Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ઝૂઓલોજી વિષય ચલાવતી અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૦–૨૧, જૂન–૨૦૨૦ થી અમલમાં આવનાર S.Y.B.Sc.ના સિલેબસ બનાવવા બાબતે ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૧૭/૧૨/૨૦૧૯ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ ભલામણ કરેલ છે. જે ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૩૦/૬/૨૦૨૦ ની સભાના **ઠરાવ ક્રમાંકઃ૩૩** અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૧૭/૧૨/૨૦૧૯ની સભાનાં ભલામણ ક્રમાંકઃ ૨

:: આથી ઠરાવવામાં આવે છે કે, જૂન–૨૦૨૦ થી અમલમાં આવનાર UGC ના મોડયુલ પ્રમાણેના જરૂરી મુદ્દાઓ લઈને તૈયાર કરેલ S.Y.B.Sc.Sem-III & IV તથા EG (Mr. Sci.) Zoology ના અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૩૦/૦૬/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૩૩

:: **આથી ઠરાવવામાં આવે છે કે, ઝુઓલોજી વિષયની અભ્યાસસમિતિએ તેની તા.૧૭/૧૨/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે ભલામણ કરેલ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ મંજૂર કરેલ** જૂન–૨૦૨૦ થી અમલમાં આવનાર UGC ના મોડયુલ પ્રમાણેતૈયાર કરેલ S.Y.B.Sc.Sem-III & IV તથા EG (Mr. Sci.) Zoology ના અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

R-B Q+A
ઈ.ચા. કુલસચિવ

ક્રમાંક : એકે./પરિપત્ર/૫૮૦૯ /૨૦૨૦
તા. ૧૫–૦૭–૨૦૨૦

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ઝૂઓલોજી વિષય ચલાવતી અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓ .
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III ZOOLOGY PAPER – III (Z – 301)
(Effective from June 2020)
(Non-chordates, Evolution and Economic Zoology)

UNIT - 1

Classification:

Introduction to classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Protozoa
  - Porifera
  - Coelenterata (Cnidaria)
  - Helminthes
  - Annelida.

UNIT - 2

- Study of the following animal type with reference to the structure and functions of various organs of all systems of **Earthworm**:
  - Systematic position
  - Habit and Habitat
  - External features
  - Body wall and its function
  - Coelom – composition and function
  - Food and feeding mechanism
  - Digestive system and digestion
  - Circulatory system
  - Excretory system and excretion
  - Nervous system-(central, peripheral and sympathetic)
  - Sense organs
  - Epidermal receptors
  - Buccal and photoreceptors
  - Reproductive system-copulation, cocoon formation and development

UNIT - 3

➢ Evolution and Adaptations:

- Variation
- Deep sea & Cave Dwelling Adaptations

UNIT – 4 Economic Zoology:

➢ Vermi culture:

- Definition of Vermiculture
- Vermicomposting and Vermibed
- Limitations of traditional agricultural system
- Role of earthworm in saving environment
- Vermibreeds
- Earthworm-The Cinderella of Vermiculture
- Ecology of earthworm
- Physical, Chemical and biological parameters of Vermicast
- Vermiculture process
- Advantages and disadvantages of Vermicomposting
- Prospects of Vermiculture and Vermicomposting

➢ Sericulture:

- Life-History of Indian species of Mulberry silk-worm (Bombyx mori)
- Management of Silk industry including rearing
- Spinning and reeling
- Types and Economic importance of silk

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B.Sc. SEM – III

ZOOLOGY PRACTICAL – I (Based on paper - III)

(Non-chordates, Evolution and Economic Zoology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Trypanosoma
- Monocystis
- Vorticella
- Grantia
- Euplectella
- Spongilla
- Hydra
- Cyanea
- Gorgonia
- Planaria
- Taenia
- Ascaris
- Aphrodite
- Leech
- Hirudo medicinais

2 - The following practical of Earthworm to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- Earthworm:
  - External features
  - Digestive System
  - Mounting of setae
  - Reproductive system
  - Mounting of Septal nephridia
  - Nervous system Spermathica
  - Blood glands

3 - Permanent Slides of earthworm:

- T.S.passing through pharynx
- T.S.passing through gizzard
- T.S. passing through typhlosolar region
- T.S.passing through testis
- T.S.passing through ovary

4 – Evolution:

Adaptations:

- Deep sea adaptations:
  - Giant squid
  - Octopus
  - Flat fish
  - Arrow fish
- Cave dwelling adaptations:
  - Troglobite
  - Proteus (Proteus anguinus)
- Variation:
  - Digits in man
  - Giraffe

5 – Economic Zoology:

- Life history of Indian mulberry silk worm (Bombyx mori)
- Vermiculture (with the help of charts/ photographs/ models etc.)
- Vermibreeds, Vermiculture process(Vermicompost practices)

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR CBCS AND SEMESTER SYSTEM

B.Sc. SEM – III ZOOLOGY PAPER – IV (Z – 302)

(Effective from June 2020)

(Chordates, Histology and Osteology)

UNIT – 1

Classification:

Introduction to classification:

- General study of the following protochordates and chordates up to subclass with examples:
  - Urochordata
  - Cephalochordate
  - Cyclostomes
  - Pisces
  - Amphibia.

UNIT – 2

Animal type study:

- Study the ***Labeo rohita*** as an animal type with reference to their structure and functions of various organs of all systems.
  - Systematic position
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT – 3 Histology:

- Study the Ultra structure following mammalian tissues:
  - Salivary gland
  - Stomach
  - Liver
  - Intestine
  - Pancreas

- Kidney
- Ovary
- Testis

UNIT – 4 Osteology:

- Comparative study of girdles and skulls in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

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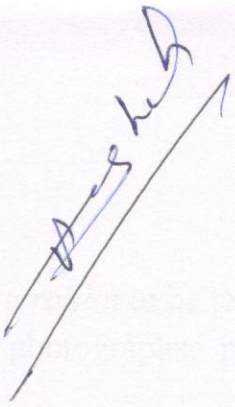

B.Sc. SEM – III

ZOOLOGY PRACTICAL - II (Based on paper -IV)

(Chordates, Histology and Osteology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Ascidian
- Salpa
- Oikopleura
- Amphioxus
- Lamprey
- Scoliodon
- Chimaera
- Protopterus
- Eel
- Hilsa
- Pterois
- Frog
- Uruaeotyphlus
- Siren
- Rhacophorus

2 - The following body systems of ***Labeo rohita*** to be taught / studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- Digestive system
- Urinogenital system
- Brain-dorsal and ventral view

3 - To study the permanent mammalian histological slides:

- Salivary gland
- Stomach
- Liver

- Pancreas
- Intestine
- Kidney
- Ovary
- Testis

4 - Osteology:

- To study the pectoral girdles, pelvic girdles and skulls in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

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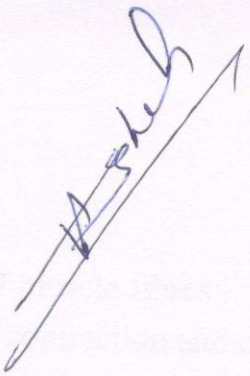

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III ZOOLOGY PAPER – V (Z – 303)
(Effective from June 2020)
(Biochemistry and Animal Physiology)

UNIT – 1

Biochemistry:

- Introduction and structure of:
  - Carbohydrates
  - Proteins
  - Lipids

UNIT – 2

- **Metabolism:**
  - Glycolysis
  - TCA & oxidative phosphorylation (ETS or Biological oxidation)
  - Gluconeogenesis
  - Glycogenesis
  - Glycogenolysis

UNIT – 3

- **Muscle coordination:**
  - Types and structure of muscle fibres
  - Physiology of muscle contraction and energetic

UNIT – 4

- **Hematology:**
  - Composition of blood
  - Haemopoiesis
  - Blood groups

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B.Sc. SEM – III

ZOOLOGY PRACTICAL - III (Based on paper - V)

(Biochemistry and Animal Physiology)

1- Preparation of atomic models:

- Glucose
- Fructose
- Galactose
- Maltose
- Lactose
- Sucrose
- Valine
- Threonine
- Glycine
- Alanine
- Glycerol

2 - Qualitative test for organic compound:

- Carbohydrates:
  - Glucose
  - Fructose
  - Maltose
  - Lactose
  - Sucrose
- Proteins:
  - Albumin
  - Casein

3 – Haematology:

- Prepare blood smear to observe R.B.C. and W.B.C. from human blood
- To study clotting time of human blood
- To study Blood Groups
- Estimation of Haemoglobin from human blood
- To study Haemin crystals from human blood

4 - To study different types of muscle fibres and nerve fibres:

- Striated muscle fibre
- Nonstriated muscle fibre
- Cardiac muscle fibre

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III MARINE SCIENCE (E. G.)
(Effective from June 2020)

UNIT - 1

Scope of marine science:

- Introduction to marine science and career
- Classification :
  - Prokaryotes
  - Eukaryotes - Fungi, Protista, Plant, Animalia – Five Kingdoms

UNIT - 2

Geology of the ocean:

- Physico-chemical properties of Marine Environment
- Zonations of ocean

UNIT - 3

Marine Biology:

- Adaptations:
  - Bony fish surviving in near freezing water (or adaptations in deep sea fishes)
  - Sea birds
  - Whales
  - Dolphins
- General characters of bony and cartilaginous fishes.

UNIT - 4 Marine organisms:

- Microorganisms:
  - Phytoplanktons
  - Zooplanktons
  - Red algae
  - Brown algae
  - Green algae
  - Multicellular algae

- Economic importance of algae
- Macro organisms:
  - Invertebrates-Economic importance
    - Marine sponges
    - Mollusca
    - Arthropods (crab and prawns).
  - Vertebrate: Economic importance
    - Scoliodon (sharks)
  - Marine mammals - Whales and Dolphins

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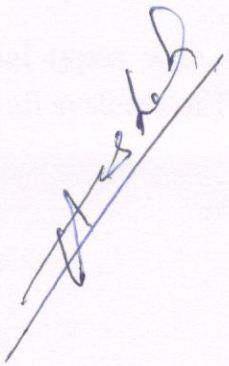

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR CBCS AND SEMESTER SYSTEM

B.Sc. SEM – IV ZOOLOGY PAPER – III (Z – 401)

(Effective from June 2020)

(Non-chordates, Evolution and Economic Zoology)

UNIT - 1

Classification:

Introduction to classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Arthropoda
  - Mollusca
  - Echinodermata
  - Hemichordata.

UNIT – 2

- Study of the following animal types with reference to the structure and functions of various organs of all systems of Pila:
  - Systematic position
  - External characters
  - Digestive system
  - Respiratory system
  - Blood vascular system
  - Excretory system
  - Nervous system
  - Reproductive system

UNIT – 3

Evolution and adaptations:

- Evidence of evolution from comparative functional anatomy:
  - Homologous
  - Analogous and vestigial organs
  - connecting link
  - Atavism (Reversion)
  - Protective coloration and mimicry

UNIT - 4

Economic Zoology:

- Dairy Farming:
  - Definition of Dairy and other ailed Aspects Indian and exotic breeds of cows and buffaloes Milk and milk by-products
- Apiculture:
  - Life-history of Honey-bees
  - Types
  - Castes
  - Structure of honeycomb
  - Economic importance of honey and wax

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B.Sc. SEM – IV

ZOOLOGY PRACTICAL – I (Based on paper - III)

(Non-chordates, Evolution and Economic Zoology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Peripetus
- Crab
- Julus
- Palaemon
- Silverfish
- Termite
- Butterfly
- Chaetoderma
- Unio
- Aplysia
- Sepia
- Starfish
- Brittle star
- Sea cucumber
- Feather star
- Balanoglossus

2 - Pila to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- External features
- Digestive system
- Reproductive system
- Nervous system
- Mountings:
  - Osphradium
  - Radula
  - Statocyst

3 - Protective coloration and mimicry (with the help of charts/models/museum specimens/photographs etc.):

- Leaf insect
- Stick insect
- Lantern fly
- Eyespot
- Butterfly
- Australian seahorse
- Rattle snake

4 - **Economic Zoology:**

- Dairy Farming:
  - Indian and exotic breeds of cows and buffaloes
- Apiculture:
  - To study Life history
  - Queen
  - Drones
  - Workers
  - Wax
  - Modern movable beehive

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV ZOOLOGY PAPER – IV (Z – 402)
(Effective from June 2020)
(Chordates, Embryology and Osteology)

UNIT – 1

Classification:

- Introduction to classification: General study of the following chordates up to subclass with examples:
  - Reptilia
  - Aves
  - Mammalia

UNIT – 2

Animal Type Study:

- Study of the **Uromastix** with reference to their structure and functions of various organs of all systems:
  - Systematic position
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT - 3

- **Embryology**:
  - Different types of eggs
  - Cleavage patterns
  - Development of frog (up to neurulation)
  - Metamorphosis in frog

UNIT – 4 Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs
  - Vertebral columns

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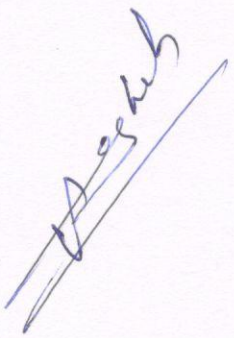

B.Sc. SEM – IV

ZOOLOGY PRACTICAL - II (Based on paper -IV)

(Chordates, Embryology and Osteology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Calotes
- Draco
- Testudo
- Python
- Krait
- Aligator
- Pigeon
- Wood packer
- Vulture
- King fisher
- Echidna
- Kangaroo
- Loris
- Porcupine
- Squirrel
- Dolphin

2 - The following practicals of **Uromastrix** to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.:

- Digestive system
- Circulatory system
- Urinogenital system
- Dorsal and ventral view of brain

3 – Study of frog embryology (with the help of models /charts /specimens /photographs /permanent slides etc).

- Uncleaved egg
- 2 cell stage
- 4 cell stage
- 8 cell stage
- 16 cell stage
- Blastula
- Gastrula
- Metamorphosis (Tadpole larva)

4 - Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs
  - Vertebral columns

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 403)
(Biochemistry and Animal Physiology)

UNIT – 1 Proteins:

- Classification:
  - Simple
  - Conjugated
  - Derived proteins
- Structure of proteins:
  - Primary
  - Secondary
  - Tertiary
  - Quarternary
- Metabolism:
  - Deamination
  - Transamination
  - Ornithine cycle
  - Hormonal control of protein metabolism

UNIT - 2 Lipids:

- Classification:
  - Simple
  - Compound
  - Derived lipids
- Metabolism:
  - β oxidation and synthesis of long chain fatty acids
  - Glycerol metabolism
  - Hormonal control of lipid metabolism

UNIT – 3 Nervous coordination:

- Synapse and mechanism of nerve impulse conduction
- Structure and function of sense organs (human) eye & ear

UNIT – 4 Excretion and osmoregulation:

- Structure of uriniferous tubule
- physiological process of excretion (including counter current mechanism) and urine formation; hormonal control (rennin angiotensin system and ADH); Osmoregulation in fresh and marine waters
- Osmosis, diffusion and Donnan's equilibrium

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B.Sc. SEM – IV

ZOOLOGY PRACTICAL – III (Based on paper V)

(Biochemistry and Animal Physiology)

1. To determine normal and abnormal constituents of urine.
2. To study different types of Sensory organs –human eye and ear.
   Different types of nerve cells.
3. **To study with the help of chart:**
   - Deamination
   - Transamination
   - Ornithine cycle
   - Hormonal control of protein metabolism
   - β oxidation and synthesis of long chain fatty acids
   - Glycerol metabolism
   - Hormonal control of lipid metabolism.
   - Rennin angiotensin system and ADH
   - Osmoregulation in fresh and marine waters

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV
MARINE SCIENCE (E. G.)

UNIT-1

- Types of seashores and their fauna:
  - Sandy shore
  - Rocky shore
  - Estuaries

UNIT-2

- Coral and coral reefs:
  - Types
  - Economic importance and threats.
- Voyage of green sea turtle.

UNIT- 3

- Introduction to aqua culture:
  - History
  - Scope
  - Present status
- General idea of different aquaculture practices:
  - Monoculture
  - Polyculture
  - Extensive culture
  - Intensive culture

UNIT-4

- Marine Pollution:
  - Causative factors and impacts

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Reference Books for Z-301 & 401

1 Living Invertebrates, 1987: Pearse, Buchsbaum, Blackwell Scientific Publication, California.

2 A Text book of Zoology Invertebrates, Vol. I 1992, 7th Edn. Parker and Haswell edited by Marshall William, C B S publishers and distributors, New Delhi.

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Reference books for Marine Science (E. G.)

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2. Dr. Alkesh Shah and Dr. Krishna Rajput: A Text Book of Marine Science for S. Y. B. Sc. Fourth Semester Published by New Popular Prakashan, Surat. ISBN No.: 978-93-87554-01-6.
3. Fundamentals of Ecology- E.P.Odum
4. Marine biology and Ecology- N.K.Pillai
5. Fishes- Mary Chandy
6. Fish and Fisheries of India – V.G. Jhingran
7. Fish and Fisheries-S.S.Khanna.
8. Marine Fish Farming for india-James Hornell
9. Introduction to Marine Biology-Karleskint
10. Marine fisheries Extension-P.N.Ananth
11. General and Applied Ichthyology(fish and fisheries)- S.K. Gupta & P.C. Gupta.:S. chand and Co. New Delhi.
12. Aquaculture Technoligy & Environment-Ujwala jadhav.
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III ZOOLOGY PAPER – III (Z – 301)
(Effective from June 2020)
(Non-chordates, Evolution and Economic Zoology)

UNIT - 1

Classification:

Introduction to classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Protozoa
  - Porifera
  - Coelenterata (Cnidaria)
  - Helminthes
  - Annelida.

UNIT - 2

- Study of the following animal type with reference to the structure and functions of various organs of all systems of **Earthworm**:
  - Systematic position
  - Habit and Habitat
  - External features
  - Body wall and its function
  - Coelom – composition and function
  - Food and feeding mechanism
  - Digestive system and digestion
  - Circulatory system
  - Excretory system and excretion
  - Nervous system-(central, peripheral and sympathetic)
  - Sense organs
  - Epidermal receptors
  - Buccal and photoreceptors
  - Reproductive system-copulation, cocoon formation and development

UNIT - 3

- **Evolution and Adaptations:**
  - Variation
  - Deep sea & Cave Dwelling Adaptations

UNIT – 4 Economic Zoology:

- Vermi culture:
  - Definition of Vermiculture
  - Vermicomposting and Vermibed
  - Limitations of traditional agricultural system
  - Role of earthworm in saving environment
  - Vermibreeds
  - Earthworm-The Cinderella of Vermiculture
  - Ecology of earthworm
  - Physical, Chemical and biological parameters of Vermicast
  - Vermiculture process
  - Advantages and disadvantages of Vermicomposting
  - Prospects of Vermiculture and Vermicomposting
- **Sericulture:**
  - Life-History of Indian species of Mulberry silk-worm (Bombyx mori)
  - Management of Silk industry including rearing
  - Spinning and reeling
  - Types and Economic importance of silk

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B.Sc. SEM – III

ZOOLOGY PRACTICAL – I (Based on paper - III)

(Non-chordates, Evolution and Economic Zoology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Trypanosoma
- Monocystis
- Vorticella
- Grantia
- Euplectella
- Spongilla
- Hydra
- Cyanea
- Gorgonia
- Planaria
- Taenia
- Ascaris
- Aphrodite
- Leech
- Hirudo medicinais

2 - The following practical of Earthworm to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- Earthworm:
  - External features
  - Digestive System
  - Mounting of setae
  - Reproductive system
  - Mounting of Septal nephridia
  - Nervous system Spermathica
  - Blood glands

3 - Permanent Slides of earthworm:

- T.S.passing through pharynx
- T.S.passing through gizzard
- T.S. passing through typhlosolar region
- T.S.passing through testis
- T.S.passing through ovary

4 – Evolution:

Adaptations:

- Deep sea adaptations:
  - Giant squid
  - Octopus
  - Flat fish
  - Arrow fish
- Cave dwelling adaptations:
  - Troglobite
  - Proteus (Proteus anguinus)
- Variation:
  - Digits in man
  - Giraffe

5 – Economic Zoology:

- Life history of Indian mulberry silk worm (Bombyx mori)
- Vermiculture (with the help of charts/ photographs/ models etc.)
- Vermibreeds, Vermiculture process(Vermicompost practices)

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III ZOOLOGY PAPER – IV (Z – 302)
(Effective from June 2020)
(Chordates, Histology and Osteology)

UNIT – 1

Classification:

Introduction to classification:

- General study of the following protochordates and chordates up to subclass with examples:
  - Urochordata
  - Cephalochordate
  - Cyclostomes
  - Pisces
  - Amphibia.

UNIT – 2

Animal type study:

- Study the ***Labeo rohita*** as an animal type with reference to their structure and functions of various organs of all systems.
  - Systematic position
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT – 3 Histology:

- Study the Ultra structure following mammalian tissues:
  - Salivary gland
  - Stomach
  - Liver
  - Intestine
  - Pancreas

- Kidney
- Ovary
- Testis

UNIT – 4 Osteology:

- Comparative study of girdles and skulls in:
    - Scoliodon
    - Frog
    - Varanus
    - Pigeon
    - Rabbit

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B.Sc. SEM – III
ZOOLOGY PRACTICAL - II (Based on paper -IV)
(Chordates, Histology and Osteology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Ascidian
- Salpa
- Oikopleura
- Amphioxus
- Lamprey
- Scoliodon
- Chimaera
- Protopterus
- Eel
- Hilsa
- Pterois
- Frog
- Uruaeotyphlus
- Siren
- Rhacophorus

2 - The following body systems of ***Labeo rohita*** to be taught / studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- Digestive system
- Urinogenital system
- Brain-dorsal and ventral view

3 - To study the permanent mammalian histological slides:

- Salivary gland
- Stomach
- Liver

- Pancreas
- Intestine
- Kidney
- Ovary
- Testis

4 - Osteology:

- To study the pectoral girdles, pelvic girdles and skulls in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III ZOOLOGY PAPER – V (Z – 303)
(Effective from June 2020)
(Biochemistry and Animal Physiology)

UNIT – 1

Biochemistry:

- Introduction and structure of:
  - Carbohydrates
  - Proteins
  - Lipids

UNIT – 2

- **Metabolism:**
  - Glycolysis
  - TCA & oxidative phosphorylation (ETS or Biological oxidation)
  - Gluconeogenesis
  - Glycogenesis
  - Glycogenolysis

UNIT – 3

- **Muscle coordination:**
  - Types and structure of muscle fibres
  - Physiology of muscle contraction and energetic

UNIT – 4

- **Hematology:**
  - Composition of blood
  - Haemopoiesis
  - Blood groups

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B.Sc. SEM – III

ZOOLOGY PRACTICAL - III (Based on paper - V)

(Biochemistry and Animal Physiology)

1- Preparation of atomic models:

- Glucose
- Fructose
- Galactose
- Maltose
- Lactose
- Sucrose
- Valine
- Threonine
- Glycine
- Alanine
- Glycerol

2 - Qualitative test for organic compound:

- Carbohydrates:
  - Glucose
  - Fructose
  - Maltose
  - Lactose
  - Sucrose
- Proteins:
  - Albumin
  - Casein

3 – Haematology:

- Prepare blood smear to observe R.B.C. and W.B.C. from human blood
- To study clotting time of human blood
- To study Blood Groups
- Estimation of Haemoglobin from human blood
- To study Haemin crystals from human blood

4 - To study different types of muscle fibres and nerve fibres:

- Striated muscle fibre
- Nonstriated muscle fibre
- Cardiac muscle fibre

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – III MARINE SCIENCE (E. G.)
(Effective from June 2020)

UNIT - 1

Scope of marine science:

- Introduction to marine science and career
- Classification :
    - Prokaryotes
    - Eukaryotes - Fungi, Protista, Plant, Animalia – Five Kingdoms

UNIT - 2

Geology of the ocean:

- Physico-chemical properties of Marine Environment
- Zonations of ocean

UNIT - 3

Marine Biology:

- Adaptations:
    - Bony fish surviving in near freezing water (or adaptations in deep sea fishes)
    - Sea birds
    - Whales
    - Dolphins
- General characters of bony and cartilaginous fishes.

UNIT - 4 Marine organisms:

- Microorganisms:
    - Phytoplanktons
    - Zooplanktons
    - Red algae
    - Brown algae
    - Green algae
    - Multicellular algae

- Economic importance of algae
- Macro organisms:
    - Invertebrates-Economic importance
        - Marine sponges
        - Mollusca
        - Arthropods (crab and prawns).
    - Vertebrate: Economic importance
        - Scoliodon (sharks)
    - Marine mammals - Whales and Dolphins

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR CBCS AND SEMESTER SYSTEM

B.Sc. SEM – IV ZOOLOGY PAPER – III (Z – 401)

(Effective from June 2020)

(Non-chordates, Evolution and Economic Zoology)

UNIT - 1

Classification:

Introduction to classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Arthropoda
  - Mollusca
  - Echinodermata
  - Hemichordata.

UNIT – 2

- Study of the following animal types with reference to the structure and functions of various organs of all systems of Pila:
  - Systematic position
  - External characters
  - Digestive system
  - Respiratory system
  - Blood vascular system
  - Excretory system
  - Nervous system
  - Reproductive system

UNIT – 3

Evolution and adaptations:

- Evidence of evolution from comparative functional anatomy:
  - Homologous
  - Analogous and vestigial organs
  - connecting link
  - Atavism (Reversion)
  - Protective coloration and mimicry

UNIT - 4

Economic Zoology:

- Dairy Farming:
  - Definition of Dairy and other ailed Aspects Indian and exotic breeds of cows and buffaloes Milk and milk by-products
- Apiculture:
  - Life-history of Honey-bees
  - Types
  - Castes
  - Structure of honeycomb
  - Economic importance of honey and wax

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B.Sc. SEM – IV

ZOOLOGY PRACTICAL – I (Based on paper - III)

(Non-chordates, Evolution and Economic Zoology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Peripetus
- Crab
- Julus
- Palaemon
- Silverfish
- Termite
- Butterfly
- Chaetoderma
- Unio
- Aplysia
- Sepia
- Starfish
- Brittle star
- Sea cucumber
- Feather star
- Balanoglossus

2 - Pila to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- External features
- Digestive system
- Reproductive system
- Nervous system
- Mountings:
  - Osphradium
  - Radula
  - Statocyst

3 - Protective coloration and mimicry (with the help of charts/models/museum specimens/photographs etc.):

- Leaf insect
- Stick insect
- Lantern fly
- Eyespot
- Butterfly
- Australian seahorse
- Rattle snake

4 - **Economic Zoology:**

- Dairy Farming:
  - Indian and exotic breeds of cows and buffaloes
- Apiculture:
  - To study Life history
  - Queen
  - Drones
  - Workers
  - Wax
  - Modern movable beehive

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV ZOOLOGY PAPER – IV (Z – 402)
(Effective from June 2020)
(Chordates, Embryology and Osteology)

UNIT – 1

Classification:

- Introduction to classification: General study of the following chordates up to subclass with examples:
  - Reptilia
  - Aves
  - Mammalia

UNIT – 2

Animal Type Study:

- Study of the **Uromastix** with reference to their structure and functions of various organs of all systems:
  - Systematic position
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT - 3

- **Embryology**:
  - Different types of eggs
  - Cleavage patterns
  - Development of frog (up to neurulation)
  - Metamorphosis in frog

UNIT – 4 Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs
  - Vertebral columns

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B.Sc. SEM – IV
ZOOLOGY PRACTICAL - II (Based on paper -IV)
(Chordates, Embryology and Osteology)

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Calotes
- Draco
- Testudo
- Python
- Krait
- Aligator
- Pigeon
- Wood packer
- Vulture
- King fisher
- Echidna
- Kangaroo
- Loris
- Porcupine
- Squirrel
- Dolphin

2 - The following practicals of **Uromastrix** to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.:

- Digestive system
- Circulatory system
- Urinogenital system
- Dorsal and ventral view of brain

3 – Study of frog embryology (with the help of models /charts /specimens /photographs /permanent slides etc).

- Uncleaved egg
- 2 cell stage
- 4 cell stage
- 8 cell stage
- 16 cell stage
- Blastula
- Gastrula
- Metamorphosis (Tadpole larva)

4 - Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs
  - Vertebral columns

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 403)
(Biochemistry and Animal Physiology)

UNIT – 1 Proteins:

- Classification:
  - Simple
  - Conjugated
  - Derived proteins
- Structure of proteins:
  - Primary
  - Secondary
  - Tertiary
  - Quarternary
- Metabolism:
  - Deamination
  - Transamination
  - Ornithine cycle
  - Hormonal control of protein metabolism

UNIT - 2 Lipids:

- Classification:
  - Simple
  - Compound
  - Derived lipids
- Metabolism:
  - β oxidation and synthesis of long chain fatty acids
  - Glycerol metabolism
  - Hormonal control of lipid metabolism

UNIT – 3 Nervous coordination:

- Synapse and mechanism of nerve impulse conduction
- Structure and function of sense organs (human) eye & ear

UNIT – 4 Excretion and osmoregulation:

- Structure of uriniferous tubule
- physiological process of excretion (including counter current mechanism) and urine formation; hormonal control (rennin angiotensin system and ADH); Osmoregulation in fresh and marine waters
- Osmosis, diffusion and Donnan's equilibrium

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B.Sc. SEM – IV

ZOOLOGY PRACTICAL – III (Based on paper V)

(Biochemistry and Animal Physiology)

1. To determine normal and abnormal constituents of urine.

2. To study different types of Sensory organs –human eye and ear.
Different types of nerve cells.

3. To study with the help of chart:

- Deamination
- Transamination
- Ornithine cycle
- Hormonal control of protein metabolism
- β oxidation and synthesis of long chain fatty acids
- Glycerol metabolism
- Hormonal control of lipid metabolism.
- Rennin angiotensin system and ADH
- Osmoregulation in fresh and marine waters

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR CBCS AND SEMESTER SYSTEM
B.Sc. SEM – IV
MARINE SCIENCE (E. G.)

UNIT-1

- Types of seashores and their fauna:
  - Sandy shore
  - Rocky shore
  - Estuaries

UNIT-2

- Coral and coral reefs:
  - Types
  - Economic importance and threats.
- Voyage of green sea turtle.

UNIT- 3

- Introduction to aqua culture:
  - History
  - Scope
  - Present status
- General idea of different aquaculture practices:
  - Monoculture
  - Polyculture
  - Extensive culture
  - Intensive culture

UNIT-4

- Marine Pollution:
  - Causative factors and impacts

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1 Living Invertebrates, 1987: Pearse, Buchsbaum, Blackwell Scientific Publication, California.
2 A Text book of Zoology Invertebrates, Vol. I 1992, 7th Edn. Parker and Haswell edited by Marshall William, C B S publishers and distributors, New Delhi.
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6 Modern text book of Zoology, Invertebrates 10th Edn., 2009, R.L. Kotpal, Rastogi publ., Meerut.
7 Invertebrates Structure and Function, 2nd Edn.1979, EJW Barrington, John Wiley and Sons Inc.
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14 Applied Zoology,2016,Tarit Kumar Banerjee,N.C.B.A.,(P)LtdLondon
15 Economic Zoology,Biostatistics and Animal Behaviour,2005-2006,Rastogi Publication,Shukla,Mathur,Upadhyay,Prasad

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