

**Hindi Vidya Prachar Samiti's Ramniranjan Jhunjhunwala College of Arts, Science & Commerce
(Empowered Autonomous College)
M.Sc Part I NEP Zoology Syllabus Semester – I & II**



**Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College
of Arts, Science & Commerce
(Empowered Autonomous College)**

**Affiliated to
UNIVERSITY OF MUMBAI**

Syllabus for M.Sc Part I (under NEP)

PROGRAM: M.Sc. ZOOLOGY

PROGRAM CODE: RJSPZOO

**(REVISED in 2026-2027 in alignment with the NEP 2020 facilitating the inter-and
multidisciplinary learning and multiple entry and exit of the students)**

(CBCS 2026-2027)



10-9-26

SEMESTER-I

DSE-II:

MARINE SCIENCES - I

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SEMESTER-I (THEORY)		L	Cr
Course Code: RJSPGZOOE102		30 Hrs	2
UNIT I		15	
Geological and Physical 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 Physical properties of sea water: Salinity, Chlorinity, Temperature, Light, Density, Pressure, Salinity-Temperature- Density relationship (STD). 1.3 Oceanographic circulation: Ekman spiral, geotropic current, westward intensification with dynamic topography, Vertical circulation: wind induced circulation, Thermohaline circulation and upwelling of water. 1.4 Dynamics of circulation: Waves- Characteristics and types of waves, Tides-Tides generating forces, equilibrium theory of tides, dynamic theory of tides, Currents- Types of currents, major currents of the world, Coriolis effect and El Nino effect.		
UNIT II		15	
Chemical and Biological Oceanography			
2	2.1 Composition of sea water- major and minor constituents with trace elements, factors affecting them and their biological role. 2.2 Nutrients cycles: a) Nitrogen b) Phosphorus c) Silicon. 2.3 Marine biotic diversity: Marine bacteria, plankton, nekton, benthos, seaweed and sea grasses. Intertidal organisms and their zonation 2.4 Adaptations of Marine life with respect to -Light, Temperature, Salinity.		

M.Sc-I	Semester I DISCIPLINE SPECIFIC ELECTIVE II : Marine Sciences
RJSPGZOOE102 Marine Sciences	Course Objectives: 1. To acquaint learners with fundamentals of geological and physical oceanography. 2. To introduce the learners to various aspects of chemical and biological oceanography. Learning Outcomes: 1. Learners will get an understanding of ocean topography and oceanic circulation. 2. Learners will be able to comprehend the significance of chemical parameters in ocean and their effect on oceanic fauna.

SEMESTER -I PRACTICAL: MARINE SCIENCES

CODE: RJSPGZOOEP102

1. Determination of physico-chemical parameters:
 - a. Salinity (Argentometric and conductivity method)
 - b. Dissolved oxygen,
 - c. Carbon dioxide.
 - d. Nitrite/Nitrate- Nitrogen
 - e. Silicates.
 - f. Phosphate-phosphorus.
2. Identification
 - a. Phytoplankton: Diatoms, Cyanobacteria (*Prochlorococcus*), Dinoflagellates (*Ceratium*), Coccolithophores.
 - b. Zooplankton- Noctiluca, Obelia medusa, Crustacean larvae (Nauplius, Zoea, Zoea porcelina, Mysis, Phyllosoma, Alima), Copepods, Mysids, Echinoderm larvae (Bipinnaria, Ophiopluteus, Echinopluteus, Auricularia, Doliolaria), Nauplius, Sagitta, Doliolum, Salpa, Fish eggs and larvae, Jelly fish, Physalia, Porpita.
 - c. Seaweed- Nori (*Pyropia*), Kelp (*Saccharina*), Sea lettuce (*Ulva*) and sea grasses- *Halophila*, *Thalassia*
 - d. Benthic organisms- Polychaetes (*Nereis*), Amphipods, sea anemone, sea star, sea urchin.
3. Study of adaptations in intertidal organisms:
 - a. Rocky shore: Balanus, Mytilus, Chiton
 - b. Sandy shore: Solen, Dentalium, Sand bubbler crab
 - c. Muddy shore: Fiddler crab, Lingula, Arenicola

M.Sc-I	Semester I DISCIPLINE SPECIFIC ELECTIVE
RJSPGZOOEP102 Marine Sciences	Course Objectives: 1. To introduce the learner to analysis of marine water sample. 2. To enable the learners to identify different planktons. 3. To introduce the learners to intertidal ecology. Learning Outcomes: 1. Learners will be able to analyse and interpret the quality of marine water samples. 2. Learners will be able to analyse and identify different of planktons in the sample water. 3. Learners will understand the adaptations of intertidal organisms.

SEMESTER-II

DSE-II:

MARINE SCIENCES - II

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M.Sc Part I NEP Zoology Syllabus Semester – I & II

SEMESTER-II (THEORY)		L	Cr
Course Code: RJSPGZOOE202		30 Hrs	2
UNIT I		15	
Ocean resources			
1	1.1 Sea bed minerals with emphasis on Indian ocean: Polymetallic nodules, phosphorites, carbonates, placer deposits and petroleum resources, gas hydrates. 1.2 Fossilization process: Types of microfossils and classification 1.3 Role of microfossils in paleo: oceanography, paleoclimate, marine archaeology, petroleum exploration and monitoring marine pollution & mitigation. 1.4 Plankton: Classification of Plankton, adaptation to planktonic life, factors influencing the distribution and abundance, plankton bloom, patchiness, vertical distribution and red tide. Diurnal migration of zooplankton, Inter-relationship between phyto and zooplankton. 1.5 Methods of collection, preservation and analysis of plankton.		
UNIT II		15	
Pollution and biodeterioration			
2	2.1 Impact of anthropogenic activities: a) Pollution- Domestic sewage, industrial/heavy metals, Agricultural- fertilizers and pesticides. b) Oil pollution. c) Ocean dumping. d) Radioactive and Thermal waste. 2.2 Ecology of harmful algal blooms: causative species, bloom formation, decomposition and its impact on ecosystem function 2.3 Introduced species and marine bio-invasion: concept, alien species and effect on local ecosystem function. 2.4 Fouling and Boring organisms: larvae and their adherence to substratum, mechanism, implications and control		

M.Sc-I	Semester II DISCIPLINE SPECIFIC ELECTIVE: MARINE SCIENCES
RJSPGZOOE202 Marine Sciences	Course Objectives: 1. To acquaint learners with different ocean resource and their economic as well as ecological significance. 2. To introduce the learners to various aspects of oceanic pollution and bio-deterioration. Learning Outcomes: 1. Learners will get an overview of the different resources obtained from ocean and its commercial as well as ecological value. 2. Learners will be able to comprehend the impact of oceanic pollution and ways to combat the same. 3. Learners will be able to understand the concepts of biodeterioration and biofouling.

SEMESTER -II

PRACTICAL: MARINE SCIENCES

CODE: RJSPGZOOEP202

1. Identification of foraminiferans and radiolarians from sand.
2. Detection of heavy metals: a) Zinc b) Lead c) Copper.
3. Estimation of primary productivity by light and dark bottle.
4. Quantitative estimation of plankton- settling and displacement method.
5. Temporary mounting of plankton from given sample.
6. Identification of fouling and boring organisms- Lepas, Balanus, Caprella, Teredo, Crassostrea, Littorina, Limnoria.
7. Study of marine algae.

M.Sc-I	Semester II DISCIPLINE SPECIFIC ELECTIVE: MARINE SCIENCES
RJSPGZOOEP202 Marine Sciences	Course Objectives: 1. To introduce the learner to analysis of marine water sample. 2. To enable the learners to quantify the plankton sample. 3. To make the learner identify different fouling and boring organisms. Learning Outcomes: 1. Learners will be able to analyse and interpret the quality of marine water samples. 2. Learners will be able to comprehend quantitative techniques of plankton analysis. 3. Learners will understand various fouling and boring organisms and their impact.

REFERENCE BOOKS

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3. R.V. Tait, Marine zoology, Oxford press.
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8. Thurman, H. V., & Trujillo, A. P. (2004). Introductory oceanography. Upper Saddle River, N.J: Pearson Prentice Hall.
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19. P. Michal, Ecological methods for field and laboratory investigations.
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SEMESTER I and II
(DISCIPLINE SPECIFIC ELECTIVE: MARINE SCIENCES)
PATTERN FOR THEORY EXAMINATION

Internal: 25M (Assignment/ Seminar/Case Study/ Test)

External: 25M

QUESTION PAPER PATTERN FOR EXTERNAL THEORY EXAM

Maximum Marks: 25

Duration: 1 hr 15 mins

Instructions:

- i. All questions are compulsory.
- ii. All questions carry equal marks.
- iii. Draw neat and labelled diagrams wherever necessary.

Q1: Based on Unit 1:

12.5M

a or a (7.5 MARKS)

b or b (5 MARKS)

Q.2: Based on Unit 2:

12.5M

a or a (7.5 MARKS)

b or b (5 MARKS)

SKELETON PAPER FOR PRACTICAL EXAMINATION

SEMESTER I

Total marks: 50

Q.1. Determination of physico-chemical parameters

06 + 10M

a) Dissolved oxygen (6 marks) and Nitrite/Nitrate- Nitrogen (10 marks)

OR

b) Salinity (6 marks) and Phosphate- phosphorus (10 marks)

OR

c) Carbon dioxide (6 marks) and Silicates(10 marks)

Q2. Identify and Describe

15M

A- any one Seaweed/Seagrass

B- Any one phytoplankton

C & D- Any one zooplankton each

E- Any one benthic organism

Q.3. Identification of intertidal organisms and its adaptations.

09 M

A, B & C- one each from each type of shore (rocky, sandy & muddy)

Q.4. Viva

05M

Q.5. Journal

05M

SKELETON PAPER FOR PRACTICAL EXAMINATION

SEMESTER II

Total marks: 50

Q.1. Detection and estimation of heavy metals: Zinc / Lead / Copper	12M
OR	
Q.1. Estimation of primary productivity by light and dark bottle.	
Q.2. Quantitative estimation of plankton- Settling method or Displacement method.	10M
Q.3. Identification of foraminiferans from given sand sample.	06M
OR	
Q.3. Temporary mounting of plankton from given sample.	
Q.4. Identify and Describe:	12M
A and B- any one fouling or boring organism each.	
C and D- any one algae	
Q.5. Viva	05M
Q.6. Journal	05M
