Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College

of Arts, Science & Commerce

(Empowered Autonomous College)

Affiliated to

UNIVERSITY OF MUMBAI

SYLLABUS FOR M.Sc-I.

SEMESTER : I & II

PROGRAM : M.SC. ZOOLOGY

PROGRAM CODE : RJSPGZOO

NATIONAL EDUCATION POLICY (NEP 2020)

LEVEL 6.0

(CBCS 2023-2024)

SEMESTER- I

OPEN ELECTIVE -II

OCEANOGRAPHY AND FISHERY SCIENCE

M.Sc - I NEP Zoology Open Elective Course Syllabus Semester I & II

SEMESTER-I (THEORY)		**L**	**Cr**
RJSPGZOOE102		**60 Hrs**	**2**
	UNIT I	**15**	
	Fundamentals of Oceanography		
1	1.1 Terminology of submarine topography: Continental shelf, continental slope, submarine canyons, submarine mountain ranges, Guyots and trenches with special reference to the Indian Ocean and adjacent seas. 1.2 A general knowledge of typical oceanographic research vessel and its equipments, oceanographic labs and stations of the world and India.		
	UNIT II	**15**	
	Chemical Oceanography		
2	2.1 Composition of sea water- constancy of its composition and factors affecting the composition, major and minor constituents, trace elements and their biological role. 2.2 Dissolved gases in the sea water and their role in the environment, CO_2 system, dissolved O_2 and oxygen profile, hydrogen sulphide. 2.3 Nutrients in the ocean, their cycles and factors influencing their distribution a) Nitrogen b) Phosphorus c) Silicon.		
	UNIT III	**15**	
	Planktology		
3	3.1. Classification of Plankton, Adaptation to planktonic life. Factors influencing the distribution and abundance, plankton bloom, patchiness, vertical distribution and red tide. 3.2. Diurnal migration of zooplankton, Inter-relationship between phyto and zooplankton.		
	UNIT IV	**15**	
	Basics of Aquaculture		
4	4.1. History, scope and importance of aquaculture, Aquaculture practices in India, Cultivable organisms for aquaculture and criterion for their selection. 4.2. Different systems of aquaculture such as Pond Culture, Cage Culture, Pen Culture, Running Water Aquaculture, Raft Culture, Aqua ranching. 4.3. Impact of aquaculture on the environment.		

M.Sc-I	**Semester I OPEN ELECTIVE : OCEANOGRAPHY AND FISHERY SCIENCE**
RJSPGZOOE 102 Oceanography and fishery science	**Course Objectives:** 1. To acquaint learners with fundamentals of oceanography and chemical oceanography. 2. To introduce the learners to various aspects of planktology and aquaculture. **Learning Outcomes:** 1. Learners will get an idea of ocean topography and chemical oceanography. 2. Learners will be able to comprehend the techniques of plankton analysis and aquaculture practices.

M.Sc - I NEP Zoology Open Elective Course Syllabus Semester I & II

SEMESTER -I PRACTICAL: OCEANOGRAPHY AND FISHERY SCIENCE.

CODE: RJSPGZOOEP102

1) Textural features: Sediment analysis- size fraction (sand, silt, clay)

2) Determination of physico-chemical parameters:
a) Salinity (Argentometric and conductivity method)
b) Dissolved oxygen,
c) Carbon dioxide.
d) Nitrates-nitrites.
e) Silicates.
f) Phosphate-phosphorus.

3) Estimation of primary productivity by light and dark bottle.

4) Quantitative estimation of plankton- settling method, Displacement method.

5)Identification of Zooplankton permanent slides (Noctiluca, Obelia medusa, Zoea, Zoea porcelina, Copepods, Mysids, Echinoderm larvae, Nauplius, Sagitta, Doliolum, Salpa, Fish eggs and larvae, Jelly fish, Physalia, Porpita).

6) Temporary mounting of Zooplankton from the given sample.

7) Identification of different aquaculture systems.

M.Sc-I	**Semester I OPEN ELECTIVE**
RJSPGZOOEP102 Oceanography and fishery science	**Course Objectives:** 1. To introduce the learner to analysis of marine water sample. 2. To enable the learners to identify and quantify the plankton sample. 3. To introduce the learners to different systems of aquaculture. **Learning Outcomes:** 1. Learners will be able to analyse and interpret the quality of marine water samples. 2. Learners will be able to comprehend the types and quantitative techniques of plankton analysis. 3. Learners will understand various aquaculture practice.

SEMESTER- II

OPEN ELECTIVE -II

OCEANOGRAPHY AND FISHERY SCIENCE

SEMESTER-II (THEORY)		L	Cr
RJSPGZOOE202		60 Hrs	2
	UNIT I	**15**	
	Marine Resources		
1	1.1 Resources from the sea: A) Mineral resources: i) Continental margin. ii) Deep sea mud oozes and manganese nodules. iii) Oil, gas and sulphur deposits and role of ONGC. B) Bioactive compounds from the sea. C) Scientific and economical aspect of seabed exploration and mining.		
	UNIT II	**15**	
	Oceanography & Pollution		
2	2.1 Impact of anthropogenic activities**:** A) a) Pollution- Domestic sewage, industrial/heavy metals, Agricultural-fertilizers and pesticides. b) Oil pollution. c) Ocean dumping. d) Radioactive and Thermal waste. B) Reclamation.		
	UNIT III	**15**	
	Basic Classification and morphometric studies of fishes		
	3.1. Diversity of fishes in India, General classification of fishes. 3.2. Morphology and anatomy: Body forms, fins, scales, colouration. 3.3. Measurement of fish: Measurement of length and weight, Morphometric measurements, Meristic counts, Biometric index. 3.4. Age and growth: Principles of age determination. Scale method. Otolith method. Other skeletal parts as age indicators. Length-frequency method.		
	UNIT IV	**15**	
	Advances in Aquaculture		
	4.1. Hatchery and grow out practices for cultivable species of freshwater fishes (Indian major carps and exotic carps) and prawns (*Macrobrachium rosenbergii*). 4.2. Integrated aquaculture and sewage fed fishery Hatchery and grow out practices for the culture of brackish water fishes (*Chanos chanos* and *Lates calcarifer*), Prawns (*Penaeus monodon* and *Penaeus indicus*). 4.3. Oyster Culture of edible sps. and recent trends in pearl culture. Seaweeds and its culture.		

M.Sc-I	Semester II OPEN ELECTIVE
RJSPGZOOE202 Oceanography and fishery science	**Course Objectives:** 1. To acquaint learners with exploration of marine resources and aspects of marine pollution. 2. To introduce the learners to fish classification and techniques in fisheries. 3. To make the learner understand culture practises of selected aquaculture species. **Learning Outcomes:** 1. Learners will get an idea of marine resources and hazards of marine pollution. 2. Learners will be able to comprehend the techniques of fisheries and fish classification. 3. Learner will be able to apply the techniques in aquaculture practices.

SEMESTER II

PRACTICALS (OPEN ELECTIVE: OCEANOGRAPHY AND FISHERY SCIENCE)

CODE: RJSPGZOOEP202

1. Identification of foraminiferans and radiolarians from sand.
2. Detection of heavy metals: a) Zinc b) Lead c) Copper.
3.Morphological study of cartilaginous fish and bony fish (fins, scales, body characters)

4. Biometric studies of fish/ prawn
   A. Study of relationship between total length and standard length/head length/body depth length/body weight.
   B. Calculate the biometric index values and derive correlation.

5. Mounting of otolith from ear ossicles of Sciaena.
6. Identification of fresh water sps for aquaculture:
   Rohu, Catla, Mrigal, Tilapia, and fresh water giant prawn *Macrobrachium rosenbergii*.
7. Study and identification of marine algae using herbarium specimen;

a) Ulva, b)Sargassum, c) Hypnea, d)Caulerpa e) Padina

M.Sc-I	**Semester II Practicals**
Oceanography and fishery science **RJSPGZOOEP 202**	**Course Objectives:** 1. To acquaint learners with techniques of heavy metal and sediment analysis. 2. To introduce the learners to biometric studies in fisheries. 3. To make the learner understand important aquaculture species. 4. To acquaint the learners with techniques of algal preservation. **Learning Outcomes:** 1. Learners will be able to analyse and interpret the data of water and sediment analysis. 2. Learners will be able to comprehend the techniques for biometric studies in fisheries. 3. Learner will be able to identify commercially important aquaculture species. 4. Learners will get a hand on training of algal preservation.

PRACTICAL PAPER PATTERN

SEMESTER I PRACTICAL EXAMINATION

ELECTIVE OCEANOGRAPHY AND FISHERY SCIENCE

CODE: RJSPGZOOEP102

Total- 50 marks

Q1.Estimation of Textural features: Sediment analysis- size fraction (sand, silt, clay) 8M

OR

Q1.Temporary mounting of Zooplankton from the given sample.

Q2.Determination of physico-chemical parameters 10M

a}Salinity (Argentometric and conductivity method)

OR

b) Dissolved oxygen, and Phosphate-phosphorus.

OR

c) Carbon dioxide.and Silicates.

OR

d) Nitrates-nitrites.

OR

Q2 Estimation of primary productivity by light and dark bottle.

Q3. Quantitative estimation of plankton- settling method, Displacement method. 07M

Q4. Identify and Describe 15M

- A to D any one plankton
- Any one aquaculture system

Q.5 Viva 5M

Q.6 Journal 5M

• Candidates are required to present certified journal on the day of practical examination.

M.Sc - I NEP Zoology Open Elective Course Syllabus Semester I & II

SEMESTER II PRACTICAL EXAMINATION

ELECTIVE OCEANOGRAPHY AND FISHERY SCIENCE

CODE: RJSPGZOOEP202

Q1. Identification of foraminiferans and radiolarians from sand. 6M

OR

Q1.Mounting of otolith from ear ossicles of Sciaena.

Q2. Detection of heavy metals: a) Zinc OR b) Lead OR c) Copper. 10M

Q3.Describe the Morphological characters of the given fish. (fins, scales, body characters) 05M

Q4. Biometric studies of fish/ prawn. 10M

A. Study of relationship between total length and standard length/head length/body depth length/body weight.
B. Calculate the biometric index values and derive correlation.

Q5.Identify and describe. 9M

A and B-Any two species from fresh water aquaculture.
C Marine Algae from herbarium specimen.

Q.6 Viva 5M

Q.7 Journal 5M

• Candidates are required to present certified journal on the day of practical examination.