I DEGREE

AQUACULTURE TECHNOLOGY

I SEMESTER – PAPER – I

2020 – 2021

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – I **Paper - I**

BASIC PRINCIPLES OF AQUACULTURE

UNIT – I : INTRODUCTION

1-1 Concept of Blue Revolution – History and definition of Aquaculture.

1-2 Fresh Water Aquaculture, Brackish Water Aqua Culture and Mari Culture.

1-3 Different aquaculture system. Pond, Cage, Pen, Running Water, Extensive, Semi Intensive, Intensive System and their Significance. Monoculture, Poly-Culture and Mono-Sex Culture Systems and Mixed Culture.

UNIT – II : POND ECOSYSTEM

2-1 Food chains and Food Web

2-2 Lotic and lentic system, Streams and Springs.

2-3 Importance of plankton and Benthos in culture ponds and primary productivity.

UNIT – III : TYPES OF FISH PONDS

3-1 Functional classification of Pond – Nursery, rearing, production, stocking and quarantine ponds.

3-2 Hatchery design – Fish Hatchery

UNIT – IV : POND PREPARATION

4-1 Important, (nature of soil, water resources) Factors in the construction of an ideal fish Pond – site selection topography, nature of the soil, water resources.

4-2 Lay out and arrangements of Ponds in a Fish Farm.

UNIT – V : POND MANAGEMENT FACTORS

5-1 Manure application in culture ponds

5-2 Physico - chemical conditions of soil and water (PH, temperature, depth turbidity, light) to increase oxygen and reduce ammonia and hydrogen sulphide in culture pond, correction of PH.

5-3 Eradication of Predators and weed control advantages and disadvantages of weed, weed plants in culture ponds, aquatic weeds, weed Fish, toxins used for weed control and control of predators.

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SRI Y.N.COLLEGE (AUTONOMOUS) NARSAPUR, W.G.DIST.,

AQUACULTURE TECHNOLOGY COURSE SYLLABUS

SEMESTER-I-PAPER-I

BASIC PRINCIPLES OF AQUACULTURE

Max.Marks: 75

Time: 3 Hrs.

PART – I

5x5 = 25 M

Answer any Five of the following.

1. Cage Culture – పెట్టెల యందు పెంపకము.
2. Food Chains – ఆహారపు గొలుసులు
3. Nursery Ponds – నర్సరీ కుంటలు
4. Soil Characters of Pond – చెరువు యొక్క మృత్తిక లక్షణాలు
5. Manure applications in Culture Ponds – చెరువులయందు ఎరువుల వాడకం
6. P^H – పి.హెచ్.
7. Aquatic Weeds – నీటికలుపు మొక్కలు
8. Weed Fishes – భక్షక చేపలు.

PART – II

Answer any Five of the following choosing at least two questions from Section A and Section B. All questions carry equal marks. 5x10 = 50 M

SECTION – A

9. Write an essay on Mono culture and Poly culture.
   ఏక సంవర్ధనము మరియు బహు సంవర్ధనము గూర్చి ఒక వ్యాసము వ్రాయుము.
10. Describe the differences between Lotic and Lentic waters.
    లోటిక్ మరియు లెన్ టిక్ జలాల మధ్య వ్యత్యాసములను తెల్పుము.
11. Give an account of the design and construction of Culture Ponds.
    సంవర్ధన చెరువుల యొక్క డిజైన్ మరియు నిర్మాణమును గూర్చి వివరింపుము.
12. Give an account on Nitrogen Cycle
    సత్రజని వలయము గూర్చి వ్రాయుము.
13. Explain the Fish Hatchery design.
    చేపల హేచరీ డిజైన్ గూర్చి తెల్పుము.

SECTION – B

14. Describe the organic and inorganic fertilizers used in fresh water culture ponds.
మంచినీటి చెరువులయందు సహజ ఎరువు, కృత్రిమ ఎరువుల వాడకమును గూర్చి వివరింపుము.

15. Write an essay on physic-chemical characters of fresh water culture ponds.
సంవర్ధన చెరువుల భౌతిక-రసాయనిక లక్షణాలపై ఒక వ్యాసము వ్రాయుము.

16. Describe the detailed account on Aquatic Weeds and their control in Aqua Culture ponds.
జలసంవర్ధన చెరువులయందు కలుపుమొక్కలను గూర్చి తెలిపి వాటి నివారణ పద్ధతులను వివరింపుము.

17. Write an essay on predatory and weed fishes.
పరభక్షక చేపలు మరియు వీడ్ చేపలను గూర్చి ఒక వ్యాసము వ్రాయుము.

18. Write an account on lay out of a fish farm.
చేపల చెరువు యొక్క లే-అవుట్ గూర్చి వ్రాయుము.

M. Lakshmi Murthy

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

SEMESTER – I

BASIC PRINCIPLES OF AQUACULTURE - PAPER - I

BLUE PRINT

Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	01	01	15	SECTION – A 1 Essay and 1 Short
UNIT – II	01	01	15	SECTION – A 1 Essay and 1 Short
UNIT – III	01	01	15	SECTION – A 1 Essay and 1 Short
UNIT – IV	04	01	45	SECTION – A – 2Essay SECTION – B – 2Essay 4 Essays and 1 Short
UNIT – V	03	04	50	SECTION – B – 3Essay 3 Essays and 4 Short
TOTAL	10	08	140	

M Radhakrishnamurty

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – I **Paper - I**

BASIC PRINCIPLES OF AQUACULTURE

PRACTICALS :

1. Estimation of carbonates, Bicarbonates in water sample.
2. Estimation of dissolved oxygen.
3. Field visit to nursery, rearing and stocking ponds of aqua farms.
4. Field visit to hatchery.
5. Study of algal bloom and their control.
6. Collection and identification of phytoplankton and zooplankton.
7. Study of aeration devices.
8. Collection and study of aquatic weeds.
9. Filed survey of nearby aqua farm.

PRACTICAL MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1. Estimation of DO_2 un the given sample of water and write the procedure adopted. 10 + 5 = 15M
2. Identify draw and comment on the given spotters A, B, C, D, E 5 x 4 = 20M
3. Record and field Book 10 + 5 = 15M

TOTAL : 50M

M Radhakrishnamurthy

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II DEGREE

AQUACULTURE TECHNOLOGY

II SEMESTER – PAPER – II

2020 – 2021

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – II **Paper - II**

BIOLOGY OF FIN FISH & SHELL FISH

UNIT – I : GENERAL CHARACTERS AND CLASSIFICATION OF CULTIVABLE FIN AND SHELL FISH.

1-1 General characters ad classification of fishes up to the classes.

1-2 Fish, crustaceans and molluscs of commercial importance.

1-3 Sense orange of Fishes.

1-4 Specialized organs in Fishes – electric Organ, Venom and Toxins.

1-5 Buoyancy in Fishes – Swim bladder or air bladder.

UNIT – II : FOOD, FEEDING AND GROWTH

2-1 Natural Fish Food, Feeding habits, Stimuli for Feeding, gut content analysis, structural modifications in relation to feeding habits.

2-2 Principles of age and growth determination, Growth rate measurement – scale method, otolith method.

2-3 Length – weight relationship, condition factor.

UNIT – III : REPRODUCTION BIOLOGY

3-1 Breeding in Fishes, breeding places, breeding habits, breeding in natural environment and in artificial ponds.

3-2 Induced breeding in fishes (Fresh water)

UNIT – IV : DEVELOPMENT

4-1 Parental care in Fishes, Ovo – Viviparity, Oviparity, viviparity, nest building and brooding.

4-2 Embryonic and larval development of Fish.

4-3 Embryonic and larval development of Shrimp.

4-4 Environmental factors affecting reproduction and development of cultivable fishes.

UNIT – V : HORMONES AND GROWTH

5-1 Endocrine system in fishes.

[redacted]

5-2 Molting in crustacean shell fish.

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I B.Sc., Aquaculture Technology – Semester II

Paper II, Biology of Fin Fish & Shell Fish

Time: 3 Hrs. Max.Marks: 75

PART – I

5 x 5 = 25 M

Answer any **FIVE** of the following.
ఈ క్రింది ప్రశ్నలనుండి ఐదింటికి జవాబులు వ్రాయుము.

1. Chanos Chanos - చానాస్ చానాస్
2. Eye of Fish – చేప యొక్క కన్ను.
3. Feeding Habits of Fishes – చేపల యొక్క ఆహారపు అలవాట్లు.
4. Otolith Method – Growth Rate Measurement – ఆటోలిత్ – పెరుగుదల కొలత.
5. Breeding Habits in Fishes – చేపల ప్రత్యుత్పత్తి అలవాట్లు.
6. Parental Care in Fishes – చేపల యందు సంతానపాలన.
7. Ovary – ఓవరీ.
8. Moulting - కుబుసం విసర్జన.

PART – II

Answer any **FIVE** questions choosing at least **Two** questions from each Section A & B. Draw a neat Labeled Diagram wherever necessary. All questions carry equal marks. 5 x 10 = 50 M

ఏదైనా ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము. సెక్షన్ 'ఎ' మరియు సెక్షన్ 'బి' ల నుండి కనీసం రెండు ప్రశ్నలను ఎంచుకొని మొత్తం ఐదు ప్రశ్నలకు జవాబులు వ్రాయుము. అవసరమైనచోట భాగాలు గుర్తిస్తూ చిత్ర పటములను గీయవలెను. అన్ని ప్రశ్నలకు మార్కులు సమానము. 5 x 10 = 50 M

SECTION – A

9. Describe the General characters and Classification of Bony fishes up to classes.
   అస్థి చేపలయొక్క సామాన్య లక్షణములను తెల్పి తరగతుల వరకు వర్గీకరింపుము.
10. Describe the important characters of any two commercially important fishes.
    ఆర్థిక ప్రాముఖ్యము కల ఏవైనా రెండు చేపల యొక్క ముఖ్య లక్షణములను తెల్పుము.
11. Write an essay on feeding adaptations in fishes.
    చేపల యందు ఆహారం తినడానికి చూపు అనుకూలనాలను గూర్చి ఒక వ్యాసము వ్రాయుము.
12. Write a detailed account on length – weight relationship of fishes.
    చేపల యొక్క పొడవు-బరువు సంబంధమును గూర్చి విపులముగా వివరింపుము.
13. Describe the different breeding habits of fishes.
    చేపల యొక్క వివిధ ప్రత్యుత్పత్తి అలవాట్లను గూర్చి వివరింపుము.

SECTION - B

14. Write an essay on induced breeding technique in fishes.
    చేపల యందు ప్రేరేపితి ప్రజననము గూర్చి ఒక వ్యాసము వ్రాయుము.
15. Describe the larval development in fishes.
    చేపల యొక్క లార్వాల అభివృద్ధిని గూర్చి వివరింపుము.
16. Write an essay on endocrine glands in fishes.
    చేపల యొక్క వినాళ గ్రంధులను గూర్చి ఒక వ్యాసము వ్రాయుము.
17. Describe the Neurosecretary cells in fishes.
    చేపల యొక్క నాడీ శ్రావక కణాలను గూర్చి వివరింపుము.
18. Describe the Chromatophores in fishes .
    చేపల యొక్క క్రొమోటోఫోరులను గూర్చి వివరింపుము.

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – II

BIOLOGY OF FIN FISH & SHELL FISH - Paper - II

BLUE PRINT

Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – II	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – III	02	01	25	**SECTION – A** – 1Essay **SECTION – B** – 1Essay 2 Essays and 1 Short
UNIT – IV	01	02	20	**SECTION – B** 1 Essay and 2 Shorts
UNIT – V	03	01	35	**SECTION – B** 3 Essays and 1 Short
TOTAL	10	08	140	

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – II

BASIC OF FIN FISH & SHELL FISH - Paper - II

PRACTICALS :

1. Study of mouth parts in herbivorous and carnivorous fishes.
2. Comparative study of digestive system of herbivorous and Carnivorous fishes.
3. Length – Weight relationship of fishes.
4. Gut content analysis in fishes.
5. Mouth parts and appendages of cultivable prawns.
6. Study of eggs of fishes, shrimps, prawns.
7. Embryonic and larval development of fish.
8. Study of gonads maturity and fecundity in fishes.
9. Observation of Crustacean larvae.
10. Observation of Molluscan larvae.

PRACTICAL MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1.	Identify the gut contents of given specimen and analyse & note down the gut contents and draw the diagrams.	10 + 5 = 15
2.	Identify, draw and comment on the given spotters A, B, C, D & E	5 x 3 = 15
3.	Length - Weight relationship of given specimens	1 x 10 = 1
4.	Record and Viva	5 + 5 = 1

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III DEGREE

AQUACULTURE TECHNOLOGY

III SEMESTER – PAPER – III

2020 – 2021

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – III **Paper - III**

FISH NUTRITION & FEED TECHNOLOGY

UNIT – I : NUTRITIONAL REQUIREMENTS OF CULTIVABLE FISH.

1-1 Requirement for protein, carbohydrates, lipids, fiber, for different cultivable fish.

1-2 Essential Amino acid and fatty acids.

UNIT – II : FORMS OF FEEDS & FEEDING METHODS

2-1 Feed conversion efficiency, feed conversion ratio.

2-2 Wet feeds, Moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets, advantage of pelletization.

2-3 Manual feeding, automatic feeders, surface spraying, bag feeding and tray feeding.

UNIT – III : FEED MANUFACTURE & STORAGE

3-1 Feed ingredients and their selection.

3-2 Feed formulation – Steam pelleting, grinding, mixing and drying, pelleting and packing.

3-3 Water stability of feeds, farm made aqua feeds, Micro-Coated feeds, Micro-Encapsulated feeds and micro – bund diets.

3-4 Microbial, insect and rodent damage of feed, chemical spoilage during storage period and proper storage methods.

UNIT – IV : FEED ADDITIVES & NON-NUTRIENT INGREDIENTS

4-1 Binders, anti-oxidants, probiotics.

4-2 Feed attractants and feed stimulants.

4-3 Enzymes, hormones, growth promoters and pigments.

UNIT – V : NUTRITIONAL DEFICIENCY IN CULTIVABLE FISH

5-1 Protein deficiency, Vitamin and Mineral deficiency Symptoms.

5-2 Nutritional pathology and Anti Nutrients.

5-3 Importance of Natural and supplementary feeds, balance diet.

PRACTICALS

1. Estimation of carbohydrates content in aquaculture feeds.
2. Estimation of ash in aquaculture feed.
3. Study of water stability of pellet feeds.
4. Feed formulation and preparation in the lab.
5. Study of binders used in aquaculture feeds.
6. Study of feed packing Materials.
7. Study of physical and chemical change during storage.
8. Study of physical characteristics of floating and sinking feeds.
9. Visit to a aqua feed production unit.
10. Visit to a farm for studying feeding practices.

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – III

FISH NUTRITION & FEED TECHNOLOGY - Paper - III

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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	01	25	SECTION – A 2 Essays and 1 Short
UNIT – II	02	02	30	SECTION – A 2 Essays and 2 Shorts
UNIT – III	02	01	25	SECTION – A – 1Essay SECTION – B – 1Essay 2 Essays and 1 Short
UNIT –IV	02	02	30	SECTION – B 2 Essay and 2 Shorts
UNIT – V	02	02	30	SECTION – B 2 Essays and 2 Shorts
TOTAL	10	08	140	

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MODEL PAPER FOR III SEMESTER

II B. SC., AQUACULTURE TECHNOLOGY - PAPER - III

FISH NUTRITION & FEED TECHNOLOGY

Time: 3 hrs

Max. Marks: 75

PART – I

I. Write short note on any FIVE of the following 5 x 5 = 25

1. Proteins – మాంసకృత్తులు
2. F.C.R. – ఎఫ్. సి. ఆర్.
3. Natural Feed – సహజ ఆహారము
4. Storage methods of Feed – ఆహారపు నిల్వ పద్ధతులు
5. 'Probiotics – ప్రోబయోటిక్స్
6. Anti metabolites – యాంటి మెటబోలైట్స్
7. Supplementary Feed – అనుబంధ ఆహారము
8. Anti Nutrients – వ్యతిరేక పోషకాలు

PART – I

II. Answer any FIVE questions choosing at least TWO questions from each section. Draw labeled diagrams wherever necessary. 5 x 10 = 50

SECTION – A

9. Describe various requirements for energy of different stages of cultivable fishes.
పెంపకపు చేపల వివిధ దశలకు అవసరమగు వివిధ శక్తులను గూర్చి వర్ణింపుము.

10. Write an essay on factors effecting energy partitioning and feeding.
ఆహారము మరియు శక్తి వినియోగాములను ప్రభావితం చేయు ప్రభావకాలను గూర్చి ఒక వ్యాసమును వ్రాయుము.

11. Differentiate feed conversion ratio and protein efficiency ratio.
ఆహారపు మార్పు నిష్పత్తి మరియు మాంసకృత్తుల సామర్థ్యపు నిష్పత్తుల మధ్య బేధములను గూర్చి చర్చింపుము.

12. Give an account on different types of feedings.
వివిధ రకముల ఆహారములను గూర్చి వ్రాయుము.

13. Write an essay on Feed formulation.
ఆహారపు నిష్పత్తులను గూర్చి ఒక వ్యాసము వ్రాయుము.

SECTION – B

14. Give an account on feed spoilage methods.
ఆహారము నిల్వచేయుటలో పాడగుటకు గల వివిధ పద్ధతులను గూర్చి వ్రాయుము.

15. What are the differences between Feed attractants and Feed stimulants?
ఆహారపు ఆకర్శకాలు మరియు ఆహారపు ప్రేరేపకాల మధ్య గల తేడాలు ఏమి.

16. Write an essay on growth promoters and pigments.
పెరుగుదల ప్రోత్సాహకాలను గూర్చి ఒక వ్యాసము వ్రాయుము.

17. Give an account on different deficiency symptoms.
వివిధ క్షీణతా లక్షణములను గూర్చి వ్రాయుము.

18. Describe the importance of natural and supplementary feeds.
సహజ మరియు అనుబంధ ఆహారముల యొక్క ప్రాముక్యతను గూర్చి వర్ణింపుము.

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – III

FISH NUTRITION & FEED TECHNOLOGY - Paper - III

PRACTICAL MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1.	Estimate the amount of carbohydrates present in Aquaculture feed and write the procedure adopted.	10 + 5 = 15M
2.	Describe the binders used in Aquaculture feed.	1 x 10 = 10M
3.	Write the physical and chemical changes of feed during storage near Aqua farms.	1 x 10 = 10M
4.	Record + Field Visit Note book	8 + 7 = 15M
	TOTAL :	50M

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III DEGREE

AQUACULTURE TECHNOLOGY

IV SEMESTER – PAPER – IV

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – IV **Paper - IV**

FRESH WATER & BRACKISH WATER AQUA CULTURE

UNIT – I : INTRODUCTION TO FRESH WATER AQUACULTURE

1-1.1 Status, scope and prospects of fresh water aquaculture in the world, India and A.P.

1-1.2 Different fresh water Aquaculture systems.

UNIT – II : CARP CULTURE

2-1 Major cultivable Indian carps – labeo, catla and cirrhinus & Minor carps.

2-2 Exotic fish species introduced to Indian – Tilapia, Pangassius and clarius sp.

2-3 Composite fish culture (fish) system of Indian and exotic carps.

UNIT – III : CULTURE OF AIR-BREATHING AND COLD WATER FISH

3-1 Recent developments in the culture of clarius, anabas, murrels.

3-2 Advantages and constraints in the culture of air breathing and cold water fishes – seed resources, feeding, management and production.

3-3 Special systems of Aqua culture brief study of culture in running water, re-circulatory systems, cages and pens, sewage-fed fish culture.

UNIT – IV : CULTURE OF PRAWN

4-1 Fresh Water prawns of India – Commercial value.

4-2 Macrobrachium rosenbergii and M. Malcomsoni- biology, seed production, pond preparation, stocking management of Nursery and grow out ponds, feeding harvesting.

UNIT – V : CULTURE OF BRACKISH WATER SPECIES.

5-1 Culture of P.Mondon – Hatchery technology and culture practices including feed and disease management.

5-2 Culture of l-vannamei – hatchery technology and culture practices including feed and disease management.

5-3 Mixed culture of fish and prawns.

PRACTICALS

1. Identification of important cultivable carps.
2. Identification of important cultivable air-breathing fishes.
3. Identification of important cultivable fresh water prawns
4. Identification of different life history stages of fish.
5. Identification of different life history stage of fresh water prawn.
6. Collection and study of weed fish.
7. Identification of commercially viable crabs – scyllea serrata, portunus pelagicus p.sanguinolentus. Neptuples pelagicus, N.Sanguinolentus.
8. Identification of lobsters – panularius polyphagus, P.ornatus, p.homarus, p.sewelli, p.penicillatus.
9. Identification of oysters of Nutritional significance crossostrea Madrasensis, c.gryphoides, c.cucullata, c.rivularis, pienodanta.
10. Identification of Mussels and clams.
11. Identification of developmental stages of oysters
12. Field visit to aqua farm and study of different components like dykes etc.

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MODEL PAPER FOR IV SEMESTER

II B. SC., AQUACULTURE TECHNOLOGY - PAPER - IV

FRESH WATER & BRAKISH WATER AQUACULTURE

Time: 3 hrs Max. Marks: 75

PART – I

I. Write short note on any FIVE of the following 5 x 5 = 25

1. Status of aquaculture in India – భారత దేశము నందలి ఆక్వాసంరంభ స్థితి
2. Pond culture – చెరువు సంవర్ధనము
3. Minor carps – మైనరీ కార్ప్ చేపలు
4. Tilapia - టిలాపియా
5. Air-breathing fishes. – శ్వాసించే చేపలు
6. Cage culture – పంజరపు సంవర్ధనము
7. M. malcomsoni – మా. మాల్కొల్సోని
8. Hatchery – హేచరీ

PART – I

II. Answer any FIVE questions choosing at least TWO questions from each section. 5 x 10 = 50
Draw labeled diagrams wherever necessary.

SECTION – A

9. Describe the scope and prospects of fresh water aquaculture in Andhra Pradesh.
ఆంధ్రప్రదేశ్ నందలి మంచినీటి ఆక్వా సంవర్ధనము యొక్క పరిధి మరియు అవకాశములను గూర్చి వర్ణింపుము.

10. Write an essay on different fresh water aquaculture systems.
వివిధ రకముల మంచినీటి సంవర్ధనపు వ్యవస్థలను గూర్చి ఒక వ్యాసము వ్రాయుము.

11. Give an account on cultivable species of Indian Major Carps.
భారత దేశపు పెద్ద కార్ప్ పెంపకపు చేపలను గూర్చి వ్రాయుము.

12. Write an essay on composite fish culture system in India.
భారత దేశము నందలి సమగ్ర చేపల పెంపకను గూర్చి ఒక వ్యాసము వ్రాయుము.

13. Give an account on recent developments in the culture of murrels.
మరెల్ చేపల సంవర్ధనము నందలి ఆధునిక అభివృద్ధిని గూర్చి వ్రాయుము.

SECTION – B

14. Give an account on sewage-fed fish culture.
వ్యర్థపు నీటి చేపల సంవర్ధనము గూర్చి వ్రాయుము.

15. Describe the commercial value of fresh water prawns of India.
భారత దేశము నందు వాణిజ్యపు విలువలు కలిగిన రొయ్యలను గూర్చి వర్ణింపుము.

16. Write an essay on biology of *Macrobrachium rosenbergii*.
మాక్రోబ్రాఖియం రోజేన్బెర్గై యొక్క జీవశాస్త్రంను గూర్చి ఒక వ్యాసము వ్రాయుము.

17. Give an account on cultural practices of *Penaeus monodon*.
పినయస్ మోనోడాన్ యొక్క పెంపకపు పద్ధతులను గూర్చి వ్రాయుము.

19. Write an essay on mixed culture of fish and prawns.
చేపలు మరియు రొయ్యల మిశ్రమ సంవర్ధనమును గూర్చి ఒక వ్యాసము వ్రాయుము

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – IV

FRESH WATER & BRACKISH WATER AQUA CULTURE - Paper - IV

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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – II	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – III	02	02	30	**SECTION – A** – 1Essay **SECTION – B** – 1Essay 2 Essays and 2 Shorts
UNIT – IV	02	01	25	**SECTION – B** 2 Essay and 1 Short
UNIT – V	02	01	25	**SECTION – B** 2 Essays and 1 Short
TOTAL	10	08	140	

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – IV

FRESH WATER & BRACKISH WATER AQUA CULTURE - Paper - IV

PRACTICAL MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1. Give a detailed account on the life history stages of given specimen and draw the life stages — 15 + 5 = 20M
2. Identify, Draw and comment on the given spotters A, B, C, D and E — 4 x 2 ½ =10M
3. Identify, Draw and Comment on the given spotters. A, B, C and D — 4 x 2 ½ =10M
4. Record and Viva — 7 + 3 = 10M

TOTAL : 50M

M Radhakrishnaiah

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III DEGREE

AQUACULTURE TECHNOLOGY

V SEMESTER – PAPER – V

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – V **Paper - V**

FISH HEALTH MANAGEMENT

UNIT – I : PATHOLOGY AND PARASITOLOGY

1-1 Introduction to fish diseases – Definition and types of diseases.

1-2 Neoplasms, Inflammation.

UNIT – II : DISEASES OF FIN FISH

2-1 Fungal diseases – saprolegniosis, Branchirmycosis, Ichthyophorus diseases.

2-2 Viral diseases – Haemorrhagic Scepticemia, Spring viremia of carps, infections hematopoietic necrosis, channel cat fish viral disease.

2-3 Bacterial diseases – Vibrio infections, columnaris, furunculosis, Bacterial gill disease, Bacterial kidney disease.

UNIT – III : DISEASES OF SHELL FISH

3-1 Major shrimp viral diseases – Bacculovirus, Bacculaviral midget necrosis, infectious hypodermal and haematopoietic, yellow head bacculovirus.

UNIT – IV : NUTRITIONAL DISEASES.

4-1 Nutritional Pathology – vitamin mineral deficiency diseases.

4-2 Environmentally induced diseases.

UNIT – V : FISH HEALTH MANAGEMENT

5-1 Methods of fish disease diagnosis, prevention of fish diseases.

5-2 Therapeutic Methods fish diseases.

PRESCRIBED BOOKS :

1. Shaperclaus W.1991 Fish diseases – Vol. I & II. Oxonian press Pvt. Ltd.,
2. Roberts RJ 1989. Fish Pathology. Bailliere Tindall.

REFERENCES :

1. Shankar KM 7 Mohan CV 2002. Fish and Shellfish Health Management. UNESLO. Publ. Sindermann. CJ 1990.
2. Bullock G et.al, 1972 Bacterial diseases of fishes. The publications, New Jersey.

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Unit No.	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	01	25	Section – A 2 Questions- Essay
UNIT – II	02	01	25	Section – A 2 Questions- Essay
UNIT – III	02	02	30	Section – A - 1 Ques. Section – B - 2 Ques.
UNIT – IV	02	02	30	Section – B 2 Questions- Essay
UNIT – V Virology	02	02	30	Section – B 2 Questions- Essay

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – V **Paper - V**

FISH HEALTH MANAGEMENT

Time : 3 Hrs. Max. Marks : 75

PART - I

Answer any FIVE of the following. **5 x 5 = 25M**

1. Types of Fish Diseases – చేపల రోగాల రకాలు
2. Fungal diseases of fin fish – చేపలలో శిలీంద్ర వ్యాదులు
3. Bacculoviral midgut necrosis (BMN) – బాక్యులో వైరల్ మిడ్ గట్ నీక్రోసిస్
4. Haemotopoietic - హిమటోపోయిటిక్
5. Vitamin deficiency diseases fishes – చేపలలో విటమిన్ తగ్గుదల వ్యాదులు
6. Environmentally induced diseases of fishes – చేపలలో పర్యావరణ ప్రేరేపిత వ్యాధులు.
7. Prevention of fish diseases – చేపలలో రోగ నివారణ.
8. Fish disease diagnosis – చేపల రోగ నిర్ధారణ.

PART – II

Answer any FIVE of the following choosing at least two questions from section A&B. All questions carry equal marks. **5 x 10 = 50M**

SECTION - A

9. Write an essay on types of fish diseases.
   చేపలలో రోగ రకాలను గూర్చి ఒక వ్యాసము వ్రాయుము.
10. Write an essay on Neoplasm and Inflammation in fishes.
    చేపలలో నియోప్లాసమ్ మరియు ఇన్ ఫ్లమేషన్ గూర్చి ఒక వ్యాసము వ్రాయుము.

11. Give an account on viral diseases of fishes.
చేపలలో వైరల్ డిసీజస్ గూర్చి వ్రాయుము.

12. Give an account on Bacterial diseases of fishes.
చేపలలో బ్యాక్టీరియల్ డిసీజస్ గూర్చి వ్రాయుము.

13. Give an account on Bacculovirus and Bacculoviral midgut necrosis of shell fish.
బాక్యులో వైరస్ మరియు బాక్యులో వైరల్ మిడ్ గట్ నీక్రోసిస్ గూర్చి వ్రాయుము.

SECTION - B

14. Write an essay on infections Haematopoietic and Yellow head bacculovirus of shell fish.
షెల్ ఫిస్ యొక్క హిమటోపోయ్ టిక్ మరియు ఎల్లో హెడ్ బాక్యులో వైరస్ గూర్చి ఒక వ్యాసము వ్రాయుము.

15. Write an account on vitamin deficiency diseases of fishes.
చేపలలో విటమిన్ డెఫిష్యన్సి రోగాల గూర్చి వ్రాయుము.

16. Describe the detailed account on Environmentally induced diseases of fishes.
చేపలలో పర్యావరణ ప్రేరేపిత రోగాల గూర్చి వివరింపుము.

17. Write an account on fish disease diagnosis and prevention of fish diseases.
చేపలలో రోగ నిర్ధారణ మరియు రోగ నివారణలను గూర్చి ఒక వ్యాసము వ్రాయుము.

18. Write an account on therapeutic methods of fish diseases.
చేపల రోగాల థెరాప్యుటిక్ పద్ధతుల గూర్చి వ్రాయుము.

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AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – V Paper - V

FISH HEALTH MANAGEMENT

PRACTICALS :

1. Enumeration of Bacteria by TPC method.
2. Observation of gross pathology and external lesions of fish and prawn with reference to the common diseases in aquaculture.
3. Examination of pathological changes in gills and gut lumen, lymphioid organ, muscles and nerves of fishes.
4. Examination of pathological changes in gut lumen, hepatopancreas, lymphoid organ, muscles and nerves of prawn and shrimp.
5. Bacterial pathogens – isolation, culture and characterization.
6. Identification of parasites – isolation, culture and characterization.
7. Identification of parasites in fishes : Protozoan, Helminths, Crustaceans.
8. Molecular and immunological techniques, Biochemical tests, Agglutination test challenge tests.
9. Estimation of antibiotics used in aquaculture practices.
10. Estimation of probiotics used in aquaculture.
11. Field visit to farm for health monitoring and disease diagnosis.

PRACTICAL MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1. Estimation of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves of fishes. 1 x 20 = 20M
2. Identification of parasites in fishes Protozoan, Helminths, Crustaceans 1 x 15 = 15M
3. Record and field note Book 10 + 5 = 15M

TOTAL : 50M

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III DEGREE

AQUACULTURE TECHNOLOGY

V SEMESTER – PAPER – VI

2020 – 2021

AQUACULTURE TECHNOLOGY COURSE SYLLABUS

Semester – V **Paper - VI**

FISHERIES EXTENSION, ECONOMICS & MARKETING

UNIT – I : INTRODUCTION

1-1 Meaning and scope of economics with reference to fisheries.

1-2 Basic concepts of economics – goods, services, wants and utility, demand and supply, value, price, market demand and individual demand, elasticity of demand, law of diminishing marginal utility.

1-3 Various factors influencing the fishery product's price.

UNIT – II : FISHERIES MARKETING

2-1 Basic marketing functions, consumer behaviour and demand, fishery market survey and test marketing a product.

2-2 Fish marketing – prices and price determination of fishes.

2-3 Marketing institutions – primary (Producer fishermen, fishermen cooperatives, and fisheries corporations) and secondary (merchant / agent / speculative middlemen)

UNIT – III : FISHERIES ECONOMICS

3-1 Aquaculture economics – application of economics principles to aquaculture operations.

3-2 Various inputs and production function. Laws of variable proportions.

3-3 Cost and earnings of aquaculture systems – carp culture, shrimp farming systems, hatcheries, Cost and earnings of fishing units and freezing plants.

3-4 Socio-economic conditions of fishermen in Andhra Pradesh, Role of Matsya fed and NABARD in uplifting fishermen's conditions, fishermen cooperatives.

3-3 Contribution of fisheries t the national economy.

UNIT – IV : FISHERIES EXTENSION

4-1 Fisheries extension – scope and objectives, principles and features of fisheries extension education.

4-1.1 Fisheries extension methods and rural development.

UNIT – V : TRANSFER OF TECHNOLOGY

5-1 ICAR programs – salient features of ORP, NDS, LLP, IRDP, ITDA, KVK, FFDA, FCS, FTI, TRYSEM.

5-2 Education of farmers through print and electronic media.

PRACTICALS :

Project work / on-job training at industry.

PRESCRIBED BOOK(S) :

1. Adivi Reddy sv 1997. An introduction to extension education. Oxford & IBH Co.Pvt.Ltd. New Delhi.
2. Jayaraman R 1996. Fisheries Economics. Tamilandu Veterinary and Animal Science University, Tuticorn.
3. Subba Rao N 1986. Economics of Fisheries. Daya publishing house, Delhi.

REFERENCES :

1. Dewwett KK and Varma JD 1993. Elementary economic theory. S.Chand, New Delhi.
2. Korakandy R 1996. Economics of Fisheries Management. Daya Publishing House, Delhi.
3. Tripathi SD 1992. Aquaculture Economics. Asian Fisheries Society, Mangalore.

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – V

Fisheries Extension, Economics & Marketing - Paper - VI

Time : 3 Hrs. Max. Marks : 75

PART - I

Answer any FIVE of the following. 5 x 5 = 25M

1. Basic concepts of Economics – అర్థశాస్త్ర ప్రాధమిక సూత్రాలు.
2. Value and Price – వ్యాల్యు మరియు ధర.
3. Primary Marketing – ప్రాధమిక మార్కెట్.
4. Marketing Functions – మార్కెట్ యొక్క లక్షణాలు.
5. Law of variable proportions – చర అనుపాతాల సూత్రము.
6. Fishermen Co-operatives – మత్స్యకారుల సహకార సంఘాలు.
7. Fisheries Education- మత్యాల విద్యాబోధన
8. Salient features of FFDA – ఎఫ్.ఎఫ్.డి.ఎ. యొక్క లక్షణాలు

PART – II

Answer any FIVE question choosing at least TWO Questions from each section A&B. All questions carry equal marks. 5 x 10 = 50M

SECTION - A

9. Write an essay on utility and its types.
   ప్రయోజనము మరియు ప్రయోజన రకాలను గూర్చి ఒక వ్యాసము వ్రాయుము.
10. Give an account on various factors influencing the fishery product price.
    మత్స్య ఉత్పత్తుల ధర పై ప్రభావితము చూపే వివిధ అంశాలను వివరింపుము.
11. Write an essay on Basic fish marketing functions.
    ప్రాధమిక మత్స్య మార్కెట్ లక్షణాల పై ఒక వ్యాసము వ్రాయుము.
12. Explain Secondary Marketing Institutions.
    ద్వితియ మార్కెట్ సంస్థలను గూర్చి వివరింపుము.

13. Write a detailed account on shrimp farm expenditure (cost & earning)
ప్రిమ్ప్ ఫామ్ యొక్క లాభ నష్టాలపై సమగ్ర నివేధిక నిమ్ము.

SECTION - B

14. Give a detailed account on Socio-economic conditions of Fishermen in Andhra Pradesh.
ఆంధ్రప్రదేశ్ మత్స్యకారుల సామాజిక, ఆర్థిక స్థితి గతులను గూర్చి సమగ్రముగా తెల్పుము.

15. Write a detailed account on Fisheries Extension Education.
మత్స్య అనుబంధ విద్యావిధానమును గూర్చి విపులంగా వివరింపుము.

16. Write any three ICAR Programmes in related to Aquaculture.
జల సంవర్ధనము యొక్క అభివృద్ధి కొరకు ఏవైనా మూడు ICAR ప్రోగ్రామ్స్ ను గూర్చి తెల్పుము.

17. How Aquaculture helps in Rural development.
గ్రామీణప్రాంతాల అభివృద్ధి కొరకు జల సంవర్ధనము ఏ విధముగా ఉపయోగపడుచున్నదో వివరింపుము.

18. Explain ITDA, KVK and TRYSEM.
ఐ.టి.డి.ఎ., కే.వి.కే మరియు ట్రైసెమ్ ను గూర్చి తెల్పుము.

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Unit No.	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – II	02	02	30	**SECTION – A** 2 Essays and 2 Shorts
UNIT – III	02	02	30	**SECTION – A** – 1Essay **SECTION – B** – 1Essay 2 Essays and 2 Shorts
UNIT – IV	02	01	25	**SECTION – B** – 2Essay 2 Essays and 1 Shorts
UNIT – V	02	01	25	**SECTION – B** – 2Essay 2 Essays and 1 Shorts
Total	10	08	140	

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – V

Fisheries Extension, Economics & Marketing – Paper - VI

PRACTICAL PROJECT WORK

1. Survey of Price Variations of Fresh water Fish markets in and around Narsapur Mandal.
2. Survey of Dry Fish markets in and around Narsapur Mandal – Different Species Market price survey and submit project report.
3. Survey of Socio- Economic conditions of Fishermen in the Narsapur Mandal.

Practical Examination Model Question Paper

Fisheries Extension, Economics & Marketing - Paper – VI

Time.: 3 Hrs. Max. Marks : 50

1. Project work submission at the time of practical examination 40 M
2. Viva 10 M

TOTAL : 50M

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III DEGREE

AQUACULTURE TECHNOLOGY

VI SEMESTER – PAPER - VII

2020 – 2021

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SEMESTER VI

FISHERY ENGINEERING – SYLLABUS

UNIT 1: FISHING CRAFTS

1-1 Different types of fishing crafts in India – inland and marine – traditional, motorized and mechanized.
1-2 Classification of fishing craft
1-3 Boat building materials – wood, steel, FRP, ferro-cement, aluminum etc.,
1-4 Mechanization of fishing craft and its impact

UNIT II: FISHING GEAR

2-1 Evolution of fishing methods and gear-principles
2-2 Design of fishing gear and fish catching methods
2-3 Fishing accessories, Netting materials – naturals and synthetic fishing gear materials and yarn numbering system
2-4 Active fishing gear – classification and description of modern fishing gears – Design and operation of – trawls, purse seines, ring seines, beach / shore seine, boat seine, pole and line, squid jigs, trolling.

UNIT III: ANCHORS, FISH FINDING & NAVIGATIONAL EQUIPMENT (INTRODUCTORY)

3-1 Types of Anchors – Chains, ropes, blocks, leads.
3-2 Echo sounders, fish finders, sonar and net sonde.
3-3 Sexant, chronometer, gyro compass, radar, decca, omega.

UNIT IV: EXPLORATION OF FISH AND CONSERVATION

4-1 Remote sensing applications in fish finding and catching
4-2 Destructive and prohibited fishing practices
4-3 Fish aggregating devices and artificial reefs

UNIT V: FISH PROCESSING EQUIPMENT

5-1 Ice making machinery.
5-2 Operation of various freezing machinery
5-3 Machinery for sausage making canning and packing
5-4 General maintenance of freezing and cold storage ice plant.

PRESCRIBED BOOKS:

1. Fridman A1 1992. Calculations for fishing gear designs, FAO, USA, Fishing news books Ltd, England
2. Gerhard Klust 1982, netting material for fishing gears, FAO, USA, Fishing news books Ltd, England
3. Jan-Olf – Trung 1992. Fishing boats of the world – Volumes – 1, 2, & 3. FAO, USA. Fishing news books Ltd, England

REFERENCES:

1. Dag. Pike 1992. Fishing boats and their equipment, FAO, USA, Fishing news books Ltd, England.

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AQUACULTURE TECHNOLOGY COURSE
Semester – VI
FISHERY ENGINEERING - Paper – VII

Time : 3 Hrs. Max. Marks : 75

PART - I

Answer any FIVE of the following. 5 x 5 = 25M

1. Classification of Fishing Craft – చేపలు పట్టే బోటులను గూర్చి వర్గీకరింపుము.
2. Fishing Accessories – చేపల పట్టె అనుబంధ ఉపకరణాలు.
3. Trawl net – ట్రాల్ వల.
4. Types of Anchors – యాంకర్స్ రకాలు.
5. Artificial reefs – కృత్రిమ రీఫ్స్.
6. Canning – కెనింగ్.
7. Shore seine net – షోర్ సీన్ వల
8. Fishing Traps – చేపలు పట్టుకొనే ట్రాప్స్ (ఉచ్చులు)

PART – II

Answer any FIVE of the following choosing at least TWO Questions from each section A&B. Draw a neat labeled diagrams wherever necessary. 5 x 10 = 50M

ఈ క్రింది ఇవ్వబడిన ప్రశ్నల నుండి ఐదింటికి సమాధానములు వ్రాయుము. సెక్షన్ A మరియు B ల నుండి కనీసం రెండేసి ప్రశ్నలను ఎంచుకోవలెను. అవసరమైనచోట చిత్రపటములను గీయుము.

SECTION - A

9. Write an essay on marine fishing craft used in India.
   భారతదేశంలో సముద్రాలలో చేపలు పట్టుకొనుటకు ఉపయోగించే పడవలను గూర్చి వివరింపుము.

10. Write a detailed account on Boat building Material.
పడవలను తయారు చేయుటకు అవసరమైన సామాగ్రిని గూర్చి విపులంగా వివరింపుము.

11. Write an essay on different types netting materials.
వలలను తయారు చేయు వివిధ రకాల మెటిరియల్ ను గూర్చి ఒక వ్యాసము వ్రాయుము.

12. Give an account on Boat seine net operation.
బోట్ సీన్ వలను ఉపయోగించు విధానమును గూర్చి తెల్పుము.

13. Write different types of Anchors used in Fishing.
చేపలు పట్టుకొనెటప్పుడు ఉపయోగించే వివిధ రకాల యాంకర్స్ ను గూర్చి తెల్పుము.

SECTION - B

14. Write an account on Echo sounders used in fishing operation.
చేపలు పట్టుకొనెటప్పుడు ఇకో సౌండ్ ర్స్ ను ఉపయోగించే విధానమును గూర్చి వివరింపుము.

15. Write an essay on Remote sensing application in Fishing.
చేపలు పట్టుకొనే విధానములో రిమోట్ సెన్సింగ్ ను ఉపయోగించే విధానము పై ఒక వ్యాసము వ్రాయుము.

6. Write an account on Fish aggregating devices.
చేపల అగ్రిగేటింగ్ డివైసెస్ ను గూర్చి తెల్పుము.

7. Give an account on Ice making Machinery.
ఐస్ ను తయారు చేయు వివిధ రకాల యంత్రాలను గూర్చి వివరింపుము.

8. Write a account on general maintenance of cold storage Ice plant.
కోల్డ్ స్టోరేజ్ ఐస్ ప్లాంట్ యొక్క సాధారణ మైన్ టెనెన్స్ గూర్చి తెల్పుము.

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DEPARTMENT OF ZOOLOGY & FISHERIES

AQUACULTURE TECHNOLOGY COURSE

Semester – VI

FISHERY ENGINEERING – Paper - VII

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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT – I	02	02	30	SECTION – A 2 Essays and 2 Shorts
UNIT – II	02	02	30	SECTION – A 2 Essays and 2 Shorts
UNIT – III	02	02	30	SECTION – A – 1Ess SECTION – B – 1Ess 2 Essays and 2 Shor
UNIT – IV	02	01	25	SECTION – B 2 Essay and 1 Sho
UNIT – V	02	01	25	SECTION – B 2 Essays and 1 Sh
TOTAL	10	08	140	

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Semester – VI

PRACTICALS

1. Site survey: preparation of site map and contour map
2. Ice making
3. Testing of different netting materials natural and synthetic
4. Estimation of buoyancy and de-buoyancy of different and floating and sinking materials
5. Identification of craft operated for fishing in Andhra Pradesh
6. Identification of gear operated for fishing in Andhra Pradesh
7. Visit to fishing harbor to study deck machinery
8. Visit to fishing harbor to study hull equipment
9. Visit to boat building yard and dry docking yard
10. Visit to fish processing unit to study the equipment used in fish processing

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AQUACULTURE TECHNOLOGY COURSE

Semester – VI

FISHERY ENGINEERING – Paper - VII

PRACTICAL EXAMINATION MODEL QUESTION PAPER

Time : 3 Hrs. Max. Marks : 50

1. Identify, draw and comment on the given spotters - Gear - Models Provided. 2 x 5 = 10M

   A) Cast Net

   B) Trawl Net

2. Identify draw and comment on the given spotters - Craft - models provided. 2 x 5 = 10 M

   A) Sangadam

   B) Catamaran

3. Write an account on Ice making methods in detail with the help of neat diagrams. 1 x 15 = 15 M

4. Record and Field visit Note Book 10 +5 = 15M

TOTAL : 50M

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