પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો ઝુલોજી વિષયનો (બી.એસ.સી. વિથ ઓનર્સ) નો સેમેસ્ટર-૧ (શિક્ષણ વિભાગની SOP પ્રામાણેની પેપર સ્ટાઈલ સાથે), સેમેસ્ટર-૨ નો અભ્યાસક્રમ આ સાથે સામેલ છે.

માનનીય કુલપતિશ્રીની મંજુરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન,૨૦૨૩થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો ધ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.

23/12/2023

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/ એકેડેમિક/૨૧૪૪/૨૦૨૩-૨૦૨૪
ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,
સરકારી પોલીટેકનિક કેમ્પસ,
ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,
ખડીયા, જૂનાગઢ-૩૬૨૨૬૩
તા.૨૩/૧૨/૨૦૨૩

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જુનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઇ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)

Bhakta Kavi Narsinh Mehta University
Junagadh

BOARD OF LIFE SCIENCE
FACULTY OF SCIENCE
SYLLABUS FOR
BACHELOR OF SCIENCE (HONOURS) PROGRAMME
(SEMESTER-II)
EFFECTIVE FROM JUNE, 2023

FORWARD

In academics, syllabus serves as a roadmap for teaching various topics in a well-defined manner. Along with constant changes in the field of subject, it is always required to review and update the syllabus so as to meet changing scenario at regional, national and global levels. In science, higher education at degree level creates base for students to sharpen their skills and enable them for securing employment. Moreover, for a few this also opens a new realm of research and education at post-graduation level. Hence, finalizing degree level syllabus requires to keep all these facts in mind.

The NEP 2020 states, "Assessments of educational approaches in undergraduate education that integrate the humanities and arts with Science, Technology, Engineering and Mathematics (STEM) have consistently shown positive learning outcomes, including increased creativity and innovation, critical thinking and higher-order thinking capacities, problem-solving abilities, teamwork, communication skills, more in-depth learning and mastery of curricula across fields, increases in social and moral awareness, etc., besides general engagement and enjoyment of learning".

Here, the current syllabus is finalized after elaborate discussions amongst well qualified and experienced teachers. The syllabus is prepared according to the guidelines of UGC under NEP 2020. We delighted to share the curriculum and credit framework for B.Sc. Zoology Sem-1 and Sem-2. The present syllabus encompasses latest trends in the subject. We are hopeful that students will be able to enhance their knowledge and understating of the subject well.

INDEX

Syllabus of B.Sc. Zoology Sem-1 & 2 as per NEP 2020 guidelines

The syllabus of B.Sc. Zoology Sem-1 & 2 has been prepared as per the guidelines of NEP 2020 and Bhakta Kavi Narsinh Mehta University, Junagadh.

As explained in NEP 2020, "the undergraduate degree will be of either 3 or 4-year duration, with multiple exit options within this period, with appropriate certifications, e.g., a UG certificate after completing 1 year in a discipline or field including vocational and professional areas, or a UG diploma after 2 years of study, or a Bachelor's degree after a 3-year programme. The 4-year multidisciplinary Bachelor's programme, however, shall be the preferred option since it allows the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student".

Pattern of Examination for Semester-I and Semester-II

EVALUATION OF 100 MARKS (4 CREDIT PAPER)

Continuous and Comprehensive Evaluation (CCE)-Formative-50 Marks		**Semester End Evaluation (SEE)-Summative-50 Marks**
Theory (25 Marks)	**Practical (25 Marks)**	
1. Test 15 Marks **2. Assignment 05 Marks** **3. Attendance 05 Marks**	**1. Performance 15 Marks** **2. Viva 10 Marks**	**1.Writing and Memory skill test**
Total 25 Marks	**Total 25 Marks**	**Total 50 Marks**

Marks of practical and viva will be considered under CCE.

Credit Summary

S.N.	Type of Course	3 years	4 Years Honours	4 Years Honours with Research
1	Major: Discipline Specific Core Course	64	88	88
2	Minor: Discipline Specific minor Course	24	32	32
3	Multidisciplinary course/ Interdisciplinary	12	12	12
4	Ability Enhancement Course (AEC)	10	10	10
5	Skill Enhancement Course (SEC)/Internship	14	14	14
6	Value Added Course (VAC)	08	08	08
7	On job training/internship	--	12	--
8	Research Project/dissertation	--	--	12
	Total	**132**	**176**	**176**

Zoology Program Outcomes Objectives:

- The programme in Zoology aims to equip students with recent advances in Zoology from organismic to reductionist biology.
- It also aims to empower students to understand the challenges of society and the country that falls into the realms of Zoology, such as Aquaculture, environment and health, animal behaviour, wildlife conservation, etc.
- It also offers students to a series of multidisciplinary and skill-based courses so that they can choose to specialize in the specific area of their interests in Zoology.
- The open elective has been chosen to attract students from diverse interdisciplinary areas of sciences, such as fisheries, Environmental studies, Economic zoology, etc.
- This course is designed to ignite the inquisitive mind to enter into research in interdisciplinary areas.
- It is expected that a student after successfully completing the programme would sufficiently be skilled and empowered to solve the problems in the realms of Zoology and its allied areas.
- They would have plethora of job opportunities in the education, environment, agriculture based, and wildlife related sectors.
- The bright and ignited mind may enter research in the contemporary areas of Zoological/Biological Sciences.

Program Specific Outcomes:

- Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, biochemistry, ecology, evolutionary biology, developmental biology and applied and economic zoology.
- Analyse the relationships among animals, plants, and microbes.
- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, tools and techniques of Zoology, Toxicology, Entomology, Nematology, Sericulture, Biochemistry, Fish biology, Animal biotechnology.
- Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm, wildlife conservation.
- Gains knowledge about effective communication and skills of problem-solving methods.
- Contributes the knowledge for Nation building.

SUBJECT: ZOOLOGY (MAJOR, MINOR, MDC/IDC & SEC)

FACULTY: SCIENCE

Semester-II							
No.	**Core/Elective/ Ict.**	**Name of Course**	**Credits**	**CCE**	**SEE**	**Total**	**Course/ paper Code**
1	MAJOR	Chordates-I, Evolution and Developmental Biology	03	25	50	75	DSC-101
	MAJOR (Practical)	Chordates-I, Evolution and Developmental Biology	01	25	00	25	DSC-101P
2	MAJOR	Fundamentals of Zoology-II	03	25	50	75	DSC-102
	MAJOR (Practical)	Fundamentals of Zoology-II	01	25	00	25	DSC-102P
3	MINOR	Chordates-I, Evolution and Developmental Biology	03	25	50	75	DSM-101
	MINOR (Practical)	Chordates-I, Evolution and Developmental Biology	01	25	00	25	DSM-101P
4	Multidisciplinary Course	Fundamentals of Zoology-II	03	25	50	75	MDC-101
	Multidisciplinary Course (Practical)	Fundamentals of Zoology-II	01	25	00	25	MDC-101P
5	Skill Enhancement Course (Practical)	Aquarium Management	02	25	25	50	SEC-101
Total			18			450	

CCE - Continuous and Comprehensive Evaluation

SEE - Semester End Evaluation (SEE)

Zoology Sem-I Discipline Specific Core Courses (Major-1)

Course Level	UG		**Teaching Hours**	45 + 30 = 75
Programme	Zoology		**CCE (Theory)**	25
Semester	I		**CCE (Practical)**	25
Course Type	Discipline Specific Core Courses (Major-1)		**SEE**	50
Course title	NON-CHORDATES-I and WILDLIFE		**Total**	100
Credit	03 + 01 (Practical) = 04		**Exam Duration**	2:00 Hrs.
Course Code	DSC-101 DSC-101P (Practical)		**Practical Exam Duration**	2:00 Hrs.

COURSE OBJECTIVES:

- The course would provide an insight to the learner about the existence of different lifeforms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities.
- The course will also make the students aware about wild and domestic animals; difference between national parks and sanctuaries; population and conservation status of wildlife according to IUCN; and will create interest among them to explore the animal diversity in nature.

COURSE OUTCOMES:

- Upon completion of the course, students should be able to:
- Learn about the importance of systematics, taxonomy and structural organization of animals. Appreciate the diversity of protozoans living in varied habit and habitats. Critically analyze the organization, culture, life cycle and pathogenicity of Amoeba and Entamoeba making them familiarize with diseases spread by them.
- Learn about the importance of systematics, taxonomy and structural organization of sponges, canal system and spicules in sponges.
- Learn about the importance of systematics, taxonomy and structural organization of cnidarian animals, Polymorphism in cnidaria and study of Obelia (Sea-Fur) as type animal.
- Able to differentiate between wild life and domesticated animals with understanding of importance of Natural vegetation and wildlife. Familiarize with the conservation methods and appraise the efforts made by the government for their conservation. Learn more about status of some representatives of wildlife, their habitats, threats, etc. along-with different conservation projects, sanctuaries and national parks.

THEORY **3 CREDITS (3 Hours/Week)** **DSC-101/Major-1**

NON-CHORDATES-I and WILDLIFE

COURSE CONTENT		
Units	**Title of the Unit and the Topics**	**No. of Lectures**
Unit 1	**Protozoa** 1.1 General characteristic and classification up to class 1.2 Study of Amoeba proteus: systematic position, habit and habitat, culture, structure, locomotion, nutrition, respiration, excretion, osmoregulation, behaviour, reproduction and biological significance	**12**
Unit 2	**Porifera** 2.1 General characteristics and classification up to class 2.2 Canal system in sponges 2.3 Spicules in sponge.	**10**
Unit 3	**Cnidaria** 3.1 General characteristics and classification up to class 3.2 Polymorphism in cnidaria 3.3 Study of Obelia (Sea-Fur): Systematic position, habit and habitat, hydroid colony (morphology and histology, asexual reproduction), medusa stage (Development of medusa, morphology and histology, sexual reproduction), alternation of generation and metagenesis	**12**
Unit 4	**Wildlife** 4.1 Introduction & Importance of Wildlife 4.2 Difference between National Parks & Sanctuaries 4.3 Wildlife in Gujarat: NATIONAL PARKS: (i) Gir Forest National Park (ii) Marine National Park in Gulf of Kutch SANCTUARIES: (i) Kutch desert wildlife sanctuary, (ii) Barda wildlife sanctuary (iii) Nalsarovar bird sanctuary (iv) Khijadia bird sanctuary	**11**

PRACTICAL **1 CREDITS (2 Hours/Week)** **DSC-101P/Major-1**

NON-CHORDATES-I and WILDLIFE

Based on ZOOLOGY DSC-101

Practical 1	Identification and classification of Invertebrate animals-1: Phylum: Protozoa: - Arcella, Ceratium, Vorticella, Plasmodium
Practical 2	Identification and classification of Invertebrate animals-2: Phylum: Porifera: - Leucosolenia, Grantia, Euplectella, Hyalonema, Euspongia, Chalina
Practical 3	Identification and classification of Invertebrate animals-3: Phylum: Cnidaria:- Hydra, Porpita, Physalia, Aurelia, Rhizoastoma, Metridium, Pennatula, Gorgonia
Practical 4	Study of *Amoeba proteus*: structure, locomotion, nutrition, reproduction
Practical 5	Examination of pond water collected from different places for diversity in protozoa
Practical 6	Study of spicules in porifera
Practical 7	To study polymorphism in cnidaria
Practical 8	To study coral/ coral reefs.
Practical 9	National Park & Sanctuary (as per theory syllabus) spotting in map of Gujarat.
Practical 10	Study of following wild animals-1. Asiatic Lion, Leopard, Hyena, Chinkara, Spotted deer, Wild Ass by photograph, Chart, stuffed animals or multimedia
Practical 11	Study of following wild animals-2. Caracal, Dugong, Dolphin, Greater flamingo, Painted stork, Uromastyx by photograph, Chart, stuffed animals or multimedia
Practical 12	To study IUCN Red data list categories with example [Extinct-Pink Headed Duck, Critically Endangered-Great Indian Bustard, Endangered-Tiger, Vulnerable-Snow Leopard, Least concerned-Indian Peafowl]
Practical 13	To submit any chart/model according to syllabus.

REFERENCE BOOKS:

1. Invertebrate Zoology…….…..…E. L. Jordan & Dr. P. S. Verma
2. Invertebrate Zoology…….……..…….…..P. S. Dhami & J. K. Dhami
3. A modern textbook of Zoology Invertebrate Zoology……...…….R. L. Kotpal
4. A textbook of Practical Zoology Invertebrates……..…….S. S. Lal
5. A Manual of Practical Zoology, Invertebrates…….……..P. S. Verma
6. Wild Life of Gujarat……..…….……H. S. Singh
7. Indian National Parks and Sanctuaries…….…..…Khati & Annand S

Zoology Sem-II

Discipline Specific Core Courses (Major-3)

Course Level	UG		**Teaching Hours**	45 + 30 = 75
Programme	Zoology		**CCE (Theory)**	25
Semester	II		**CCE (Practical)**	25
Course Type	Discipline Specific Core Courses (Major-3)		**SEE**	50
Course title	CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY		**Total**	100
Credit	03 + 01 (Practical) = 04		**Exam Duration**	2:00 Hrs.
Course Code	DSC-201 DSC-201P (Practical)		**Practical Exam Duration**	2:00 Hrs.

Course Objectives:

- The course is designed with an aim to provide scope and historical background of chordates. It will impart knowledge regarding basic concepts of origin of chordates and make the students understand the characteristics and classification of animals with notochord. The exclusive phenomena in fishes like migration will be explained.
- The course will create a deep understanding of how evolution works, and general knowledge about the most important theories of evolutionary biology. The subject introduces students to studies of human evolution and evidenced of biological evolution.
- Developmental biology aims to understand the scientific principles that govern reproduction in humans and other mammals.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- Understand different classes of lower chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum. Study about diversity in animals making students understand about their distinguishing features.
- Understand different classes of higher chordates and studies few important animals like Archaeopteryx as a connecting link between Reptiles and Aves and Platypus as connecting link between Aves & Mammals.
- Students will understand basis of evolutionary processes including the role of natural selection for the origins and evolution of modern humans, studies of fossils and evolution of horse as evidence of evolutionary process.
- Students will understand the structure of reproductive cells and theory of metamorphosis in amphibians as developmental biology.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

THEORY **3 CREDITS (3 Hours/Week)** **DSC-201/Major-3**

CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

COURSE CONTENT		
Units	**Title of the Unit and the Topics**	**No. of Lectures**
Unit 1	**Protochordata to Pisces** 1.1 General characteristic and classification up to class 1.2 Introduction of fish morphology 1.3 Difference between Chondrichthyes and Osteichthyes 1.4 Scales in fishes 1.5 General account of Migration in Fishes (Anadromous and Catadromous)	**12**
Unit 2	**Tetrapoda** 2.1 General characteristic and Classification up to class 2.2 Archaeopteryx as a connecting link between Reptiles & Aves 2.3 General account of Ratite 2.4 Platypus as connecting link between Aves & Mammals	**12**
Unit 3	**Evolutionary Biology** 3.1 Introduction to Evolutionary Theories: Lamarckism, Darwinism, Neo-Darwinism 3.2 Origin and Evolution of Man 3.3 Evidences of Evolution: Types of fossils and evolution of horse	**11**
Unit 4	**Developmental Biology** 4.1 Types of Eggs according to yolk 4.2 Types of Cleavage 4.3 Gametogenesis: Spermatogenesis and Oogenesis 4.4 Metamorphosis: Changes, hormonal regulations in amphibians	**10**

PRACTICAL **1 CREDITS (2 Hours/Week)** **DSC-201P/Major-3**

CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Based on ZOOLOGY DSC-201

Practical 1	Identification and classification of chordate animals-I A. Sub-Phylum: Urochordata: Herdmania, Doliolum, Oikoplura B. Sub-Phylum: Cephalochordata: Amphioxus C. Class: Cyclostomata : Petromyzon, Myxine, Bdellostoma
Practical 2	Identification and classification of chordate animals-II Super Class: Pisces: Scoliodon, Pristis, Electric Ray, Rhinobatus, Acipensor, Eel, Hippocampus, Protopterus
Practical 3	Identification and classification of Chordate animals-III (i) Class: Amphibia: Ichthyophis, Bufo, Salamander (ii) Class: Reptiles: Turtle, Draco, Chameleon, Mabouia (Skink), Varanus, Snake, Crocodile. (iii) Class: Aves: Weaver Bird, Parrot, Owl, Wood pecker. (iv) Class: Mammal: Duck-bill, Kangaroo, Hedgehog, Bat, Dolphin
Practical 4	To study scales in fishes
Practical 5	To study Migration in Fishes (Anadromous and Catadromous)
Practical 6	Study of Archaeopteryx & Platypus as a connecting link through charts or Multimedia.
Practical 7	To study Evolution of Man
Practical 8	To study evolution through charts/models/pictures: (i) Study of fossil from plaster cast models and pictures (ii) Evolution of horse with diagrams/ cut outs of limbs and teeth of horse ancestors
Practical 9	To study types of eggs according to Yolk
Practical 10	To study types of Cleavage
Practical 11	Study of Gametogenesis: Spermatogenesis and Oogenesis through chart/models
Practical 12	Study of Metamorphosis in amphibians through chart/models
Practical 13	To submit any chart/model according to syllabus.

Reference Book for Zoology Discipline Specific Core Courses (Major-3)

1. Modern textbook of Zoology Vertebrates……..…….……R. L. Kotpal
2. Chordate Zoology……..…….E. L. Jordan & Dr. P. S. Verma
3. Practical Zoology Vertebrate……..…….S. S. Lal
4. A Text Book of Chordates…… N. Arumugam, A. Thangamani, S. P. Kumar, LM. Narayana
5. Chordate zoology……...…… P.S. Dhami & J.K. Dhami
6. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology……PS Varma & VK Agrawal
7. Physiology of anatomy and physiology……Tortora & Tortora
8. The Origin of Species……..Charles Darwin
9. The Descent of Man……..Charles Darwin
10. Evolutionary Biology: Applied Concepts and Mechanisms……Maia Gustin
11. Developmental Biology, 6th edition……..Scott F Gilbert
12. Developmental Biology……..M Subramanian

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

Theory Examination Paper Style NEP 2020

SEMESTER – II

ZOOLOGY DSC-201/Major-3: CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Time: 2 Hours **Total Marks: 50**

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-5: (From UNIT-1 and UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-5: (From UNIT-3 and UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

PRACTICAL EXAMINATION

SEMESTER – II ZOOLOGY

DSC-201P/Major-3: CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Time: **3** Hours Total Marks: **25**

Que. No.	Particulars	Marks
Que-1	Describe evolution of _____ . (Practical-7 / 8ii)	**02**
Que-2	Do as per instruction and show it to examiner (Practical-11/12)	**02**
Que-3	Do as per instruction and show it to examiner (Practical-6)	**02**
Que-4	Write as per instruction. (A) Identify and classify giving reasons (Practical-1/2) (B) Identify and classify giving reasons (Practical-3) (C) Identify and describe (Practical-4/5/8i) (D) Identify and describe (Practical-9/10)	**08**
Que-5	Certified Journal.	**01**
Que-6	Viva-voice.	**10**

Zoology Sem-II Discipline Specific Core Courses (Major-4)

Course Level	UG		**Teaching Hours**	45 + 30 = 75
Programme	Zoology		**CCE (Theory)**	25
Semester	II		**CCE (Practical)**	25
Course Type	Discipline Specific Core Courses (Major-4)		**SEE**	50
Course title	FUNDAMENTALS OF ZOOLOGY-II		**Total**	100
Credit	03 + 01 (Practical) = 04		**Exam Duration**	2:00 Hrs.
Course Code	DSC-202 DSC-202P (Practical)		**Practical Exam Duration**	2:00 Hrs.

Course Objectives:

- The students will be introduced to the principles of normal biological function in human body. Basic human physiology will be outlined and correlated with histological structures. Students will be exposed to the concept of muscle works. They also learn the physiology of urine formation.
- The course will create a comprehensive understanding of the behaviour of animals and Origin and history of Ethology. It also includes study of few important types of animal behaviour.
- The study of ecology will develop an understanding of the differences in the structure and function of different types of ecosystems. It creates understating of ways that organisms interact with both the physical and the biological environment.

Course Learning Outcomes:

Upon completion of the course, students should be able to:

- Understand the basic histological structure of muscles and important endocrine gland of human body.
- Know the principles of normal biological function in human body. Outline basic human physiology and correlate with histological structures. Understand how animal moves through muscles and how human kidney filter blood and formulate urine.
- Students acquire knowledge of key concepts and principles of animal behaviour and learn to apply ethical standards in conducting and evaluating psychological and behavioural research to build and enhance interpersonal skills in animal conservation.
- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors. Understand ecosystem, types, their food chains and food webs. Apply the basic principles of ecology in wildlife conservation and management.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

THEORY **3 CREDITS (3 Hours/Week)** **DSC-202/Major-4**

FUNDAMENTALS OF ZOOLOGY-II

COURSE CONTENTS		
Units	**Title of the Unit and the Topics**	**No. of Lectures**
Unit 1	**Histology** 1.1 Histological structure and function of muscle (i) Skeletal (ii) Visceral and (iii) Cardiac 1.2 Histological structure and function of following organs of Mammals : (i) Pituitary gland (ii) Thyroid gland (iii) Adrenal gland (iv) Kidney	**12**
Unit 2	**Physiology** 2.1 Muscle Physiology: Mechanism of muscle contraction (Sliding filament theory) 2.2 Renal Physiology: (i) Nitrogenous Waste (ii) Structure of Nephron (iii) Formation of Urine (iv) Control of Renal Function	**12**
Unit 3	**Animal Behaviour** 3.1 Origin and history of Ethology; Contribution of Karl Von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen in ethology. 3.2 Social Behaviour: (i) Honey bee (ii) Termite 3.3 Courtship & Reproductive Behaviour: (i) Spider (ii) Scorpion (iii) Peacock 3.4 Parental Care Behaviour: (i) Arius (ii) Ichthyophis (ii) Alytes	**11**
Unit 4	**Ecology** 4.1 Introduction and history of Ecology, Structure and function of Ecosystem 4.2 Marine Ecosystem 4.3 Fresh water – Pond Ecosystem 4.4 Terrestrial Ecosystem- Grassland 4.5 Food chain and food web	**10**

PRACTICAL **1 CREDITS (2 Hours/Week)** **DSC-202P/Major-4**

FUNDAMENTALS OF ZOOLOGY-II

Based on ZOOLOGY DSC-202

Practical 1	To study Histological structure and function of muscle through slide/chart/model. (i) Skeletal (ii) Visceral and (iii) Cardiac
Practical 2	To study Histological structure and function of mammalian organs through slide/chart/model. (i) Pituitary gland (ii) Thyroid gland (iii) Adrenal gland (iv) Kidney
Practical 3	To study Mechanism of muscle contraction through chart/model.
Practical 4	To study the chemical constituents of Normal and abnormal urine.
Practical 5	To study Pavlov experiment of Classical Conditioning.
Practical 6	To study Lorenz experiment of imprinting behaviour.
Practical 7	To Study Social Behaviour: (i) Honey bee (ii) Termite
Practical 8	To Study Courtship Behaviour (i) Spider (ii) Scorpion (iii) Peacock
Practical 9	To Study Parental Care Behaviour: (i) Arius (ii) Ichthyophis (ii) Alytes
Practical 10	To study different types of food web and food chain as per theory syllabus
Practical 11	To study biotic and abiotic components of aquatic ecosystem: Marine and Fresh water ecosystem
Practical 12	To study biotic and abiotic components of grassland ecosystem
Practical 13	To submit any chart/model according to syllabus.

Reference Book for Zoology Discipline Specific Core Courses (Major-4)

1. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology……PS Varma & VK Agrawal
2. Physiology of anatomy and physiology……Tortora & Tortora
3. Animal physiology……..……..Eckert
4. Essential of animal physiology……...……S. C. Rastogi
5. Element of animal physiology…….……R. Nagabhushanam
6. Human physiology…….……C. C. Chatterjee
7. Principal of animal physiology……...……Wood D. W.
8. Physiology of anatomy and physiology…….……Tortora & Tortora
9. Text book of Baley's Histology…….Copenharver bunga & burge
10. A text-book of the principles of animal histology…….. Ulrie Dahlgren
11. Animal Behaviour……..…….Agarwal V.K.
12. An Introduction to Animal Behaviour……..Aubrey Manning, Marian Stamp Dawkins
13. CONCEPTS OF ANIMAL BEHAVIOUR…….Reena Mathur
14. Fundamentals of Ecology…… Eugene Odum
15. Environment & Ecology …….R Rajagopalan

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

Theory Examination Paper Style NEP 2020

SEMESTER – II

ZOOLOGY DSC-202/Major-4: FUNDAMENTALS OF ZOOLOGY-II

Time: 2 Hours **Total Marks: 50**

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-5: (From UNIT-1 and UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-5: (From UNIT-3 and UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

PRACTICAL EXAMINATION

SEMESTER – II

ZOOLOGY DSC-202P/Major-4: FUNDAMENTALS OF ZOOLOGY-II

Time: **3** Hours Total Marks: **25**

Que. No.	Particulars	Marks
Que-1	Describe experiment of _____ behaviour (Practical-5/6)	**02**
Que-2	Detect the chemical constituents of _____ urine (Practical-4)	**02**
Que-3	Describe biotic and abiotic factors of _____ (Practical-11/12)	**02**
Que-4	Write as per instruction. (A) Identify and describe (Practical-1) (B) Identify and describe (Practical-2) (C) Identify and describe (Practical-7/8) (D) Identify and describe (Practical-9)	**08**
Que-5	Certified Journal.	**01**
Que-6	Viva-voice.	**10**

Zoology Sem-II Discipline Specific Minor Courses (Minor-2)

Course Level	UG		**Teaching Hours**	45 + 30 = 75
Programme	Zoology		**CCE (Theory)**	25
Semester	II		**CCE (Practical)**	25
Course Type	Discipline Specific Core Courses (Minor-2)		**SEE**	50
Course title	CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY		**Total**	100
Credit	03 + 01 (Practical) = 04		**Exam Duration**	2:00 Hrs.
Course Code	DSM-201 DSM-201P (Practical)		**Practical Exam Duration**	2:00 Hrs.

Course Objectives:

- The course is designed with an aim to provide scope and historical background of chordates. It will impart knowledge regarding basic concepts of origin of chordates and make the students understand the characteristics and classification of animals with notochord. The exclusive phenomena in fishes like migration will be explained.
- The course will create a deep understanding of how evolution works, and general knowledge about the most important theories of evolutionary biology. The subject introduces students to studies of human evolution and evidenced of biological evolution.
- Developmental biology aims to understand the scientific principles that govern reproduction in humans and other mammals.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- Understand different classes of lower chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum. Study about diversity in animals making students understand about their distinguishing features.
- Understand different classes of higher chordates and studies few important animals like Archaeopteryx as a connecting link between Reptiles and Aves and Platypus as connecting link between Aves & Mammals.
- Students will understand basis of evolutionary processes including the role of natural selection for the origins and evolution of modern humans, studies of fossils and evolution of horse as evidence of evolutionary process.
- Students will understand the structure of reproductive cells and theory of metamorphosis in amphibians as developmental biology.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

THEORY **3 CREDITS (3 Hours/Week)** **DSM-201/Minor-2**

CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

COURSE CONTENT		
Units	**Title of the Unit and the Topics**	**No. of Lectures**
Unit 1	**Protochordata to Pisces** 1.1 General characteristic and classification up to class 1.2 Introduction of fish morphology 1.3 Difference between Chondrichthyes and Osteichthyes 1.4 Scales in fishes 1.5 General account of Migration in Fishes (Anadromous and Catadromous)	**12**
Unit 2	**Tetrapoda** 2.1 General characteristic and Classification up to class 2.2 Archaeopteryx as a connecting link between Reptiles & Aves 2.3 General account of Ratite 2.4 Platypus as connecting link between Aves & Mammals	**12**
Unit 3	**Evolutionary Biology** 3.1 Introduction to Evolutionary Theories: Lamarckism, Darwinism, Neo-Darwinism 3.2 Origin and Evolution of Man 3.3 Evidences of Evolution: Types of fossils and evolution of horse	**11**
Unit 4	**Developmental Biology** 4.1 Types of Eggs according to yolk 4.2 Types of Cleavage 4.3 Gametogenesis: Spermatogenesis and Oogenesis 4.4 Metamorphosis: Changes, hormonal regulations in amphibians	**10**

PRACTICAL **1 CREDITS (2 Hours/Week)** **DSM-201P/Minor-2**

CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Based on ZOOLOGY DSM-201

Practical 1	Identification and classification of chordate animals-I A. Sub-Phylum: Urochordata: Herdmania, Doliolum, Oikoplura B. Sub-Phylum: Cephalochordata: Amphioxus C. Class: Cyclostomata : Petromyzon, Myxine, Bdellostoma
Practical 2	Identification and classification of chordate animals-II Super Class: Pisces: Scoliodon, Pristis, Electric Ray, Rhinobatus, Acipensor, Eel, Hippocampus, Protopterus
Practical 3	Identification and classification of Chordate animals-III (i) Class: Amphibia: Ichthyophis, Bufo, Salamander (ii) Class: Reptiles: Turtle, Draco, Chameleon, Mabouia (Skink), Varanus, Snake, Crocodile. (iii) Class: Aves: Weaver Bird, Parrot, Owl, Wood pecker. (iv) Class: Mammal: Duck-bill, Kangaroo, Hedgehog, Bat, Dolphin
Practical 4	To study scales in fishes
Practical 5	To study Migration in Fishes (Anadromous and Catadromous)
Practical 6	Study of Archaeopteryx & Platypus as a connecting link through charts or Multimedia.
Practical 7	To study Evolution of Man
Practical 8	To study evolution through charts/models/pictures: (i) Study of fossil from plaster cast models and pictures (ii) Evolution of horse with diagrams/ cut outs of limbs and teeth of horse ancestors
Practical 9	To study types of eggs according to Yolk
Practical 10	To study types of Cleavage
Practical 11	Study of Gametogenesis: Spermatogenesis and Oogenesis through chart/models
Practical 12	Study of Metamorphosis in amphibians through chart/models
Practical 13	To submit any chart/model according to syllabus.

Reference Book for Zoology Discipline Specific Core Courses (Minor-2)

1. Modern textbook of Zoology Vertebrates……...…….……R. L. Kotpal
2. Chordate Zoology……..…….E. L. Jordan & Dr. P. S. Verma
3. Practical Zoology Vertebrate……...…….S. S. Lal
4. A Text Book of Chordates…… N. Arumugam, A. Thangamani, S. P. Kumar, LM. Narayana
5. Chordate zoology……...…… P.S. Dhami & J.K. Dhami
6. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology……PS Varma & VK Agrawal
7. Physiology of anatomy and physiology……Tortora & Tortora
8. The Origin of Species……..Charles Darwin
9. The Descent of Man……..Charles Darwin
10. Evolutionary Biology: Applied Concepts and Mechanisms……Maia Gustin
11. Developmental Biology, 6th edition……..Scott F Gilbert
12. Developmental Biology……..M Subramanian

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

Theory Examination Paper Style NEP 2020

SEMESTER – II

ZOOLOGY DSM-201/Minor-2: CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Time: 2 Hours **Total Marks: 50**

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-1: (From UNIT-1) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-2: (From UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-3: (From UNIT-3) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-4: (From UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

QUESTION-5: (From UNIT-1 and UNIT-2) (10 Marks)
(1)…….. (05)
(2)……..(05)

OR

QUESTION-5: (From UNIT-3 and UNIT-4) (10 Marks)
(1)…….. (05)
(2)……..(05)

PRACTICAL EXAMINATION

SEMESTER – II ZOOLOGY

DSM-201P/Minor-2: CHORDATES-I, EVOLUTION and DEVELOPMENTAL BIOLOGY

Time: **3** Hours Total Marks: **25**

Que. No.	Particulars	Marks
Que-1	Describe evolution of _____ . (Practical-7 / 8ii)	**02**
Que-2	Do as per instruction and show it to examiner (Practical-11/12)	**02**
Que-3	Do as per instruction and show it to examiner (Practical-6)	**02**
Que-4	Write as per instruction. (A) Identify and classify giving reasons (Practical-1/2) (B) Identify and classify giving reasons (Practical-3) (C) Identify and describe (Practical-4/5/8i) (D) Identify and describe (Practical-9/10)	**08**
Que-5	Certified Journal.	**01**
Que-6	Viva-voice.	**10**

Zoology Sem-II Multidisciplinary Course

Course Level	UG	**Teaching Hours**	45 + 30 = 75
Programme	Zoology	**CCE (Theory)**	25
Semester	II	**CCE (Practical)**	25
Course Type	Multidisciplinary Course	**SEE**	50
Course title	FUNDAMENTALS OF ZOOLOGY-II	**Total**	100
Credit	03 + 01 (Practical) = 04	**Exam Duration**	2:00 Hrs.
Course Code	MDC-101 MDC-101P (Practical)	**Practical Exam Duration**	2:00 Hrs.

Course Objectives:

- The students will be introduced to the principles of normal biological function in human body. Basic human physiology will be outlined and correlated with histological structures. Students will be exposed to the concept of muscle works. They also learn the physiology of urine formation.
- The course will create a comprehensive understanding of the behaviour of animals and Origin and history of Ethology. It also includes study of few important types of animal behaviour.
- The study of ecology will develop an understanding of the differences in the structure and function of different types of ecosystems. It creates understating of ways that organisms interact with both the physical and the biological environment.

Course Learning Outcomes:

Upon completion of the course, students should be able to:

- Understand the basic histological structure of muscles and important endocrine gland of human body.
- Know the principles of normal biological function in human body. Outline basic human physiology and correlate with histological structures. Understand how animal moves through muscles and how human kidney filter blood and formulate urine.
- Students acquire knowledge of key concepts and principles of animal behaviour and learn to apply ethical standards in conducting and evaluating psychological and behavioural research to build and enhance interpersonal skills in animal conservation.
- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors. Understand ecosystem, types, their food chains and food webs. Apply the basic principles of ecology in wildlife conservation and management.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

THEORY **3 CREDITS (3 Hours/Week)** **MDC-201**

FUNDAMENTALS OF ZOOLOGY-II

COURSE CONTENTS		
Units	**Title of the Unit and the Topics**	**No. of Lectures**
Unit 1	**Histology** 1.1 Histological structure and function of muscle (i) Skeletal (ii) Visceral and (iii) Cardiac 1.2 Histological structure and function of following organs of Mammals: (i) Pituitary gland (ii) Thyroid gland (iii) Adrenal gland (iv) Kidney	**12**
Unit 2	**Physiology** 2.1 Muscle Physiology: Mechanism of muscle contraction (Sliding filament theory) 2.2 Renal Physiology: (i) Nitrogenous Waste (ii) Structure of Nephron (iii) Formation of Urine (iv) Control of Renal Function	**12**
Unit 3	**Animal Behaviour** 3.1 Origin and history of Ethology; Contribution of Karl Von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen in ethology. 3.2 Social Behaviour: (i) Honey bee (ii) Termite 3.3 Courtship & Reproductive Behaviour: (i) Spider (ii) Scorpion (iii) Peacock 3.4 Parental Care Behaviour: (i) Arius (ii) Ichthyophis (ii) Alytes	**11**
Unit 4	**Ecology** 4.1 Introduction and history of Ecology, Structure and function of Ecosystem 4.2 Marine Ecosystem 4.3 Fresh water – Pond Ecosystem 4.4 Terrestrial Ecosystem- Grassland 4.5 Food chain and food web	**10**

PRACTICAL **1 CREDITS (2 Hours/Week)** **MDC-201**

FUNDAMENTALS OF ZOOLOGY-II

Based on ZOOLOGY MDC-201

Practical 1	To study Histological structure and function of muscle through slide/chart/model. (i) Skeletal (ii) Visceral and (iii) Cardiac
Practical 2	To study Histological structure and function of mammalian organs through slide/chart/model. (i) Pituitary gland (ii) Thyroid gland (iii) Adrenal gland (iv) Kidney
Practical 3	To study Mechanism of muscle contraction through chart/model.
Practical 4	To study the chemical constituents of Normal and abnormal urine.
Practical 5	To study Pavlov experiment of Classical Conditioning.
Practical 6	To study Lorenz experiment of imprinting behaviour.
Practical 7	To Study Social Behaviour: (i) Honey bee (ii) Termite
Practical 8	To Study Courtship Behaviour (i) Spider (ii) Scorpion (iii) Peacock
Practical 9	To Study Parental Care Behaviour: (i) Arius (ii) Ichthyophis (ii) Alytes
Practical 10	To study different types of food web and food chain as per theory syllabus
Practical 11	To study biotic and abiotic components of aquatic ecosystem: Marine and Fresh water ecosystem
Practical 12	To study biotic and abiotic components of grassland ecosystem
Practical 13	To submit any chart/model according to syllabus.

Reference Book for Zoology Multidisciplinary Courses

1. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology……PS Varma & VK Agrawal
2. Physiology of anatomy and physiology……Tortora & Tortora
3. Animal physiology……..……..Eckert
4. Essential of animal physiology……...……S. C. Rastogi
5. Element of animal physiology…….……R. Nagabhushanam
6. Human physiology…….……C. C. Chatterjee
7. Principal of animal physiology……...……Wood D. W.
8. Physiology of anatomy and physiology…….……Tortora & Tortora
9. Text book of Baley's Histology…….Copenharver bunga & burge
10. A text-book of the principles of animal histology…….. Ulrie Dahlgren
11. Animal Behaviour……..…….Agarwal V.K.
12. An Introduction to Animal Behaviour……..Aubrey Manning, Marian Stamp Dawkins
13. CONCEPTS OF ANIMAL BEHAVIOUR…….Reena Mathur
14. Fundamentals of Ecology…… Eugene Odum
15. Environment & Ecology …….R Rajagopalan

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

Theory Examination Paper Style NEP 2020

SEMESTER – II

ZOOLOGY MDC-201: FUNDAMENTALS OF ZOOLOGY-II

Time: 2 Hours **Total Marks: 50**

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From UNIT-1) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-1: (From UNIT-1) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-2: (From UNIT-2) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-2: (From UNIT-2) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-3: (From UNIT-3) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-3: (From UNIT-3) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-4: (From UNIT-4) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-4: (From UNIT-4) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-5: (From UNIT-1 and UNIT-2) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-5: (From UNIT-3 and UNIT-4) (10 Marks)

(1)…….. (05)

(2)……..(05)

PRACTICAL EXAMINATION

SEMESTER – II

ZOOLOGY MDC-201: FUNDAMENTALS OF ZOOLOGY-II

Time: **3** Hours Total Marks: **25**

Que. No.	Particulars	Marks
Que-1	Describe experiment of _____ behaviour (Practical-5/6)	**02**
Que-2	Detect the chemical constituents of _____ urine (Practical-4)	**02**
Que-3	Describe biotic and abiotic factors of _____ (Practical-11/12)	**02**
Que-4	Write as per instruction. (A) Identify and describe (Practical-1) (B) Identify and describe (Practical-2) (C) Identify and describe (Practical-7/8) (D) Identify and describe (Practical-9)	**08**
Que-5	Certified Journal.	**01**
Que-6	Viva-voice.	**10**

Zoology Sem-II Skill Enhancement Course

Course Level	UG		**Teaching Hours**	60
Programme	Zoology		**SEE**	50
Semester	II			
Course Type	Skill Enhancement Course			
Course title	AQUARIUM MANAGEMENT		**Total**	50
Credit	02		**Exam Duration**	2:00 Hrs.
Course Code	SEC-101			

Course Objectives:

1. Student will be able to know the fundamentals of aquarium fish industry.
2. Student will understand the biological features of aquarium fishes.
3. Student will get to know the food and feeding habits of aquarium fishes.
4. Student will get aware about transportation of fishes

Course Learning Outcomes:

After completing the course, the student should be able to:

1. Construct an aquarium.
2. Manage the fish diseases.
3. Prepare the proper dosage of different kinds of natural and synthetic fish feed.
4. Properly handle and maintain the aquarium fish.

SKILL BASED **2 CREDITS (4 Hours/Week)** **SEC-201**

AQUARIUM MANAGEMENT

COURSE CONTENT		
UNIT-1	Practical 1	Introduction to Aquarium Fish Keeping
	Practical 2	The potential scope of Aquarium Fish Industry
	Practical 3	Exotic and Endemic species of Aquarium Fishes
UNIT-2	Practical 4	Biology of Aquarium Fishes: Common Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish
	Practical 5	Food and feeding of Aquarium fishes: Use of live fish feed organisms. Preparation and composition of formulated fish feeds
	Practical 6	Fish Transportation: Live fish transport - Fish handling, packing and forwarding techniques.
UNIT-3	Practical 7	General Aquarium maintenance

Reference books for Zoology Skill Enhancement Course SEC-201

1. Freshwater Aquariums: Basic Aquarium Setup and Maintenance……..…… D. Alderton
2. Ornamental Fish Culture and Aquarium Management……..… A D Dholakia
3. Home Aquarium and Ornamental Fish Culture……...… C. S. Tharadevi, K. V. Jayashree
4. Aquarium Management……A. Saxena

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

Theory Examination Paper Style NEP 2020

SEMESTER – II

ZOOLOGY SEC-201 Skill Enhancement Course: AQUARIUM MANAGEMENT

Time: 1 Hours **Total Marks: 25**

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From Unit-1) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-1: (From Unit-1) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-2: (From Unit-2) (10 Marks)

(1)…….. (05)

(2)……..(05)

OR

QUESTION-2: (From Unit-2) (10 Marks)

(1)…….. (05)

(2)……..(05)

QUESTION-3: (From Unit-3) (05 Marks)

(1)…….. (05)

OR

(1)……..(05)

PRACTICAL EXAMINATION SEMESTER – II

SEC-201/ SKILL ENHANCEMENT COURSES: AQUARIUM MANAGEMENT

Time: **3** Hours Total Marks: **25**

Que. No.	Particulars	Marks
Que-1	Do as per instruction and show it to examiner (Practical-1/2).	**02**
Que-2	Do as per instruction and show it to examiner. (Practical-3)	**02**
Que-3	Do as per instruction and show it to examiner. (Practical-4)	**03**
Que-4	Do as per instruction and show it to examiner. (Practical-5)	**03**
Que-5	Do as per instruction and show it to examiner. (Practical-6)	**02**
Que-6	Do as per instruction and show it to examiner. (Practical-7)	**02**
Que-7	Certified Journal.	**01**
Que-8	Viva-voice.	**10**