GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
B.Voc.(Aquaculture)
Syllabus & Title of the paper

(T= Theory, P= Practical)

SEMESTER-I						
	GENERAL COMPONENTS					
No.	**TITLE**	**Credits**	**Hours Week**	**Internal marks**	**External marks**	**Total**
1	English (Communication & soft skills)	3T	4T	25	75	100
2	LIFE SKILL	2T	2T	-	50	50
	SKILL DEVELOPMENT	2T	2T	-	50	50
3	Chemistry	4T	4T	25	75	100
	Chemistry practical	1P	2P	25	25	50
4	Zoology	4T	4T	25	75	100
	Zoology practical	1P	2P	25	25	50
5	Biology of Fin Fish &Shell Fish	4T	4T	25	75	100
	Aqua practical	1P	2P	25	25	50
6	Basic Principles of Aquaculture	3T	4T	25	75	100
	Aqua practical	1P	2P	25	25	50
7	Fresh water and Brackish water Aquaculture	3T	4T	25	75	100
	Aqua practical	1P	2P	25	25	50
	TOTAL	30		TOTAL		950

GOVERNMENT DEGERR COLLEGE
AVANIGADDA

B.Voc., Course in Aquaculture, SYLLABUS (w.e.f -2021-22)

SEMESTER – I

PAPER – I

BIOLOGY OF FIN FISH & SHELL FISH

HOURS: 60 **Max.Marks: 100**

Learning Objectives:

1. **To gain knowledge in classification of fish, crustacean and molluscs.**
2. **To understand the feed and feed management in fish culture.**
3. **To improve the knowledge to determination of age and growth methods in fish**
4. **To understand the reproductive biology of fish, shrimp.**
5. **To understand the Embryonic and larval development cultivable aquatic fin and shell fish.**
6. **To understand the hormonal influences in finfish and shell fish.**

Learning Outcomes:

1. **By the end of the course the student have good knowledge in Taxonomy, Morphology & Physiology of Fin fish & Shell fish.**
2. **Knowledge on the basic taxonomy tools for the identification of fin &shell fishes will be learnt by the student.**

UNIT-I: GENERAL CHARACTERS & CLASSIFICATION OF CULTIVABLE FIN & SHELL FISH

1-1 General Characters and classification of fishes

1-2 General characters and classification of Crustaceans and mollusks up to the level of classes.

1-3 Morphology of a teleost. Variation in the form and structure, skin, colouration, scales,

1-4 Anatomy of a teleost fish. Alimentary canal and associated structures like gills, swim bladder, accessory respiratory organs, heart and circulation of blood.

UNIT-II: FOOD, FEEDING AND GROWTH

2-1 Natural fish food, feeding habits, feeding intensity, stimuli for feeding, utilization of food, gut content analysis, structural modifications in relation to feeding habits .

2-2 Principles of Age and growth determination; growth regulation, Growth rate measurement – scale method, otolith method, skeletal parts as age indicators

2-3 Genetic, biotic & ecological factors in determining the longevity of fishes, length frequency method, age composition, age-length keys, absolute and specific growth, back calculation of length and growth, annual survival rate, asymptomatic length, fitting of growth curve

UNIT-III: REPRODUCTIVE BIOLOGY

3-1 Breeding in fishes, breeding places, breeding habits & places, breeding in natural environment and in artificial ponds, courtship and reproductive cycles

3-2 Induced breeding in fishes

3-4 Breeding in shrimp,

UNIT – IV: DEVELOPMENT

4-1 Parental care in fishes, ovo-viviparity, oviparity, viviparity, nest building and brooding

4-2 Embryonic and larval development of fishes

4-3 Embryonic and larval development of shrimp.

UNIT-V: HORMONES & GROWTH

5-1 Endocrine system in fishes

5-2 Neurosecretary cells, androgenic gland, ovary, Y-organ, chromatophores, pericardial glands and cuticle.

5-3 Molting, molting stages, metamorphosis in crustacean shell fish

PRESCRIBED BOOK(S):

1. Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON

2. Saxena AB 1996. Life of Crustaceans. Anmol Publications Pvt.Ltd., NewDelhi

REFERENCES:

1. Tandon KK &Johal MS 1996. Age and Growth in Indian Fresh Water Fishes. Narendra Publishing House, New Delhi.

2. Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, NewYork

3. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology and Management.

4. Barrington FJW 1971. Invertebrates: Structure and Function.ELBS

5. Parker F &Haswell 1992. The text book of Zoology, VolI. Invertebrates (eds. Marshal AJ & Williams). ELBS & Mc Millan & Co.

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

I B.Voc.Aquaculture

SEMESTER – I
PAPER – I
BIOLOGY OF FIN FISH & SHELL FISH

Theory- Internal **Total Marks: 25**

1Internals (2) Best of Two : 10 marks
2. Assignments (5) : 5x1=5marks
3. Seminar : 5 marks
4. Attendance : 5marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA.
I B.Voc Aquaculture
SEMESTER – I
PAPER – I
BIOLOGY OF FIN FISH & SHELL FISH

Aquaculture :Theory- **External Total Marks: 75**

Section –A

Short Answer questions 1 to 8 (Any 5 from given 10) **5×5=25**

Section –B

Essay Questions 9 to 13 (With internal choice) **5×10=50**

Question Paper Blue Print

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.VOC. AQUACULTURE)

SEMESTER-I

PAPER – I

BIOLOGY OF FIN FISH & SHELL FISH

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 75Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	5	10	02	10	20
UNIT-II	02	5	10	02	10	20
UNIT-III	02	5	10	02	10	20
UNIT-IV	1	5	5	02	10	20
UNIT-V	1	5	5	02	10	20

Section-A: Questions numbers 1 to 8

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 9 to 13,

Internal Choice (either / or) and 5 Questions has to be answered.

1. **ShortQuestions : 5 x 5 = 25**
2. **EssayQuestions : 5 x 10 = 50**

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.Voc Aquaculture

SEMESTER – I
PAPER – I
BIOLOGY OF FIN FISH & SHELL FISH

Time:3hrs **Max.Marks:75**

Answer any FIVE of the following
Draw labeled diagrams wherever necessary **5x5=25**

1. Electric organs.
2. Swim bladder in fishes
3. Natural fish food
4. Length-weight relationship
5. Breeding places
6. Induced breeding
7. Nest building
8. Ovo-viviparity

II. Answer any FIVE of the following: **5x10=50**
Draw labeled diagrams wherever necessary

9. a. Describe general characters of fishes and classify up to class level.

(or)

b. Explain fin fish and shell fish commercial importance.

10.a. Explain different methods to estimate fish age and growth

(or)

b. Explain different factors in fish longevity

11.a. Write an essay on different breeding habitats.

(or)

b. Explain Breeding in shrimp

12.a. Describe embryonic and larval development in fishes.

(or)

b. Explain environmental factors effecting on fin fish in reproduction and development.

13.a. Role of Endocrine hormones in fishes.

(or)

b. Describe metamorphosis in crustaceans.

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

I B.Voc Aquaculture

SEMESTER – I

PAPER – I

BIOLOGY OF FIN FISH & SHELL FISH

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PRACTICALS: SYLLABUS

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 and shrimp

5. Mouth parts and appendages of cultivable prawns, shrimps .

6. Study of eggs of fishes, shrimps, prawns

7. Embryonic and larval development of fish

8. Study of gonadal maturity and fecundity in fishes and shellfish

9. Observation of crustacean larvae

10. Study of nest building and brooding of fishes

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.Voc. Aquaculture
SEMESTER – I

Practical's – External:

Time: 3 hrs. **Total Marks: 25**

1. Identification of given sample : 6 marks
2. Identification of given sample : 6 marks
3.Identification (2) : 5 marks (2x2 1/2)
4.Record : 5 marks
5.Viva voce : 3 marks

Practical's – Internal : Total Marks: 25

1.Assessment including viva voce : 6 marks
2.Record : 6 marks
3.Field note book : 5 marks
4.Project : 8 marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
SEMESTER – I

Time : 2hrs **Max.Marks:25**

PRACTICAL MODEL PAPER

I. the following specimens and write a short notes on their commercial importance 4x5=20M

a.
b.
c.
d.
e.
f.

II. Record 05 marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc Aquaculture SYLLABUS

SEMESTER – I

PAPER – II

BASIC PRINCIPLES OF AQUACULTURE

HOURS:60 **Max.Marks: 100**

Learning Objectives:

1. **To know the present status of aquaculture and their role in world economy and food production.**
2. **To understand the pond ecosystems and natural food production.**
3. **To improve the technical knowledge to preparation of fish pond and management of fish ponds.**
4. **To gain knowledge to estimation of different parameters in cultural ponds to better aquaculture practices.**
5. **To gain knowledge harmful algal blooms and their control.**
6. **To improve the technical skills in soil analysis for better aquaculture practice.**

Learning Outcomes:

1. **To study this course the student will be equipped with the aquatic ecosystem**
2. **Knowledge on the pond ecosystem will be learnt by the student.**
3. **Knowledge on the cultivable fishes learnt by the student.**

UNIT-I: INTRODUCTION

1.1Concept of Blue Revolution - History and definition of Aquaculture

1-1 Scope of Aquaculture at global Level, India and Andhra Pradesh

1-2 Fresh water aquaculture, brackish water aquaculture andmariculture

1-3 Aquaculture versus Agriculture; Present day needs with special reference to Andhra Pradesh

UNIT-II: POND ECOSYSTEM

2-1 General Concepts of Ecology, Carrying Capacity and Food Chains

2-2 Lotic and lentic systems, streams and springs

2-3 Nutrient Cycles in Culture Ponds – Phosphorus, Carbon andNitrogen

2-4 Importance of Plankton and Benthos in culture ponds andalgal blooms

UNIT-III: TYPES OF FISH PONDS

3-1 Classification of ponds based on water resources – spring, rain water, flood water, well water and water courseponds

3-2 Functional classification of ponds – head pond, hatchery, nursery, rearing, production, stocking and quarantineponds

3-3 Hatcherydesign

UNIT- IV: POND PREPARATION

4-1 Important factors in the construction of an ideal fish pond – site selection, topography,

4-2 nature of the soil, waterresources

4-3 Lay out and arrangements of ponds in a fishfarm

4-4 Construction of an ideal fish pond – space allocation, structure and components of barragepond.

UNIT-V: POND MANAGEMENT FACTORS

5-1 Need of fertilizer and manure application in culture ponds; Role of nutrients; NPK contents of different fertilizers and manures used in aquaculture; and precautions in their application

5-2 Physico-chemical conditions of soil and water optimum for culture – temperature, depth, turbidity, light, water and shore currents, PH, DOD, CO2 and nutrients; measures to increase oxygen and reduce ammonia & hydrogen sulphide in culture ponds; 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 ofpredators

Reference Books :

1. **Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation,New Delhi**
2. **Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd., London**
3. **Pillay TVR &M.A.Dill, 1979. Advances in Aquaculture. Fishing News BooksLtd., London**
4. **Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & SonsInc. 1981**
5. **Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsivier Scientific Publishing**

Bose AN et.al., 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing

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GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.Voc. Aquacultue

SEMESTER-I

PAPER – II
BASIC PRINCIPLES OF AQUACULTURE

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	5	10	02	10	20
UNIT-II	02	5	10	02	10	20
UNIT- III	02	5	10	02	10	20
UNIT-IV	01	5	5	02	10	20
UNIT- V	01	5	5	02	10	20

Section-A: Questions numbers 1 to 8

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 9 to 13

Internal Choice (either / or) and 5 Questions has to be answered.

1. ShortQuestions : 5 X 4 = 25
2. EssayQuestions : 5 X 10 = 50

Total : 75 Marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc., COURSE IN AQUACULTURE SYLLABUS

I B.Voc Aquaculture

SEMESTER –I

PAPER - II

BASIC PRINCIPLES OF AQUACULTURE

Time :3hrs **Max.Marks:75**

THEORY MODEL PAPER

Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x 5=25**

1. **Blue revolution.**
2. **Monoculture**
3. **Food chains**
4. **Brackish water culture**
5. **Lotic system**
6. **Phosphorus cycle**
7. **Nursery pond**
8. **Flood water**

Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x10=50**

9 .a. Explain Fresh water aquaculture

(or)

b. Explain Intensive and Semi-Intensive aquaculture.

10a. Explain Carbon cycle

(or)

b. Describe the importance of plankton and Benthos in culture ponds .

11. a. Explain different types of ponds in aquaculture.

(or)

b. Describe how to design Hatchery .

12. a. Which important factors are involved to construct an ideal fish pond.

(or)

b. **Explain the components of barrage pond.**

13. a. Explain chemical factors effect in aquaculture.

(or)

b. write about weed control in aquaculture.

1.Estimation of Carbonates, Bicarbonates in watersamples

2Estimation of Chlorides in watersamples

3Estimation of dissolvedoxygen

4Estimation of ammonia inwater

5Field visit to nursery, rearing and stocking ponds of aquafarms

6Field visit tohatchery

7Study of algal blooms and theircontrol

8Collection & identification of zooplankton andphytoplankton

9Study of aerationdevices

10Determination of soil nitrogen and phosphorus

11Collection and study of aquaticweeds

12Filed survey of nearby habitat for dietary dependency on and requirement of aqua products

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.Voc. Aquaculture
SEMESTER – I

Practical's – External:

Time: 3 hrs. **Total Marks: 25**

1. Identification of given sample : 6 marks
2. Identification of given sample : 6 marks
3.Identification (2) : 5 marks (2x2 1/2)
4.Record : 5 marks
5.Viva voce : 3 marks

Practical's – Internal : Total Marks: 25

1.Assessment including viva voce : 6 marks
2.Record : 6 marks
3.Field note book : 5 marks
4.Project : 8 marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
SEMESTER – I

Time : 2hrs **Max.Marks:25**

PRACTICAL MODEL PAPER

I. the following specimens and write a short notes on their commercial importance 4x5=20M

a.
b.
c.
d.
e.
f.

III. Record 05 marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc. AQUACULTURE SYLLABUS

SEMESTER – I

PAPER – III

FRESH WATER & BRACKISHWATER AQUACULTURE

HOURS:60(5X12) Max.Marks: 75

Learning Objectives:

1 **To know the present status of freshwater aquaculture and their role in world economy and food production.**
2 **To gain knowledge in carp and prawn culture and composite fish culture systems.**
3 **To improve the technical knowledge prawn hatchery technology and culture practices.**
4 **To gain knowledge mixed culture of fish and prawns.**
5 **To improve the knowledge and technical skills to identification of cultivable fin fish and shell fish.**

Learning Outcomes:

1 **At the end of the course the student can able to gain the knowledge on the fresh water practices**
2 **Student learn Culture systems**
3 **Student learn Brackish water culture practice.**

UNIT-1: INTRODUCTION TO FRESHWATER AQUACULTURE

1-1 Status, scope and prospects of fresh water aquaculture in the world, India and AP

1.2. Special systems of Aquaculture- brief study of culture in running water, re-circulatory systems, cages and pens, sewage-fed fishculture .

1.3Different Aquaculture systems – Pond, Cage, Pen, Running water, Extensive, Intensive & Semi-Intensive Systems and their significance. Monoculture, Polyculture and Monosex culturesystems

UNIT-II: CARP CULTURE

2-1 Major cultivable Indian carps – Labeo, Catla and Cirrhinus& Minor carps

2-2 Exotic fish species introduced to India – Tilapia, Pangassius and Clarius sp.

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

2-4 Impact of exotic fish, Compatibility of Indian and exotic carps and competition among them

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-

3-3 seed resources, feeding, management andproduction of air-breathing and cold water fishes-

UNIT-IV: CULTURE OF PRAWN

4-1 Fresh water prawns of India - commercialvalue

4-2 *Macrobrachiumrosenbergii*and *M. Malcomsonii*– biology, seed production, pond preparation, stocking, management of nursery and grow-out ponds, feeding, morphotypes andharvesting

UNIT-V: CULTURE OF BRACKISHWATER SPECIES

5-1 Culture of P.mondon – Hatchery technology and Culture practices including feedand diseasemanagement

5-2 Culture of L. vannamei – hatchery technology and culture practices including feedand diseasemanagement.

5-3 Mixed culture of fish andprawns

Reference Books:

1. **Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, New Delhi**
2. **Sena de silva, trevor a anderson 1995. Fish nutrition in aquaculture. Chapmann&Hall,**
3. **Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology andManagement.**
4. **Barrington FJW 1971. Invertebrates: Structure andFunction.ELBS**
5. **Parker F &Haswell 1992. The text book of Zoology, VolI.Invertebrate**

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GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc. AQUACUL SYLLABUS

SEMESTER – I

PAPER – III

FRESH WATER & BRACKISHWATER AQUACULTURE

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	5	10	02	10	20
UNIT-II	02	5	10	02	10	20
UNIT-III	02	5	10	02	10	20
UNIT-IV	01	5	5	02	10	20
UNIT-V	01	5	5	02	10	20

Section-A: Questions numbers 1 to 8,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 9 to 13,

Internal Choice (either / or) and 5 Questions has to be answered.

1. ShortQuestions : 5 x 5 = 25
2. EssayQuestions : 5 x 10 = 50

Total : 75

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc., AQUACULTURE SYLLABUS

SEMESTER – I

PAPER – III

FRESH WATER & BRACKISHWATER AQUACULTURE

Time:3hrs **Max.Marks:75**

THEORY MODEL PAPER

I. Answer any FIVE of the following

Draw labeled diagrams wherever necessary **5x5=25**

1. **.Fresh water aquaculture system**
2. **Aquaculture status in India**
3. **Exotic fishes**
4. **Minor carps**
5. **re-circulatory system**
6. **Sewage-fed fish culture**
7. **Seed production**
8. **grow-out ponds**

II. Answer any FIVE of the following: **5x10=50**

Draw labeled diagrams wherever necessary

9. **a. Describe status and prospects of fresh water aquaculture in A.P.**

(or)

b. Explain fresh water aquaculture system.

10. **a. Write an essay on major cultivable Indian carps**

(or)

b. Describe composite fish culture system of Indian and exotic carps.

11. **a. Explain recent culture trends in murrels**

(or)

b. Explain advantages in the culture of air-breathing and cold water fishes

.

12. **a. Write an essay commercial value of Indian fresh water prawn.**

(or)

b. Explain Macrobrachiumrosenbergii culture .

13 **a. Explain feed and disease management in P.monodon culture.**

(or)

b. Describe hatchery technology and culture practice in L. vannamei.

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

B.Voc., AQUACUL SYLLABUS

SEMESTER – I

PRACTICAL PAPER

Periods:24 **Max. Marks: 50**

FRESH WATER & BRACKISHWATER AQUACULTURE

PRACTICALS: SYLLABUS

2. **Identification of important cultivablecarps**
3. **Identification of important cultivable air-breathingfishes**
4. **Identification of important cultivable fresh waterprawns**
5. **Identification of different life history stages offish**
6. **Identification of different life history stages of fresh waterprawn**
7. **Collection and study of weedfish**
8. **Identification of commercially viable crabs – Scylla cerrata, Portunuspelagicus, P.sanguinolentus,**
9. **Neptunuspelagicus, N.Sanguinolentus**
10. **Identification of lobsters – Panuliruspolyphagus, P.ornatus, P.homarus,P.sewelli, *P.penicillatus***
11. **Identification of oysters of nutritional significance – Crossostreamadrasensis, C.gryphoides, C. cucullata, C.rivularis ,Picnodanta**
12. **Identification of mussels andclams**
13. **Identification of developmental stages ofoysters**
14. **Field visit to aqua farm and study of different components like dykesetc.**

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
I B.Voc. Aquaculture
SEMESTER – I

Practical's – External:

Time: 3 hrs. **Total Marks: 25**

1. Identification of given sample : 6 marks
2. Identification of given sample : 6 marks
3.Identification (2) : 5 marks (2x2 1/2)
4.Record : 5 marks
5.Viva voce : 3 marks

Practical's – Internal : Total Marks: 25

1.Assessment including viva voce : 6 marks
2.Record : 6 marks
3.Field note book : 5 marks
4.Project : 8 marks

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA
SEMESTER – I

Time : 2hrs **Max.Marks:25**

PRACTICAL MODEL PAPER

I. the following specimens and write a short notes on their commercial importance 4x5=20M

a.
b.
c.
d.
e.
f.

B.JAYASAI
Lecturer in Aquacuture
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