

SHIVAJI UNIVERSITY, KOLHAPUR.
Revised Syllabus for Bachelor of Science
B. Sc. III – Fisheries –To be implemented from June 2015

GENERAL OBJECTIVES OF THE COURSE

A) Aims:

- 1) To impart the knowledge of fishery science to the pupils.
- 2) To make the pupils to use the knowledge in their daily life.
- 3) To make the pupils aware of natural resources and environment.
- 4) Application of knowledge in Fisheries for nutrition, agriculture & live stock.
- 5) To provide practical experiences which form a part of their learning processes.
- 6) To develop aptitude for scientific work & ability to pursue studies far Beyond graduation.
- 7) To encourage the pupils to take life science as a carrier which is the need now a days.
- 8) To make the pupils responsible citizen of the society.

B) Objectives -

- 1) To impart knowledge is the basic aim of education. The students are expected to acquire the knowledge of animal science, fishes , natural phenomenon, manipulation of nature & environment by man.
- 2) Understanding the scientific terms, concepts, facts, phenomenon & their interrelationship especially of fish.
- 3) Applications of the knowledge.
- 4) To develop skills in practical work, experiments & laboratory materials,instruments.
- 5) To develop interests in the subject & scientific hobbies.
- 6) To develop scientific attitude which is the major objective. This makes the students open minded, critical observations, curiosity, thinking etc.
- 7) Abilities to apply scientific methods, collection of scientific data, problem solving,organize science exhibitions, clubs etc.
- 9) Appreciation of the subject, contributions of scientists, scientific methods,scientific programs etc.

5. DURATION

- The course shall be interdisciplinary course.
- The duration of course shall be three years.

6. PATTERN

Pattern of Examination will be semester for theory and annual for practical With INTERNAL ASSESSMENT (Project/Seminar/Field work for theory) Scheme

7 . MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English.

8. STRUCTURE OF COURSE

B.Sc. III – Fisheries

THEORY – No. of Papers: Eight Practical: Four

SEMESTER-V Theory

No	Subject	University exam	Internal exam.	Total
1	Fisheries paper V	40	10	50
2	Fisheries paper VI	40	10	50
3	Zoology paper XI	40	10	50
4	Zoology paper XII	40	10	50

Total=200 marks

SEMESTER-VI Theory

No	Subject	University exam	Internal exam.	Total
1	Fisheries paper VII	40	10	50
2	Fisheries paper VIII	40	10	50
3	Zoology paper XV	40	10	50
4	Zoology paper XVI	40	10	50

Total=200 marks

PRACTICALS-Annual

Practical—I 50

Practical – II 50

Practical – III 50

Practical – IV 50

Total 200

Theory +Practical Total 600 marks

9. SCHEME OF TEACHING AND EXAMINATION

Teaching scheme (Hrs/Week)

Sr.

No

Sem. - V

Sem. - VI

L P Total

1 Fisheries paper V Fisheries Paper VII 3

2 Fisheries paper VI Fisheries Paper VIII 3

3 Zoology paper XI Zoology Paper XV 3

4 Zoology paper XII Zoology Paper XVI 3

Total 12

Practical I- P 5
Practical II- P 5
Practical III- P 5
Practical IV- P 5
Total 20

Total 32

10. SCHEME OF EXAMINATION

Question paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each unit of syllabi.

OTHER FEATURES

1. Required Books, Journals stated in each syllabus of Part I, Part II and Part III Zoology and Fisheries.

A) LIBRARY :

Reference and Text Books, Journals, and Periodicals, Reference Books for Advanced Studies.

B) SPECIFIC EQUIPMENTS: Necessary to run the Course (T.V., L.C.D., and Overhead Projector), (Computer and necessary soft wares, operating systems etc.)

C) LABORATORY SAFETY EQUIPMENTS

- Fire Extinguishers at least two sets in each laboratory. (Lab. area 600 sq.ft.)
- Leakage of gases be avoided.
- Primary medical aid box (First Aid Kit)
- Sugar / Glucose – 500 gm pack: Pinch of sugar and a cup of drinking water in hypoglycemic condition. OR In extreme weakness of student or person concerned.
- Rules of animal ethics should be strictly followed.

LABORATORY INSTRUCTIONS

- 1) Always wear an apron inside the laboratory. Do not wear it outside.
- 2) Do not drink or eat inside the laboratory.
- 3) Do not place pencil, fingers or any material in the mouth. Moisten labels With water.
- 4) Use microscopes and other instruments carefully.
- 5) Clean all used glassware such as test tube, pipettes, Petri-plates, glass slides.
- 6) Put cotton plugs, papers, matches, waste dissection material etc. in a wastepaper basket. Do not throw them in sink, not leave them on desk or floor.
- 7) Regard all cultures as pathogenic. Take every precaution against infection.
- 8) Report all accidents to the instructor immediately.
- 9) Wash hands thoroughly with soap and water before and after dissection and experiment.
- 10) Always turn off water, gas and electricity before leaving the laboratory.
- 11) When students enter in lab. they should have – A Laboratory Journal, pencil and eraser, foot rule, dissection box with dissecting instruments, a small

napkin.

12) All drawings must be made with drawing pencil only.

13) As the journal is to represent student's bona fide work during the whole year, student should keep it as clean as possible and **DO NOT LOOSE IT.**

14) Students should not forget that unless their journals are certified, they are not allowed to appear for the University examination

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Revised Syllabus for

B. Sc. Part III Fisheries

[To be implemented from June 2015]

Semester V

Paper V

(Fishery Biology II and Aquaculture)

Sr.no	Unit no	Topic /sub-topic	No of lectures
1	I	A. General biology of Fin Fishes i) Determination of Age and growth ii) Methods of gut content analysis	7
2	II	Type study - Prawn (<i>Palaemon</i> sp.) i. Systematic position ii. Habits and habitat iii. External morphology iv. Functional anatomy of: a) Digestive system b) Respiratory system c) Circulatory system d) Excretory system e) Nervous system and sense organs- Eye and Statocyst. f) Reproductive system	10
3	III	Type study— Fresh water bivalve 1. Systematic position 2. Habits and Habitat. 3.External morphology. Functional anatomy of - a) Digestive system b) Respiratory system c) Excretory system d) Circulatory system e) Nervous system and sense organs	11

		f) Reproductive system and life cycle	
4	IV	A. Oyster culture edible and pearl i) Species –edible and pearl ii) Culture methods B. Prawn culture : stocking, pond maintenance and harvesting C. Sewage fed fisheries D. Culture of air breathing fishes E. Cold water fisheries F. Fish farm management G. Brood stock and hatchery management nursery management, rearing and stocking . H. Fish seed trade and transport	4 3 3 7
Total periods			45

Reference books

- 1. Theory and practice of induced breeding in fish, by Harvey B.J. and W.S.Hoor , 1979, IDRC-TS . Ottawa, Canada.**
- 2. Introduction to aquaculture - Mathew and Landew**
- 3. Aquaculture – Rath**
- 4. Fish and fisheries of India. by Jhingran V.G.**
- 5. Principles and practice of pond culture: A state of the art review. Lannan J.F.H.D. Smitherman and G. Tehobanglous(eds)1983, Oreggaon state University,U.S.A.**

	IV	<p>Tabulation</p> <p>Tabulation</p> <p>a. Definition</p> <p>b. Requirements of good statistical table</p> <p>c. Parts of table</p> <p>d. Types of tabulation</p> <p>e. Examples on tabulation</p> <p>Measures of central tendency: Mean, Mode and Median.</p> <p>Dispersion:</p> <p>i. Mean deviation</p> <p>ii. Standard deviation</p> <p>Correlation:</p> <p>i Scatter diagram</p> <p>ii Types of correlation</p> <p>iii Correlation coefficients:</p> <p>- Spearman's rank correlation coefficient</p> <p>- Karl Pearson's correlation coefficient</p> <p>Bioinformatics:</p> <p>i. Study of computer and computer devices</p> <p>ii. Three levels of Bioinformatics in structural Biology</p> <p>iii. Applications of Bioinformatics in life sciences</p> <p>iv. Internet and web site</p>	<p>3</p> <p>3</p> <p>4</p> <p>2</p> <p>2</p> <p>3</p> <p>1</p>
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Reference books

1. Ichthyology by Lagler, K.F.J.E.Bvardach and R.R. Miller
2. A History of fishes by Greenwood
3. Fishes : An introduction to Ichthyology by Moyle P.B. and J.J.Cech.
4. The Biology of fishes by Kyle H.M.T. .FH.Publi
5. The life of fishes by Marshall N.B.

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Semester VI

Paper VII

Marine Biology and Fisheries

Sr. No	Unit No	Topic/sub-topic	No of lectures
1	I	Marine habitat a. Physical parameters b. Chemical parameters c. Classification of habitat d) Physico-chemical parameters of estuary Oceanographic instruments: i. Grabs ii. Dredges iii. Secchi disc iv. Water samplers v. Reversing and non reversing thermometers vi. Plankton net	8 6
2	II	Brackish water fisheries: a) Definition of Brackish water b) Definition of estuary c) Types of estuary d) estuarine fauna- Permanent and migrated. Characteristics and fauna of : i. Rocky shore ii. Muddy shore iii. Sandy shore	6 9
3	III	Marine fisheries i) Fin fish fisheries a. Mackerel b. Pomfret c. Bombay duck d. Sardine e) hilsa f) seer fish g) tuna h) sciaenid-doma	10

		ii) Crustacean	3
		iii) Molluscan	3

Total 45 lectures.

Reference books

- 1. The marine and fresh water fishes of Ceylon by Munro**
- 2. Commercial sea fishes of India by Talwar P.K. and R.K. Kacher**
- 3. FAO species identification sheets for fishery purpose. Vol. I, II**
- 4. An introduction to the Pacific Fisheries. by Royce U.F.**
- 5. Giant prawn farming, New M.B. (ed). Elsevier Scientific Publishing Co. Amsterdam.**
- 6. Fresh water prawn farming : A manual of the culture of *M. rosenbergii*, New M.B. and S. Sngholka, 1982, FAO, Fish. Tech. Pap. 225 FAO, Rome.**
- 7. The biology and culture of Tilapias. Pull in R.S.V. and R.H. Lowe – Mcconel (Eds)**
- 8. Bivalve culture in Asia and Pacific, Davy, F.B. and M. Brahm (Eds), 1982, IDRC-200. IDRC Asia, Regional office, Singapore.**
- 9. Fish and fisheries of India by Thingrajan V.G., 1982, Hindustan Publishing Corporation, New Delhi.**

Semester VI
Paper VIII
Fish Pathology and Fishery Technology

Sr.No	Unit No	Topic –Sub-topic	Lectures
1	I	<p style="text-align: center;">Fish pathology</p> <p>i) Signs of sickness and effects on fish ii) Pathological procedure for diagnosis of fish diseases</p>	5
	II	<p>aetiology symptoms and control measures for the following:</p> <p>i. Viral diseases ii. Bacterial diseases iii. Fungal diseases iv. Protozoan diseases v. Epizootic ulcerative syndrome (EUS) vi. Worm diseases vii. Crustacean diseases</p>	13
2	III	<p>Fishing gear technology i. Materials used in fishing gears ii. Properties and numbering system of gear making fibres iii.. Net making by braiding and cutting , mounting of webbing, rigging of various gears, principles of mending. knots, hitches and bends. iv. Purse seine</p>	6
		<p>Fish spoilage: a) Criteria for freshness of fish b) Post mortem changes i. Rigor mortis ii. Bacterial spoilage iii. Chemical spoilage</p>	4
3	IV	<p>Fish preservation and processing techniques Principles and methods with reference to:</p> <p>a. Refrigeration and freezing b. Drying c. Salting d. Smoking e. Canning</p>	12

	Fish products and by-products: a. Fish body oil b. Fish liver oil c. Fish meal d. Isinglass e. Fish protein concentrate f. Fish glue g. Fish manure	5
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Total lectures 45

Reference books

- 1. Fisheries technology - Balchandran**
- 2. General topics in fishery by Ravi Reddy, Mohan Babare, Ramraopatil.**
- 3. Fisheries-Its methods and applications by Rounsfell G.A. and W.H.**
- 4. Everhart**
- 5. Manual of methods in fish biology by S.P. Biswas**
- 6. Inland fishes of India and adjacent countries (vol.I,II) by Talwar**
- 7. P.K.andA.G.Jhingran.**
- 8. Hand book of museum techniques by Aiyyappan A. and S.T.**
- 9. Satyamurthy.**
- 10. Fisheries Ecology by Pitcher T.J. and P.J.T. Hart.**
- 11. Fish stock assessment : A manual of basic methods.**
- 12. Manual of methods of fisheries biology, Pisciculture by Laevastu T.**
- 13. History of fishes by Norman**
- 14. Fish and fisheries by B.N. Yadav**
- 15. The Cambridge Natural History by HimeshShiploy**
- 16. Proceedings of the symposium on living resources of the seas around**
- 17. India-CMFRI-1073Spl. pub. Cochin**
- 18. Standard methods for the examination of water and waste water APHA**
- 19. 1981,American public health association, Washington D.C.**

B.Sc.III Fisheries
Practical I -Annual Pattern(based on papers V and VI)

Sr.No	Unit No	Topic / Sub-topic	No of practicals
1	I	Study of prawn (Demonstration) a. Digestive system b. Nervous system c. Mountings i) Mouth parts ii) Thoracic appendages iii) Abdominal appendages iv) Cornea v) Statocyst.	3
	II	Micro technique Microtechnique of following Pituitary gland / endocrine gland Testis Intestine/ oesophagus, stomach.	3
2	III	Study of Bivalve(Demonstration) Digestive system Nervous system Mountings gills Study of glochidium larva Identification of larval/life cycle stages of Prawn/shrimp	2
		Mytilus Fish	2
		Identification of following a. Weeds: Eichornia, Marcelia, Hydrilla, Pistia, Spirogyra. b. Weed fishes: Rasbora , Puntius ticto, and Tilapia c. Predatory fishes: Clarius, Anabas and Eel. d. Food and fertilizers: Lime, NPK fertilizers and fish meal.	4
3	IV	Examples based on Biostatistics: Any ten examples as per syllabus Bioinformatics	3

	<p>-Study of Computer and computer devices, peripherals- input & output devices.</p> <p>Examples of bioinformatics in relation to nucleotides and amino acid sequences.</p> <p>Estimation of sulphate , Phosphate and Nitrate from watersample.</p> <p>Visit to fish farm to study management. Submission of tour report at the time of practical examination.</p> <p>A suitable project related to subject should be carried out and report thereof be submitted at the time of practical examination .</p>	<p>1</p> <p>2</p>
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Practical II Annual pattern (based on papers VII and VIII)

Sr. No	Unit No	Topic / sub-topic	No. of practicals
1	I	1 Moisture content of fish. 2. Estimation of fish blood chloride. 3. Total RBCs and WBCs counts. 4. Estimation of hemoglobin of fish.	5
2	II	1. Determination of fecundity 2. Determination of moisture content of fish. 3. Ovo- diametry & study of stages of maturity. 4. Gonadosomatic index (GSI) and conditioning	5
3	III	1. Fish morphometry – Length-weight relationship 2. Study of ecological adaptations of the following: a. <i>Mytilus</i> b. <i>Echeneis</i> c. Exocoetus d. <i>Anguilla</i> e. Pleuronectes 3. demonstration of Oceanographic instruments by photographs. 4. Study of signs of sickness of fish.. 5. study of Economic importance of a. Bombay duck b. Mackerel c. Pomfret d. Sardine	5
4	IV	1. Study of pathological condition of fish and treatment Gross external clinical signes of fish diseases Ectoparasite Endoparasite a. Fin rot b. Argulus c. Nematode 2. Study of knots, hitches and bends.	4

		<p>3. Organoleptic tests for freshness of fish</p> <p>4. Visit to sea shore fish market/processing factories. A report of visit be submitted at the time of university practical examination.</p>	
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COMMON NATURE OF QUESTION FOR THEORY PAPER MENTIONED SPERATELY:

B.Sc. III FISHERIES

Practical Examination

Skeleton question Paper

Practical I

	Marks
Q1. Identify, sketch and describe	06
Q2 Ecological Experiment	07
Q3 Example on Biostatistics and Bioinformatics	07
Q4. Identification (Fivespots)	10
Q5.Submission of permanent slides	05
Q6 Project Report and Viva-voce	10
Q7. Journal	05
Total -	50

Practical II

	Marks
Q1. Fecundity / Ovo-diametry	06
Q2. Estimation of blood chloride / total blood cell count	10
Q3. Morphometry	05
Q4. Moisture content/signs of sickness	04
Q5. Identification (Fivespots)	10
Q6. Excursion report and viva voce	10
Q7. Journal	05
Total -	50

B.Sc. III FISHERIES EQUIVALANCE TO OLD SYLLABII

Semester pattern Equivalence to old syllabus Annual pattern

Fisheries old papers

Paper V - Fishery Biology II and Aquaculture Management.

Paper VI- Fish Physiology II , Biostatistics and Bioinformatics.

Zoology old

Paper VII Physiology, Endocrinology, Environmental Biology and Toxicology.

Zoology semester –

Paper XI- Physiology

Paper XII- Endocrinology, Environmental Biology and Toxicology.

New papers – paper V- fishery biology II and Aquaculture.

Paper VI –Fish physiologyII, Biostatistics and Bioinformatics.

Zoology old

Paper VII Physiology, Endocrinology, Environmental Biology and Toxicology.

Zoology semester –

Paper XI- Molecular Biology, Biotechnology and Biotechnology

Paper XII- Endocrinology, Environmental Biology and Toxicology.

Fisheries old

Paper VII - Marine ecology and fisheries

Paper VIII- Fish pathology and Fisheries Technology.

Zoology old

Paper VIII Molecular Biology, Biotechnology, Biotechnology and Applied

Zoology.

Zoology semester

New papers

Paper XV- Molecular Biology, Biotechnology and Biotechnology

Paper XVI- Applied Zoology.

New papers

Paper VII – Marine Biology and Fisheries

Paper VIII-Fish Pathology and Fishery Technology.

Zoology old

Paper VIII Molecular Biology, Biotechnology, Biotechnology and Applied

Zoology.

Zoology semester

New papers

Paper XV- Physiology

Paper XVI- Applied Zoology.