws pertaining to sea.

8. Describe the importance of remote sensing in oceanography.

9. Write short notes on:
- **a. Tides**
- **b. Dissolved oxygen**
- **c. Nekton**
- **d. Mangroves**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – I Semester
Paper 1.2 : Finfish Culture

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the life history of a cultivable finfish known to you.

2. How do you select a finfish for aquaculture?

3. Give an account on the classification of culture systems.

4. How do you eradicate the weed and predatory fishes from the pond?

5. Describe the culture practices of mullets.

6. Describe the method of polyculture.

7. Write an essay on integrated farming .

8. Give an account on the harvesting methods of cultured fish.

9. Write short notes on:
- **a. Monoculture**
- **b. Pond preparation**
- **c. Seabass**
- **d. Marketing of aquaculture products.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – I Semester
Paper 1.3 : Crustacean Farming

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the status of crustacean farming in India.

2. Describe the food and feeding habits of shrimp.

3. Give an account on the types of shrimp farming.

4. How do you culture the crustaceans in cages?

5. Write an essay on supplementary feeds in crustacean farming.

6. Give an account on the culture of *Macrobrachium.*

7. How do you culture the crabs?

8. Discuss the impacts of chemicals application in farming.

9. Write short notes on:
- **a. Shrimp reproduction**
- **b. Intensive farming**
- **c. Lobster farming**
- **d. Farming economics.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – I Semester
Paper 1.4 : Aquaculture Engineering

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the types and properties of soil.

2. Describe briefly the survey methods employed in aquaculture.

3. Write an essay on the different types sluice gates in aquaculture farms.

4. What are the effects of waves and tides on aquaculture practices.

5. Give an account on the types of materials used in aquaculture.

6. Describe the design and construction of a shrimp hatchery.

7. How do you treat water for aquaculture purpose?

8. Describe the working principles of aerators and spectrophotometer.

9. Write short notes on:
- **a. Earth work estimations**
- **b. Engineering properties of materials**
- **c. Pumps**
- **d. Secchi disc**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – II Semester
Paper 2.1 : Mariculture

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the status of open-sea farming in India.

2. Write an essay on the perspectives of mariculture .

3. Describe the methods of crop selection in open-sea farming.

4. How do you manage ponds in tropical areas?

5. Discuss the role of feeds in farming.

6. How do you manage water quality in ponds?

7. Give an account of nutritional requirements of finfish.

8. Describe the laws pertaining to aquaculture.

9. Write short notes on:
- **a. Organic manures**
- **b. Weed fish**
- **c. Balanced diets**
- **d. Exploitation of living resources.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – II Semester
Paper 2.2 : Molluscan & Seaweed farming

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the present status of molluscan farming in India.

2. Write an essay on the life cycle of a cultivable mollusk known to you.

3. How do you culture oysters?

4. Describe the culture methods of pearl oyster.

5. Give an account of cephalopod culture.

6. How do you monitor water quality in molluscan farms?

7. Discuss the present status of seaweed farming in India.

8. Describe the lifecycle of a red seaweed studied by you.

9. Write short notes on:
- **a. Biofouling**
- **b. Post-harvest technology**
- **c. Mussel farming**
- **d. Breed improvement in seaweeds**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – II Semester
Paper 2.3 : Reproduction & Genetics in Aquaculture

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the reproductive biology of mullets.

2. Describe briefly the reproductive biology of shrimp.

3. Write an essay on induced breeding in finfish.

4. Give an account on cryopreservation in aquaculture.

5. Write an essay on IN-VITRO fertilization in aquaculture.

6. Discuss the role of genetics in aquaculture.

7. Define transgenesis. Explain its application in aquaculture.

8. Give an account on genetic modifications in seaweeds.

9. Write short notes on:
- **a. Polyploidy**
- **b. Sex Control**
- **c. Cross-breeding**
- **d. Sea-cucumber culture**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – II Semester
Paper 2.4 : Seed Production & Hatchery Management
Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe wild seed collection methods of milkfish.

2. Discuss the impacts of exploitation of wild seed.

3. How do you produce mullets seed in hatchery?

4. Describe hatchery of a pearl oyster.

5. Give an account on the hatchery of lobsters.

6. Describe the methods of transporting the fry.

7. Write an essay on small scale hatcheries.

8. How do you manage the nurseries of cultivable organisms?

9. Write short notes on:
- **a. Seaweeds hatchery**
- **b. Sustainble yields in aquaculture**
- **c. Seed production in crabs**
- **d. Harvesting of fry.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – III Semester
Paper 3.1 : Marine Microbiology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the types of microscopes.

2. Describe the distribution of bacteria in the marine environment.

3. Write an essay on the sterilization methods employed in microbiology.

4. Give an account on the culture of viruses.

5. Describe the ultrastructure of a bacterium.

6. Write an essay on the culture of fungi.

7. Discuss the role of microbes in the sea.

8. Give an account on the chemotherapy to control microbes.

9. Write short notes on:
- **a. Mangrove microbiology**
- **b. Decomposition of carbohydrates**
- **c. Working principle of a light microscope**
- **d. Bacteria preservation**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – III Semester
Paper 3.2 : Principles of Biochemistry

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the structure of proteins.

2. Write an essay on the carbohydrate metabolism.

3. Discuss the factors affecting enzyme catalysis.

4. Give an account on the biomolecules purification methods.

5. Describe the principles involved in spectroscopy.

6. How do you immobilize enzymes? Discuss its advantages.

7. Describe the general properties of prostaglandins.

8. Give an account on the properties of antibiotics.

9. Write short notes on:
- **a. Interleukins**
- **b. Bioenergetics**
- **c. Interferons**
- **d. Nanometry**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – III Semester
Paper 3.3 : Bioactive Marine Natural Products

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the significance of marine natural products.

2. Write an essay on HPLC.

3. Give an account on the NMR characterization of biomolecules.

4. Discuss the anti-tumour and tumour-promoting natural products.

5. Write an essay on marine toxins.

6. Give an account on the peptides extracted from marine organisms.

7. Discuss the structure and importance of prostaglandins .

8. Write an essay on the factors affecting drug action.

9. Write short notes on:
- **a. Liquid-liquid extraction**
- **b. Antiviral compounds**
- **c. Marine cosmetic products**
- **d. UV Characterization of biomolecules.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – III Semester
Paper 3.4 : Marine Pollution & Biodeterioration

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the sources of pollution in marine environment.

2. Describe the composition, fate and effects of sewage pollution in sea.

3. Write an essay on industrial pollution in the sea.

4. Give account of the sources and treatment of oil pollution in sea.

5. Write an essay on thermal pollution in the sea.

6. Discuss the impacts of dredging in marine habitats.

7. Discuss the role of biotechnology in controlling marine pollution.

8. Give an account of biodeterioration in marine environment.

9. Write short notes on:
- **a. Radioactive pollution**
- **b. Agricultural pollutants in the sea**
- **c. Biofouling in sea**
- **d. Environment monitoring methods.**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – IV Semester
Paper 4.1 : Pathology & Immunology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the disease-causing agents.

2. How do you diagnose a disease?

3. Write an essay on the bacterial diseases in cultured organisms.

4. Discuss the types and modes of action of antibiotics.

5. Describe the general characteristics of antigens.

6. Give an account on the structure of immunoglobulin.

7. Describe the types of immunity.

8. Write an essay on the cytotoxicity mechanisms.

9. Write short notes on:
- **a. Types of antibodies**
- **b. Fungal diseases**
- **c. Immunotherapy**
- **d. Invertebrate immunology**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – IV Semester
Paper 4.2 : Molecular Biology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the ultrastructure of a cell.

2. Give an account on the structure of DNA.

3. Compare the characteristics of cell and nuclear membranes.

4. Write an essay on the regulation of gene expression in prokaryotes.

5. Discuss the Operon concept.

6. Describe the transcription process in eukaryotes.

7. Briefly describe protein synthesis.

8. Give an account on the restriction endonucleases.

9. Write short notes on:
- **a. RNA processing**
- **b. Bacteriophage genetics**
- **c. Genetic code**
- **d. Enzymes acting on DNA**

Department of Marine Living Resources
Andhra University

M.Sc. Coastal Aquaculture & Marine Biotechnology – IV Semester
Paper 4.3 : Marine Biotechnology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1.Give an account on the microbial fermentation.

2. Discuss the applications of biofermentors and biofertilizers.

3. Discuss the gene targeting approaches in biotechnology.

4. Describe the technique of Southern blotting.

5. Give an account on the media for culturing cells.

6. Discuss the cell fusion techniques.

7. Discuss the applications of DNA technology in aquaculture.

8. Write an essay on transgenic biology.

9. Write short notes on:
- **a. Allopheny**
- **b. Somatic hybridization**
- **c. Western blotting**
- **d. PCR**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – I Semester
Paper 1.1 : Oceanography & Marine Biology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the role of light in the marine environment

2. Give an account of salinity distribution in the sea.

3. Write an essay on the nutrients in the sea.

4. Give an account on the classification of marine habitats

5. Describe the adaptations in planktonic organisms.

6. Write an essay on the ecology of coral reefs.

7. Describe the laws pertaining to sea.

8. Describe the importance of remote sensing in oceanography.

9. Write short notes on:
- **a. Tides**
- **b. Dissolved oxygen**
- **c. Nekton**
- **d. Mangroves**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – I Semester
Paper 1.2 : Biochemistry

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the chemical bonds in molecules.

2. Write an essay on the structure and types of carbohydrates.

3. Describe the metabolism of proteins.

4. Give an account on the organization of cytoskeleton.

5. Describe the transport mechanisms of biomolecules through membranes.

6. Write an essay on the properties of hormones.

7. Discuss the structure and importance of prostaglandins.

8. Describe structure and properties of pencillin.

9. Write short notes on:
- **a. Interferons**
- **b. Vitamins**
- **c. Shellfish proteins**
- **d. Lipid metabolism.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – I Semester
Paper 1.3 : Marine Microbiology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the classification of bacteria.

2. Give an account on the distribution of microbes in the marine environment.

3. Write an essay on the culture of viruses.

4. Give an account on ultrastructure of a bacterium.

5. Describe the culture techniques of fungi.

6. Discuss the role of microbes in the sea.

7. Give an account on the classification of microalgae.

8. Describe the growth in bacteria.

9. Write short notes on:
- **a. Protozoans**
- **b. Culture of microalgae**
- **c. Microscopic metazoan culture**
- **d. Virus ultrastructure.**

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M.Sc. Marine Biotechnology – I Semester
Paper 1.4 : Enzymology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the nomenclature of enzymes.

2. How do you classify the enzymes?

3. Give an account on the factors affecting enzyme action.

4. Describe the mechanism of enzyme action.

5. Give an account on the regulatory enzymes.

6. How do you purify enzymes?

7. Describe the enzyme structure and properties.

8. Give an account on the membrane-bound enzymes.

9. Write short notes on:
- **a. Active site**
- **b. Multi-enzyme complex**
- **c. Activators & inhibitors of enzyme action**
- **d. Extraction of enzymes.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – II Semester
Paper 2.1 : Molecular biology & Genetics

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the components of nucleus.

2. Describe the Mendelian principles of inheritance

3. Write an essay on mutations.

4. Describe the organization of cytoskeleton.

5. Give an account on signal transduction mechanisms.

6. Describe the replication of DNA.

7. Write an essay on regulation systems at the molecular level.

8. Briefly describe the method of protein synthesis.

9. Write short notes on:
- **a. Cytogenetics**
- **b. Packing of molecular components**
- **c. Ribozyme**
- **d. Extra chromosomal cell division**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – II Semester
Paper 2.2 : Microbial Technology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the recycling of nutrients in the sea.

2. Give an account on the mangrove microbiology.

3. Write an essay on fermentation.

4. Describe the bioconversion mechanisms mediated by microbes.

5. Give an account on the microbial degradation of carbohydrates.

6. Describe working principle of a bioreactor studied by you.

7. Write an essay on *Spirulina*.

8. Give an account on lipid degradation.

9. Write short notes on:
- **a. Protein degradation**
- **b. Carbon cycle**
- **c. Fermentor**
- **d. Single cell proteins**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – II Semester
Paper 2.3 : Enzyme Technology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Write an essay on cell and enzyme reactors.

2. Describe the enzymes acting on DNA.

3. Give an account on enzyme kinetics.

4. Describe the methods of enzyme immobilization.

5. Write an essay on synthetic enzymes.

6. Give an account on the enzymes of industrial importance

7. Discuss the application of enzymes in disease diagnosis.

8. Write an essay on biological energy transducers.

9. Write short notes on:
- **a. RNAses**
- **b. Co-enzymes**
- **c. Enzyme-substrate kinetics**
- **d. Biosensors**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – II Semester
Paper 2.4 : Marine Living Resources

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the phytoplankton distribution in the sea.

2. Write an essay on zooplankton distribution in the sea.

3. Describe culture of *Chaetoceros.*

4. Write an essay on the culture of finfish.

5. Discuss the role of sea-ranching in preserving marine living resources.

6. Give an account on the culture of seaweeds.

7. Describe the distribution of mangroves in India.

8. Write an essay on the distribution of echinoderms in the sea.

9. Write short notes on:
- **a. *Skeletonema***
- **b. Corals**
- **c. Seagrasses**
- **d. Molluscan culture**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – III Semester
Paper 3.1 : Aquaculture & Health Management

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the present status of aquaculture in India

2. How do you select a species for aquaculture.

3. What are the criteria required for selecting a site for culture.

4. Describe the culture of shrimps.

5. Give an account on the culture of milkfish.

6. Write an essay on the culture of *Porphyra.*

7. Describe the bacterial diseases of cultivable organisms.

8. Write an essay on eco-friendly culture practices.

9. Write short notes on:

- **a. Viral diseases**
- **b. Mullets**
- **c. Oyster culture**
- **d. Gynogenesis**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – III Semester
Paper 3.2 : Cell & Tissue culture

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the present status of cell culture in India.

2. Describe the composition of media employed in cell culture.

3. Give an account on the culture of stem cells.

4. Write an essay on tissue engineering.

5. Describe the methods of cloning the cell lines.

6. Give an account on the cell lines developed for finfish.

7. How do you preserve germplasms.

8. Discuss the industrial applications of tissue culture.

9. Write short notes on:

- **a. Primary culture**
- **b. Culture of plant cells**
- **c. 3D culture**
- **d. Aseptic conditions in cultures**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – III Semester
Paper 3.3 : Bioactive Marine Natural Products

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the significance of marine natural products.

2. Write an essay on HPLC.

3. Give an account on the NMR characterization of biomolecules.

4. Discuss the anti-tumour and tumour-promoting natural products.

5. Write an essay on marine toxins.

6. Give an account on the peptides extracted from marine organisms.

7. Discuss the structure and importance of prostaglandins .

8. Write an essay on the factors affecting drug action.

9. Write short notes on:
- **a. Liquid-liquid extraction**
- **b. Antiviral compounds**
- **c. Marine cosmetic products**
- **d. UV Characterization of biomolecules.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – III Semester
Paper 3.4 : Marine Pollution & Biodeterioration

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the sources of pollution in marine environment.

2. Describe the composition, fate and effects of sewage pollution in sea.

3. Write an essay on industrial pollution in the sea.

4. Give account of the sources and treatment of oil pollution in sea.

5. Write an essay on thermal pollution in the sea.

6. Discuss the impacts of dredging in marine habitats.

7. Discuss the role of biotechnology in controlling marine pollution.

8. Give an account of biodeterioration in marine environment.

9. Write short notes on:
- **a. Radioactive pollution**
- **b. Agricultural pollutants in the sea**
- **c. Biofouling in sea**
- **d. Environment monitoring methods.**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – IV Semester
Paper 4.1 : Genetic Engineering

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the status of genetic engineering in India.

2. Write an essay on the vectors used in biotechnology.

3. Discuss the significance of linkers and adaptors in biotechnology.

4. Give an account of restriction enzymes employed in genetic engineering.

5. How do you construct a genomic DNA library

6. Discuss the factors causing mutations in genes.

7. Write an essay on transposons.

8. Discuss the ethical and legal issues in genetic engineering.

9. Write short notes on:
- **a. Oncogenes**
- **b. Transgenic fish**
- **c. cDNA library**
- **d. Gel Electrophoresis**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – IV Semester
Paper 4.2 : Immunology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the types of immunity.

2. Discuss the properties and types of antigens.

3. Write an essay on the structure of immunoglobulin.

4. Give an account on Major Histocompatibility gene Complex in vertebrates.

5. Describe the molecular biology of B-cell.

6. Write an essay on immunoelectrophoresis.

7. How do you produce monoclonal antibodies.

8. Give an account on transplantation immunology.

9. Write short notes on:
- **a. Immunodeficiency**
- **b. Immunodiffusion**
- **c. T lymphocytes**
- **d. Hypersensitivity reactions**

Department of Marine Living Resources
Andhra University

M.Sc. Marine Biotechnology – IV Semester
Paper 4.3 : Applications of Biotechnology

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Describe the mechanisms of gynogenesis and androgenesis.

2. Write an essay on hybridization in aquaculture organisms.

3. Give an account on the preparation of synthetic feeds.

4. How do you manipulate genes to improve strains in aquaculture

5. Discuss the application of biotechnology in disease diagnosis.

6. Write an essay on gene probes.

7. Describe the methods to control the diseases.

8. Give an account on induced breeding.

9. Write short notes on:
- **a. Disease prevention**
- **b. Polyploidy**
- **c. Transgenesis**
- **d. Heterosis**

Department of Marine Living Resources
Andhra University

Non-Core Papers (Offered to Other Departments Students Under CBCS)

II Semester : 2.5 Marine Bioresources

III Semester : 3.5 Coastal Aquaculture

MODEL PAPERS

Department of Marine Living Resources
Andhra University

M.Sc. – II Semester : (Other Departments Students)
Paper 2.5 : Marine Bioresources
(Non-core Paper)

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Give an account on the classification of marine environment.

2. Write an essay on benthic resources in the sea.

3. Describe the different types of marine plants and their distribution.

4. Write an essay on zooplankton of the sea.

5. Give an account of the fauna of Indo-west Pacific region.

6. Write an essay on the craft and gear employed in the sea.

7. Describe the impact of man on the marine environment.

8. Give an account of bioactive marine natural products.

9. Write short notes on:
- **a. Marine mammals**
- **b. Sewage pollution into the sea**
- **c. Pelagic resources**
- **d. Marine invertebrates**

Department of Marine Living Resources
Andhra University

M.Sc. – III Semester (Other Departments Students)
Paper 3.5 : Coastal Aquaculture
(Non-core paper)

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the status and importance of aquaculture in India.

2. Describe the criteria for selection of species for aquaculture.

3. Give an account on the types of aquaculture practices.

4. Write an essay on the culture of shrimps.

5. Describe the culture of mullets.

6. Write an essay on seaweed culture.

7. Describe the various types of culture systems.

8. Describe the engineering aspects in aquaculture.

9. Write short notes on:
- **a. Sea-cucumbers culture**
- **b. Organic farming**
- **c. Polyculture**
- **d. Shrimp hatchery**

Department of Marine Living Resources
Andhra University

M.Sc. – III Semester (Other Departments Students)
Paper 3.5 : Coastal Aquaculture
(Non-core paper)

Time: 3 hrs **Max. Marks : 85**

Model Question Paper
Answer any 5 questions. 9th question is compulsory
All questions carry equal marks

1. Discuss the status and importance of aquaculture in India.

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