Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન પ્રાણીશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રીને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૨–૨૩ થી અમલમાં આવનાર F.Y. B.Sc. થી M.Sc. સુધીનાં અભ્યાસક્રમોનું સમીક્ષન કાર્ય અંગે ચર્ચા કરતા ઝૂઓલોજી વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા.૧૨/૦૪/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૨૮ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

ઝૂઓલોજી વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨–૨૩ થી અમલમાં આવનાર F.Y. B.Sc., S.Y. B.Sc., T.Y. B.Sc. તથા M.Sc. નાં પ્રાણીશાસ્ત્ર વિષયના રિવાઈઝડ અભ્યાસક્રમો મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૧૨/૦૪/૨૦૨૨ની ઠરાવ ક્રમાંકઃ ૨૮

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨–૨૩ થી અમલમાં આવનાર F.Y. B.Sc. થી M.Sc. સુધીનાં અભ્યાસક્રમો ઝૂઓલોજી વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણનો સ્વીકાર કરી F.Y. B.Sc. થી M.Sc. નાં પ્રાણીશાસ્ત્ર વિષયના રિવાઈઝડ અભ્યાસક્રમો મંજૂર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./પ્રાણીશાસ્ત્ર/પરિપત્ર/૭૭૭૬/૨૦૨૨
તા.૨૦–૦૪–૨૦૨૨

ઈ.ચા. કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન પ્રાણીશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ. તથા ડિપાર્ટમેન્ટનાં વડાશ્રી.
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
F.Y.B.Sc. SEMESTER- I
ZOOLOGY: Z – 101
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(Systematics and Animal Diversity)

UNIT- I: Systematics: (08 Hours)

Scope and branches Zoology, Salient features of Non-chordates, structural organization in different phylum of Non-chordates with examples.

Kingdom – Animalia

Phylum – Protozoa- Locomotory Organelles and locomotion

Porifera-Canal System in Sycon

Cnidaria-Polymorphism in Hydrozoa

Platyhelminthes, Nemathelminthes-Parasitic adaptations

Annelida-Metamerism

Arthropoda -Metamorphosis in Insects

Mollusca-Shell in Mollusca

Echinodermata-Water-vascular system in Asteroidea

Protochordata- General features

UNIT- II: Non-Chordate Animal Diversity: (07 Hours)

Type study– *Fasciola hepatica* (Liver fluke)

- Systematic position, Habit and habitat
- External features, Body wall
- Digestive system, Respiratory System, Excretory system, Nervous system
- Reproductive system, Life cycle and development
- Pathogenesis, Parasitic Adaptations

UNIT-III: Systematics: (08 Hours)

Salient features of Chordate classes with examples.

Agnatha, Pisces, Amphibia, Reptiles, Aves, Mammals

UNIT- IV: Chordate Animal Diversity: (07 Hours)

Pisces-Difference between Osteichthyes and Chondrichthyes

Amphibia- Parental care

Reptiles- Poisonous and non-poisonous snakes

Aves-Types of beak and feet in birds

Mammals-Proboscidia

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER-I
ZOOLOGY PRACTICALS (Based on Paper - Z – 101)
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(Systematics and Animal Diversity) (30 Hours)

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

1. Study of the following specimens:
Amoeba, Euglena, Paramecium, Sycon, Hyalonema, Physalia, Aurelia, Metridium, Taenia solium, Male and female, Ascaris lumbricoides, Nereis, Pheretima, Hirudinaria

2. Carcinus, Scolopendra, Limulus, Lepisma,Periplaneta,Butterfy Chiton, Dentalium, Pila,Ostrea, Octopus,Pentaceros, Ophioderma,Echinus, Cucumaria.

3. Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Ichthyophis, Salamandra, Bufo, Hyla,

4. Chelone,Hemidactylus, Chamaeleon, Vipera, Naja, Crocodylus, Gavialis, Koel, Peacock,Sparrow, Ornithorhynchus, Macropus, Bat,Dolphin

5. Study of the following permanent slides:
T.S. and L.S. of *Sycon*, **Liver fluke:** Larva stages.miracidium, sporocyst, redia, cercaria

6. Key for Identification of poisonous and non-poisonous snakes

7. An "**animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- I
ZOOLOGY: Z – 102
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(Cytogenetic, Ecology and Ethology)

UNIT-I: Cytology: (08 Hours)

- Structural organization of cells- Prokaryotes and Eukaryotes
  Introduction to cell organelles (Golgi body, E.R., Mitochondria, Nucleus, Lysosome, Ribosome, Nucleolus, Cell membrane) and cell inclusions.

UNIT-II : Genetics: (07 Hours)

Types,structures and functions of chromosomes

- Principles of inheritance, Mendel's law, deviation from Mendelian inheritance, incomplete dominance and co-dominance, Complementary genes, Supplementary genes. multiple alleles (ABO blood groups)

UNIT-III : Ecology: (08 Hours)

- Introduction to Ecology
- Marine Ecosystem
- Fresh water – Pond Ecosystem
- Desert ecosystem

Ecological Adaptations

- Aquatic, Arboreal, Volant, Desert

UNIT- IV :Ethology: (07 Hours)

- Introduction, Scope and patterns of behavior.
- Nesting behavior (Weaver bird, Horn bill) and social behavior (honeybee)
- Behavioral disorders- Alzheimer's and Dementia

VEER NARMADSOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- I
ZOOLOGY-PRACTICALS (Based on Z-102)
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(Cytogenetic, Ecology and Ethology) (30 Hours)

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

1. Ecological adaptations:
(a) Aquatic: Catla, Dolphin
(b) Arboreal: Chameleon, Squirrel
(c) Volant: Flying fish,Bat
(d) Dessert: Camel, Phrynosoma

2. To study structure of typical animal cell and cell organelles: Golgi body, E.R., Mitochondria, Nucleus, Lysosome, Ribosome, Nucleolus, Cell membrane.

3. To study nesting behaviour (Weaver bird, Horn bill) and social behaviour (Honey bees).

4. To prepare blood smear to observe R.B.C.s and W.B.C.s from human blood.

5. To study Blood groups and Rh factor in human blood.

6. Complementary genes, Suplemetary genes.

Reference Books:

(1) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
(2) Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
(3)Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV
Edition.McGraw-Hill Higher Education.
(4) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*.IX Edition.
The McGraw-Hill Companies.
(5) Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
(6) Modern Text Book of Zoology (vertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
(7) Modern Text Book of Zoology (invertebrate) R.L.Kotpal,Rastogi Publication, Meerut, India.
(8) Invertebrate Zoology- E.L.Jordan & P.S.Verma
(9) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(10) Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(9) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(10) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(11) Cell biology, Genetics and Molecular Biology- V.B. Rastogi, Rastogi Publi. Meerut- India
(12) Modern zoology –Dr. Ramesh Gupta,Prakash Publication,12th Edition,Muzaffarnagar(UP)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- II
ZOOLOGY: Z – 201
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(COMPARATIVE ANATOMY, APPLIED ZOOLOGY, WILDLIFE BIOLOGY)

Unit-1: Integumentary System: (08 Hours)

Derivatives of integument w.r.t. glands and digital tips

Digestive System

Brief comparative account of alimentary canal and digestive glands of vertebrates (Pisces to mammals).

Unit-2: Respiratory System: (07 Hours)

Brief account of Gills, Lungs, Air sacs and Swim bladder

Receptor Organs : Cutaneous receptors, Chemo receptors and Internal receptors

Unit-3: Applied Zoology: **(08 Hours)**

- **Poultry Farming**-Importance of Poultry Farming, Breeds of poultry, Cage system and deep litter system of bird keeping, Egg as food, Care of egg laying hen, poultry appliances and excreta as manure.
- **Fisheries** - Prawn fishery, Pearl Oyster fishery and Bombay duck fishery

Unit-4:Wildlife Biology: (07 Hours)

- Introduction, causes of depletion of wild life, Importance of conservation of wild life
- Difference between National Parks and Sanctuaries
- **Wildlife in Gujarat:**

National Parks

(1) Gir National Park (2) Marine National Park

Sanctuaries

(1)Wild ass sanctuary (2) Thol wildlife sanctuary (3)Velavadar black buck sanctuary

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F.Y.B.Sc. SEMESTER- II

ZOOLOGY PRACTICALS (Based on Z- 201)

(Effective from JUNE-2019 – Revised from JUNE - 2022)

(COMPARATIVE ANATOMY, APPLIED ZOOLOGY, WILDLIFE BIOLOGY)

(30 Hours)

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

1. **Integumentary System:** Derivatives of integument w.r.t. glands and Digital tips
2. **Digestive System:** Brief account of alimentary canal and digestive glands
3. **Respiratory System:** Brief account of Gills, lungs, air sacs and swim bladder
4. **Receptor Organs :** Cutaneous receptors: Free nerve endings, Tectile Corpuscles Chemo receptors:Taste buds,Organ of Jacobson
5. Study of national parks and Sanctuaries: Gir N.P., Marine N.P., Wild ass W.L.S., Thol W.L.S.and Velavadar W.L.S
6. To study Prawn fishery,Pearl Oyster fishery and Bombayduck fishery.
7. To study poultry appliances- hover canopy type brooder, modern hanging feeder (plastic), modern hanging water appliance (plastic) and box type candling appliance.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc SEMESTER- II
ZOOLOGY : Z- 202
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM)

UNIT-I Life Processes: (08 Hours)

Nutrition/ Digestion in Human

- Buccal digestion: Salivary secretion and digestion.
- Gastric digestion: Gastric secretion and digestion
- Intestinal digestion: Pancreatic secretion, bile secretion, digestion in small intestine, digestion and absorption in large intestine

Reproduction and its types.

UNIT-II Biological Chemistry: (07 Hours)

- pH and Buffers in Biological Systems
- Introduction to constituents of balanced diet-Sources, functions and deficiency status
- Diseases due to vitamin deficiency: Xerophthalmia, Nyctalopia (Night blindness), Rickets, Scurvy, Beriberi, Pellagra

UNIT-III Immunology: (08 Hours)

- Introduction and basic concepts of immunology
- Cells and organs of immune system
- Humoral and cellular immune response
- Innate and acquired immunity

UNIT-IV Tissue systems: (07 Hours)

To Study various types, their structure and functions.
Epithelial,Connective,Nervous and Muscular tissue

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS (Based on Z-202)
(Effective from JUNE-2019 – Revised from JUNE - 2022)
(LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM)
(30 Hours)

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

1. To study the control of food ingestion in animals and T.S. of intestine of mammals to show villi for absorption.

2. To study different salivary glands and their functions in human.

3. Diseases due to vitamin deficiency: Xerophthalmia, nyctalopia (Night blindness),rickets, scurvy, beriberi, pellagra

4. To study Different types of reproduction.

5. Tissue System: Study of various types of tissues with the help of permanent slides- areolar tissue, adipose tissue, Hyaline Cartilage, Mammalian bone, Medulated and non Medulated nerve fiber.

Reference Books :

(1) Shukla, G.S. & Upadhyay, V.B. Economic Zoology. Rastogi Publi. 2005, 487 pages.(For Poultry)
(2) JawaidAhsan, Sinha, S. P. 2008. A Handbook of Economic Zoology. S. Chand and Co. Publ. 272 pages.(For Poultry)
(3) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
(4)Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*.IVthEdition.McGraw-Hill Higher Education.
(5) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition.The McGraw-Hill Companies
(6) Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
(7) Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
(8) Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
(9) Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
(10) Invertebrate Zoology- E.L. Jordan & P.S.Verma
(11) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(12) A Text Book of Histology – Leslie P. Gartner-4thedi.-Amazone
(13) Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(14) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(15) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(16)Prani Auotiki (Gujarati)- Desai and Akhunji – University Granth nirman Board- Ahmedabad- India.
(17) Poultry vigyan- Mehta and Ghasura- University Granth nirman Board- Ahmedabad- India.
(18) Vanyajiv Vidya ane Vanyajiv Vyavasthapan- Prof, V.C.Soni - University Granth nirman Board- Ahmedabad- India.
(19) Ecology, Cell biology, Genetics, Animal diversity, Animal Physiology, Immunology, Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.

Web references:

(1) Comparative Anatomy - Digestive System
https://www.slideshare.net/emsicipriano/comparative-anatomy-digestive-system
(2)Comparative Anatomy - Respiratory System
https://www.slideshare.net/emsicipriano/comparative-anatomy-respiratory-system
(3)Urogenital system chap
https://www.slideshare.net/CharmHernandez/urogenital-system-chap

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
ZOOLOGY PAPER -Z – 301
(Revised Syllabus Effective from JUNE - 2022)
(Non-chordates, Evolution and Economic Zoology)

UNIT –I Classification:

Introduction to classification:

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

UNIT - IIType study:Earthworm:

- 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 receptors 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 ofMulberry silk-worm (Bombyx mori)
- Management of Silk industry includingrearing
- Spinning and reeling
- Types and Economic importance of silk

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
S.Y. B.Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 301)
(Non-chordates, Evolution and Economic Zoology)

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

1 - Classification of following animals uptosub-class.

- Trypanosoma
- Monocystis
- Vorticella
- Grantia
- Euplectella
- Spongilla
- Hydra
- Cyanea
- Gorgonia
- Planaria
- Taenia
- Ascaris
- Aphrodite
- Tubifex
- Hirudo medicinalis

2- Earthworm:

- External features
- Digestive System
- Mounting of setae
- Reproductive system
- Mounting of Septal nephridia
- Nervous systemSpermatheca
- 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 and Adaptations:

- Variation:
  - Digits in man
  - Giraffe
- Deep sea adaptations:
  - Euplectella
  - Limulus
  - Feather star
  - Flat fish
- Cave dwelling adaptations:
  - True spiders
  - Proteus anguinus

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)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
ZOOLOGY PAPER – IV (Z – 302)
(Revised Syllabus Effective from JUNE - 2022)
(Chordates, Histology and Osteology)

UNIT – 1Classification:

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

UNIT – 2Type study:

- Study the ***Labeo rohita***as an animal typewith reference to their structure and functions ofvarious organs of all systems.
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT – 3Histology:

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

- Testis

UNIT – 4Osteology:

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 302)
(Chordates, Histology and Osteology)

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

1 - Classification of following animals upto sub-class.

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

2 - Labeo rohita

- 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 girdlesand pelvic girdles in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
ZOOLOGY PAPER – V (Z – 303)
(Revised Syllabus Effective from JUNE - 2022)
(Biochemistry,GeneticsandPhysiology)

UNIT – 1Biochemistry:

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

UNIT – 2 Genetics:

- Structure and function of genetic material
- Types of RNA

UNIT – 3 Physiology:

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

UNIT – 4 Hematology:

- Composition of blood
- Haemopoiesis
- Blood groups

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 303)
(Biochemistry,GeneticsandPhysiology)

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

1 - Biochemistry:

- Preparation of atomic models:
  Glucose, Fructose, Galactose, Maltose, Lactose, Sucrose, Valine, Threonine, Glycine, Alanine, Glycerol

2 **- Genetics:**

- Structure and function:
  DNA and RNA

3 **- Haematology:**

- To study clotting time of human blood
- Estimation of Haemoglobin from human blood
- To study Haemin crystals from human blood

4 - Physiology

- To study different types of nerve fibres and muscle fibres(Striated muscle fibre, Nonstriated muscle fibre, Cardiac muscle fibre)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – III
MARINE SCIENCE (E. G.)
(Revised Syllabus Effective from JUNE - 2022)

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 and their relations
- 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
    - Molluscs
    - Arthropods (crab and prawns).
  - Vertebrate: Economic importance
    - Scoliodon (sharks)
    - Marine mammals (whales and dolphins)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B.Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 401)
(Revised Syllabus Effective from JUNE - 2022)
(Non-chordates, Evolution and Economic Zoology)

UNIT – 1 Classification:

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

UNIT – 2 Type study:

- Study of the following animal types with reference to the structure and functions of various organs of all systems of **Pila**:
  - Classification and 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 alliedaspects,Indian 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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 401)
(Non-chordates, Evolution and Economic Zoology)

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

1 - **Classification** of following animals upto sub-class.(with the help ofspecimens,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 - **Evolution**

- Homologous organs-Forelimbs and hind limbs of chordates
- Analogousorgans-Wings of butterfly, birds and bats
- Vestigial organs- Caecum and vermiform appendix in man , hindlimbs in python, leg bones in whale
- connecting link-Archaeopteryx, Ornithorhyncus, Peripatus
- Atavism (Reversion)-Human babies with a tail, Dolphins with legs, Iris dogman

4 - **Protective coloration and mimicry**

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

5 - **Economic Zoology:**

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PAPER – IV (Z – 402)
(Revised Syllabus Effective from JUNE - 2022)
(Chordates, Embryology and Osteology)

UNIT – 1Classification:

- Introduction to classification: General study of the followingchordates up to subclass with examples:
  - Reptilians
  - Aves
  - Mammals

UNIT – 2Animal Type Study:

- Study of the **Uromastix** with reference to their structure and functions of various organs of all systems:
  - 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

UNIT – 4Osteology:

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 402)
(Chordates, Embryology and Osteology)

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

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 onlywith 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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B.Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 403)
(Revised Syllabus Effective from JUNE - 2022)
(Biochemistry,Genetics andAnimal Physiology)

UNIT – 1 Biochemistry

- Digestion and absorption:
  - Carbohydrates
  - Proteins
  - Lipids

UNIT – 2 Genetics:

- Epistasis genes
- Concept of lethal alleles and, multiple alleles

UNIT – 3 Physiology:

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

UNIT – 4 Physiology:

- **Excretion and osmoregulation:**
  - Structure of uriniferous tubule
  - Physiologicalprocess 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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 403)
(Biochemistry, Genetics and Animal Physiology)

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

1 Biochemistry

(A). Qualitative test for organic compound:

Carbohydrates:

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

(B) Digestion and Absorption of Carbohydrate, Protein and Lipid.

2 Genetics:

To study Epistasis genes, lethal alleles, Multiple alleles by chart.

3 Physiology:

To determine normal constituents of urine.

To determine abnormal constituents of urine.

4 Physiology:

To study different types of Sensory organs –human eye and ear.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
MARINE SCIENCE (EG)
(Revised Syllabus Effective from JUNE - 2022)

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

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.
3. Invertebrate Zoology, 1992; S. N. Prasad, Vikas Publishing House, New Delhi.
4. Life of Invertebrates, 1992; S.N. Prasad, Vikas Publishing House, New Delhi.
5. Invertebrate Zoology, 1992 4th Edn., reprint, P.S. Dhami and J. K. Dhami, R. Chand and Co., New Delhi.
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.
8. Invertebrates Zoology, 1994, 6th Edition, Ruppert, E. Edward, R. D. Barnes; Saunders college Publishing, USA.
9. Invertebrate Zoology, 1991, P.A. Meglitsch and F. R. Schram, Oxford University Press; New York.
10. Invertebrate: A New synthesis, 1988, R.S.K. Barnes, P. Calow and P.J.W., Olive Blackwell Scientific, U.K.
11. An Introduction to Protochordata, 1990, H. S. Bhamrah and KavitaJuneja, Anmol publication, New Delhi.
12. The invertebrates: Protozoa through CtenophoraVol.I, 1959, Hyman, Libbie Henrietta, McGraw-Hill Book Co., Inc. New York.
13.A text book of Zoology, Vol.II, 1990, T. J. Parker and W. A. Haswell, Low price Publication, Delhi.
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

Reference Books for Z-302 &402

1. A text book of Zoology, Vol.II, 1990, T. J. Parker and W. A. Haswell, Low price Publication, Delhi.
2. Modern Text Book of Zoology, 1992, R. L. Kotpal, Rastogi Publication, Meerut.
3. Chordate Zoology, 1982, P. S. Dhami and J. K. Dhami, R. Chand and Co., New Delhi.
4. The life of Vertebrates, 3rd edn.1993, J. Z. Young, Oxford University Press, USA.
5. The Phylum Chordata: Biology of Vertebrates and their Kin, 1987, H. H. Newman, Distributor Satish book enterprise, Agra.
6. A text book of Zoology, 1984, R. D. Vidyarthi, S. Chand and Co., New Delhi.
7. Comparative Anatomy of the Vertebrates, G. C. Kent, R. K Carr,9thEdn., 2001, McGraw Hill, Boston, USA
8. Practical Zoology Invertebrates, 11th revised Edn., 2014, S. S. Lal, Rastogi publ.,Meerut.
9. Vertebrate Practical Zoology, 11th revised Edition, 2014, S. S. Lal, Rastogi publ.,Meerut.
10. Practical Zoology, 2004, Vijay Laxmi Sharma, Paragon International Publishers.
11. The anatomy of Garden Lizard, 1974, S.Y. Paranjape, Pune University Publication,Pune.
12. Chordate Zoology, 2009 reprint, E. L. Jorden, S. Chand and Co., New Delhi.
13. Text book of Zoology, Vertebrates, Vol. II, T.J. Parker and W.A. Haswell, edited by Marshall and Williams, CBS Publications, New Delhi.
14. An Introduction to Embryology 2012, 5thEdn., Balinsky B. L., Fabian B. C. BrooksCole Pub. Co., USA.
15. Developmental Biology: Patterns**,** principle and problems, 1982, Saunders J. W.,Prentice Hall Coll Div.
16. Developmental Biology 1992 3rd den Browder L. W., Erickson C.A. & Jeffery W. R.,Saunders college pub., London.
17. Developmental Biology, 2013, 10thEdn. Gilbert S. F., Sinauer Associates Inc.

Reference books for Z-303 &403

1. Principles of Biochemistry, 1993, 2nd Edn, Lehninger A. L. Nelson D.L. & Cox M.M.
CBH Publisher and distributors, Delhi.
2. Biochemistry, 1995 5th Edn. Zuby G. Wm, C.Brown Communications USA
3. Harpers Biochemistry ,1996 ,26 th Edn., Murray R.k.,Granner D.K. ,Mayes P.A. &Rodwell
V.W. Prentice Hall international USA.
4. Outline of biochemistry, 1995 5th Edn, Conn E.E., Stumph P.K. Bruening G &DoiR.H.John Wiley & Sons, USA
5. Principals of Biochemistry, 1993, 1st Edn., Pattabhiraman T.N.,Gajanan Book publisher sand distributors Bangalore.
6. Clinical Biochemistry, 1994, B. P. Godkar, Bhalini Publishing house, Mumbai.
7. Biochemistry, 1995 5th Edn, Stryer Sanfrancisco, W. H. Freeman & Co.
8. Biochemistry, 1990, 8th Edn., D.Voet & J. Voet, JohnWilley, New York
10. Introduction of Medical Laboratory Technique,1998, 7th Edn., Baker F. J., Silverton R.
E., Pallister C. J., Butterworth-Heinemann, UK
11. Hematology: Basic Principles and Practice, 2008, 5th Edn., Ronald Hoffman , BruceFurie, Philip McGlave, Churchill Livingstone Elsevier, USA
12. Histological and Histochemical Methods, Theory and Practice, 2008, 4th Edn., John A.Kiernan, Scion Publishing Ltd, UK
13. Basic Separation Techniques in Biochemistry, 1998, Okotore R. O., New AgeInternational, New Delhi.
14. Cytological techniques: The Principles Underlying Routine Methods, 1963, Baker J.R,Methuen & Co, London
15. Davenport H. A.: Histological and Histochemical techniques.
16. Handbook of basic Microtechnique, 1958, 2nd Edn., Gray P., McGraw-Hill, USA
17. The microscope and how to use it, 1970, George Stehli, Dover Publications Inc., NewYork.
18. Histopathological technique and Practical Histochemistry, 1976, 4th Edn, Lillie R.DMcGraw-Hill, USA

19. Staining methods (Histological and Histochemical), 1960, Mc Manus J. F. A. AndMowry R.W., Paul B. Hoeber, Inc.; Harper & Brothers, NY
20. Notes on Microscopical Techniques for Zoologist, 1964, Pantin C. F.A.: CambridgeUniversity Press
21. Elementary Microtechnique, 1973, 4th Edn., Peacock H.A., Edward Arnold Publ. Ltd.,UK
22. Histochemistry, 1968, Pearse A.G.E., Vol. I & II., W.B. Saunders Company (WBS) ofPhiladelphia
23. Microscope and microscopic life, 1979, 2nd Edn., Peter Healey, Hamlyn, UK
24. Biological Instrumentation and methodology, 2008, 2nd Revised Edition, P.K. Bajpai, S.Chand and Co. Ltd., New Delhi.
Textbook of Medical Physiology, Guyton A.C. & Hall J.E., 2006, 11th Edition, Hercourt Asia Pvt. Ltd. / W.B. Saunders Company
25. Principles of Anatomy & Physiology, 2006, 11th Edition, Tortora G.J. & Grabowski S.,John Wiley & sons, Inc.
26. Human physiology, Vol. I & II, 1980, 12th Edn. Dr. C. C. Chatterjee, Medical appliedagency, Kolkata
27. Text book of Animal Physiology, 2008, 2nd Edn. Nagabhushanam, S. V. S. Rana, S.Kalavathy, Oxford University Press, India.
28. Animal Physiology: Adaptation and Environment, 1997, Schmidt-Nielsen, Knut,Cambridge University Press,
29. General and Comparative Physiology, 1983, 3rd Edn., Hoar W. S., Prentice Hall, UK.
30. Medical Physiology, 2006, Asis Das, Books and Allied Pvt. Ltd., Kolkata
31. Endocrinology, 2005, Lohar P. S., M J P Publishers, Chennai
32. Vander, Sherman, Luciano's Human Physiology: The Mechanisms of Body Function,2003, 9th Edn., Eric P. Widmaier, Hershel Raff , Kevin T. Strang , Mc Graw Hill
33.Textbook of Practical Physiology,2001,G.K.Pal,Pravati Pal:Orient Longman
34.Experimental Physiology,2005,S.C.Rastogi:New AgeInternational Publishers.

Reference Books For Marine Science:

1) Fundamentals of Ecology- E.P.Odum
2) Marine biology and Ecology-N.K.Pillai
3) Fishes-Mary Chandy
4) Fish and Fisheries of India-V.G. Jhingran
5) Fish and Fisheries-S.S.Khanna.
6) Marine Fish Farming for India-James Hornell
7) Introduction to Marine Biology-Karleskint
8) Marine fisheries Extension-P.N.Ananth
9) General and Applied Ichthyology(fish and fisheries)-S.K.Gupta & P.C.Gupta.:S.Chand and Co.NewDelhi.
10) Aquaculture Technology & Environment-Ujwala Jadhav.
11) Economic Zoology- Dr.G.S.Shukla &Dr.V.B.Upadhyay
12) Fish and Fisheries,2013,Dr.Arvind N.Shukla,D.P.H.Pvt.Ltd.New Delhi
13) Economic Importance of Fisheries and Aquaculture,2013,S.K.Rao & S.Rawat,Campus Books,New Delhi

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-V

Zoology Paper –Z-501

(Non chordates Taxonomy, Animal type)

(Revised Syllabus Effective from JUNE - 2022)

Unit - 1: Taxonomy of non-chordates phyla to be studied up to order. (0**7 Hours)**
Structural organization of different classes of non-chordates.
(Protozoa to Annelida)

Unit - 2: Study of the following animal types with reference to the **(08 Hours)**
Structure and functions of various organs of all systems:**Leech**

Unit - 3: Amplification of non-chordate phyla **(08 Hours)**

- Protozoa: Nutrition, Economic Importance
- Porifera: Skeletal system, Reproduction
- Cnidaria:Coral and coral reefs, Mesentries
- Helminthes: Ascariasis
- Annelida:Asexual Reproduction in Polychaeta,Coelomoductsand nephridia

Unit - 4: Phyllogenetic relationships of the following minor phyla and
General organization: **(07 Hours)**

- Ctenophora
- Chaetognatha

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-V

Zoology Practicals(Based on paper Z-501)

(Revised Syllabus Effective from JUNE - 2022)

1 – <u>Classification of following animals upto order.</u>

Volvox, Ceratium, Entamoeba, Polystomella, Plasmodium, Opalina, Balantidium, Leucosolenia, Pheronema, Euspongia, Obelia,Millipora, Physalia, Valella, Rhizostoma, Tubipora, Alcyonium, Cerianthus, Pennatula, Virgularia, Adamsia, Zoanthus, Favia, Fungia, Astrea, Opisthorchis, Trichinella, Sabella, Serpula, Arenicola, Polynoe, Acanthobdella, Sagitta and Pleurobranchia

2 – Study of some aquatic invertebrates like Euglena**,** Paramoecium, Vorticella, Hydra, Daphniaand Cyclops from the culture.

3 – <u>Study of permanent slides :</u>

- Sponge spicules and gemmules
- Life cycle of Ascaris

4- The following practicals of **Leech** to be studied/taught **<u>only</u>** with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- **Systems**: Digestive system, Nervous system and Reproductive system
- **Mountings**: Jaws, Salivary glands, Ovaries and Testicular nephridia

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Paper – Z-601

(Non chordates Taxonomy, Animal type)

(Revised Syllabus Effective from JUNE - 2022)

Unit - 1: Taxonomy of non-chordates phyla to be studied up to order. **(07 Hours)**
Structural organization of different classes of non-chordates.
(Arthropoda,Mollusca, Echinodermata, Hemichordata)

Unit - 2: Study of the following animal types with reference to the **(08 Hours)**
structure and functions of various organs of all systems : **Sepia**

Unit - 3: Amplification of non-chordate phyla. **(08 Hours)**

- Arthropoda:Respiration,Excretion,Crustacean larvae
- Mollusca: Torsion and detorsion in Gastropods,Economic Importance
- Echinodermata:Autotomy andregeneration, larval forms and evolutionary significance
- Hemichordata (Balanogloussus): Reproductive system, Development.

Unit - 4: Phyllogenetic relationships of the following minor phyla and Generalorganization:

- Endoprocta **(07 hours)**
- Ectoprocta

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Practicals (Based on paper Z-601)

(Revised Syllabus Effective from JUNE - 2022)

1 - Classification of following animals upto order.

Apus, Daphnia, Cyclops, Cypris, Squilla, Hippa, Sacculina, Mantis, Dragon fly, Ear-wig, Mosquito, Ant, Bettle, Tick, Mite, Heliotis, Patella, Nautilus, Oyster, Mytilus, Doris, Cyprea, Teredo, Solen, Octopus, Loligo, Astropecten, Strongylocentrotus, Synapta, Sand-dollar, Holothuria, Pedicellina and Bugulaavicularia

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

- **Systems**: Digestive system, Nervous system
- **Mountings**: Jaws, Radula, Chromatophores and Spermatophores

3 - Study of permanent slides :

Crustacean larvae, Echinoderm larvae and Hemichordata larva

Reference books: Z-501 and Z-601

(1)Invertebrate Zoology- E. L. Jordan and P.S.Verma.

(2) A Text book of Invertebrate Zoology - S. N. Prasad.

(3) A Text book of Invertebrate Zoology - R. L. Kotpal.

(4) Invertebrates Zoology - R. W. Hegner.

(5) A manual of Zoology vol. I - E. Ayyer.

(6) The Invertebrates (only) - Bora dale & Potts.

(7) Invertebrate Zoology - Arumugum.

(8) A Text book of Zoology - Arumugum & Narayanan.

(9) A Text book of Zoology Vol. I - Parker & Haswell.

(10) Invertebrate Structure & Function - E. J. W. Barrington.

(11)A Textbook of Practical Zoology Invertebrate -S.S.Lal

(12) A Textbook of Practical Zoology- Ghosh& Manna.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Paper – Z-502

(Chordates Taxonomy, Animal type and Comparative Anatomy)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Taxonomy of chordate to be studied up to order, including Protochordata, Cyclostomata, Pisces and Amphibia. **(07 Hours)**

Unit – 2: Study of the following animal types with reference to the Structure and functions of various organs of all systems: **Scoliodon** **(08 Hours)**

Unit – 3: Amplifications **(08 Hours)**

- Geological time scale
- Origin of chordates
- Pisces: Dipnoi, Types of scales and Parental care in fishes
- Amphibia: Origin and evolution, Neoteny and Apoda (Gymnophiona)

Unit – 4: Comparative Anatomy **(07 Hours)**

- Aortic arches
- Vertebral column
- Skull

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Practicals (Based on Paper- Z-502)

(Revised Syllabus Effective from JUNE - 2022)

1. Classification of following animals up to order.

Amphioxus, Ascidian, Doliolum, Lamprey, Myxine, Tiger shark, Raja (Skates), Anabas, Harpodon, Clarius, Syngnathus, Ichthyophis, Necturus, Ambystoma, Alytes and Pipa

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

- **Systems**: Digestive system, Urinogenital system, Arterial system, Venous system and Brain
- **Mounting**: Eye muscles, Membranous labyrinth and Ampulla of Lorenzini

3. Parental care in fishes

4. Types of scales

5. Comparative study of Vertebral column and Skulls (Scoliodon, Frog, Varanus, Pigeon and Rabbit)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z-602

(Chordates Taxonomy, Animal type and Histology)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Taxonomy of chordate to be studied up to order, including Reptilia, Aves and Mammalia **(07 Hours)**

Unit – 2: Study of the following animal types with reference to the Structure and functions of various organs of all systems: **Pigeon** **(08 Hours)**

Unit – 3: Amplifications **(08 Hours)**

- Reptilia: Mesozoic reptiles, Rhyncocephalia and its phylogenetic importance, Temporal fossae and Arcades, Carapace and Plastron
- Aves: Bird migration, Flight adaptations in birds, Ratitae
- Mammals: Dentition, Prototheria, Metatheria, Cetacea and Primates

UNIT – 4: Mammalian Histology: **(07 Hours)**

- Pituitary
- Thyroid
- Parathyroid
- Adrenal
- Thymus

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on Paper- Z-602)

(Revised Syllabus Effective from JUNE - 2022)

1. Classification of following animals up to order:

Trionyx, Sphenodon, Varanus, Dhaman, Russel's viper, Sea snake, Great Indian Bustard, Horned owl,Kiwi,Flamingo,Ornithorhynchus, Koala, Erinaceas, Seal, Leopard and Rhesusmonkey

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

- **Systems**: Digestive system, Urinogenital system, Circulatory system and Brain
- **Mountings**: Pecten and Hyoid apparatus

3. Study of Mesozoic reptiles (by Models/charts/photographs etc.) like Brontosaurus, Stegosaurus, Ichthyosaurus, Dimetrodon, Allosaurus and Rhamphorhynchus

4. Types of feathers

5. Dentition in Dog, Cat, Horse, Rabbit, Rat and Man

6. Mammalian histology: Pituitary, Thyroid, Thymus, Parathyroid, Adrenal

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Reference books: Z-502 and Z-602

(1) Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.

(2) Pough H. *Vertebrate life*, VIII Edition, Pearson International.

(3) Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones andBartlett Publishers Inc.

(4) Outline of comparative anatomy of vertebrate Kingsley J.S.Central book depot.Allahabad

(5) Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IVEdition. McGraw-Hill Higher Education.

(6) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition.The McGraw-Hill Companies.

(7) Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.

(8) Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.

(9) JUNQEIRA'S Basic Histology Text & Atlas by Anthony L. Mescher

(10) Histology: Arthiur W. Ham, M. B.

(11) Vertebrate Zoology: An Experimental Field Approach-Nelson G.Hairston. Cambridge University Press, 1994

(12) Chordate Zoology E.L Jordan & P. S. Verma. S.Chand

(13) Vertebrate Zoology: An Experimental Field Approach-Nelson G.Hairston. Cambridge University Press, 1994

(14) Text Book of Zoology - Dalela and Verma. JayPrash Nath & co. Meerut

(15) Text Book of Zoology - S.N. Prasad. Vikas Publishing House pvt.ltd. Delhi

(16) Chordate Zoology - Agrawal and Dalela. JayPrash Nath & co. Meerut

(17) Text book of Zoology - R. D. Vidyarthi. S.Chand

(18) Jiv Vignan-2 (Gujarati) - Nirav Prakashan.

(19) A Text Book of General Biology - Tomer & Singh. Rastogi Publication,Meerut

(20) Text Book of Chordates - A. Thangamani, S. Prasanna Kumar

(21) Prushthvanshi Praniyo ane Garbhvidya - A.B.Vyas. Guj.Granth nirman Board.

(22) Utkrushtha Aprushthvanshi Praniyo - U.M.Rawal. Guj.Granth nirman Board.

(23) Chordate Zoology - Majupuria.

(24) A Manual of Zoology Vol. I & II - Ekambernath Ayar. S. Vishwanathan Chennai.

(25) Histology by Majumadar

(26) Histology by Shivaji Deshmukh

(27) Text book of Human histology with colour atlas and practical guide by Inderbir Singh.

(28) Prani Autikee . Gujarat granth nirman board
(29) Practical zoology Vertebrate By S. S. Lal., Rastogi publications Meerut.
(30) A manual zoology Practical zoology Chordates By Dr. P. S. Verma., S. Chand publications
(31) Practical Vertebrate zoology By Agrawal & Jindal., Pragati Prakashan
(32) Manual of prac. zoology vol.- I,II,III - P.K.G.Nair, Himalaya Publishing House.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology Paper – Z - 503

(Enzymology and Biochemistry)

((Revised Syllabus Effective from JUNE - 2022)

Unit - 1: Enzymology (08 Hours)

- Definition and chemical nature
- Properties
- Holoenzyme
- Nomenclature and classification
- Enzyme activation: Activation energy
- Mechanism of enzyme action
- Factors affecting on enzyme action
- Enzyme inhibition
- Enzyme kinetics
- Derivation of Michaelis-Menten equation
- Lineweaver-Burk plot
- Enzyme regulation

Unit - 2: Biophysical Chemistry (07 Hours)

- pH
- Buffer
- Reaction kinetics
- Thermodynamics
- Solution and Colligative properties

Unit - 3: Nucleic acid and Vitamins (07 Hours)

- **Nucleic acid :** Composition, types, Structure and function of DNA, Composition, types, Structure and function of RNA
- **Vitamins** : Composition, Structure and Formation

Unit - 4: Metabolism: (08 Hours)

(With structures)

- Glycolysis
- TCA and oxidative phosphorylation (ETS or Biological oxidation)
- Gluconeogenesis
- Glycogenesis
- Glycogenolysis
- Deamination
- Transamination
- Ornithine cycle
- β-oxidation and synthesis of long chain fatty acids
- Glycerol metabolism

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Practicals (Based on Paper- Z - 503)

(Enzymology and Biochemistry)

(Revised Syllabus Effective from JUNE - 2022)

(1) Factors affecting enzymes activity temperature,

(2) Factors affecting enzymes activity pH.

(3) To study the digestive enzymes from Human Saliva

(4) Preparation of pH, buffer or different solution as per theory

(5) Study of vitamins structure through model or chart

(6) Structure of DNA with the help of model / chart

(7) Structure of RNA with the help of model / chart

(8) Preparation of A___, T___, G___, C___ by models

Reference books: Z-503

(1) J.L. Jain – Biochemistry

(2) Lehninger- Biochemistry

(3) Stryer-Biochemistry

(4) Granner and Rodwell - Harper's Illustrated Biochemistry

(5) J H Wet - General Biochemistry

(6) RangnathaRao K-Text Book of Biochemistry

(7) C.B.Powar - Biochemistry

(8) Das.-Biochemistry

(9) Fundamentals of Biochemistry -Dr. A. C. Deb

(10) Fundamentals of Biochemistry -David T. Plummer

(11) Biochemistry -N. Arumugum

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z - 603

(Animal Physiology and Endocrinology)

(Revised Syllabus Effective from JUNE - 2022)

Unit - 1: Respiration (08 Hours)

- Aquatic & terrestrial respiratory mechanism
- Hypoxia
- O2 dissociation Curve
- Respiratory quotients
- BMR
- Transport of gases
- Exchange of gases
- Respiratory pigments
- Neural and chemical regulation of respiration.

Unit - 2: Circulation (08 Hours)

- Structure of mammalian heart
- Properties of cardiac muscles
- Internal circulation (systematic, pulmonary and coronary) Cardiac-cycle and cardiac output Stroke volume
- Blood pressure
- ECG
- Blood coagulation
- Hormonal, Ionic and Nervous regulation of heart beat.

Unit - 3: Mammalian Endocrinology (07 Hours)

Hormones:

- Pineal Gland
- Hypothalamus
- Pituitary Gland

- Thyroid Gland
- Parathyroid Gland
- Thymus
- Pancreas
- Adrenal Gland
- Ovary and Testes

Unit - 4: Chemical coordination of Hormone (07 Hours)

- Chemical nature of hormones
- Mechanism of hormonal action

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on Paper- Z - 603)

(Animal Physiology and Endocrinology)

(Revised Syllabus Effective from JUNE - 2022)

1. Study of analytical instrument principle and applications.
    - pH meter
    - Sphygmomanometer
    - Stethoscope
    - Thoma pipette of haemocytometer
2. Study of total RBC count in human blood
3. Study of WBC differential count
4. Measurement of systolic blood pressure, diastolic pressure, pulse pressure, mean pressure of anindividual with the help of sphygmomanometer and stethoscope
5. Study of Electrocardiogram (ECG)
6. Study of hormonal control and regulation of glands:
    - Pituitary Gland
    - Thyroid Gland
    - Parathyroid Gland
    - Pancreas
    - Adrenal Gland
    - Ovary and Testes

Reference books: Z-603

(1) General and Comparative Endocrinology - Barrington,
(2) Textbook of Endocrinology - R.H. Williams
(3) A Text book of Biochemistry - A. K. Berry.
(4) Text book of medical Physiology - Guyton.
(5) A Text of Animal Physiology - Nagabhushanam.
(6) A Text of Animal Physiology - A. K. Berry.
(7) Comparative animal Physiology - Proser& Brown.
(8) Animal Physiology -M. P. Arora

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Paper – Z – 504

(Embryology and Wild life Biology)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Introduction to Embryology and Gametogenesis (07 Hours)

- Introduction
- The Programme of Development
- Scope and Branches of embryology
- Spermatogenesis: Formation of spermatids, Spermiogenesis, Factors controlling spermatogenesis, Structure of a typical sperm and Significance of spermatogenesis Oogenesis: Formation of egg (ovum) - Multiplication phase, growth phase (Previtellogenesis and Vitellogenesis) and Maturation phase.

Unit – 2: Fertilization and Sexual cycles (07 Hours)

- Fertilization : External and internal fertilization - mechanism of Fertilization - capacitation and contact – acrosomal reaction and penetration – activation of ovummigration of pronuclei and amphimixis - theories of fertilization - significance offertilization
- Estrous and Menstruous cycles, Pregnancy, Parturition, Placenta and placentation

Unit – 3: Chick Embryology (07 Hours)

- Sperm, Egg, Fertilization, cleavage, blastulation, gastrulation, formation of germ layers and primitive streak
- Development of chick embryo of 8, 16, 21, 24, 33, 48 and72 hours

Unit – 4: Wildlife Biology (07 Hours)

- Introduction to wild life Endangered, vulnerable, threatened species National parks and Sanctuaries
- Causes of depletion, conservation and management
- Wild life in Gujarat
- Wild life trades and its legal provisions
- CITES (Convention on International Trade in Endangered Species)
- Conservation projects: Wild ass, Tiger, Crocodile and Black buck

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Practicals (Based on paper Z - 504)

(Embryology and Wild life Biology)

1. Different types of mammalian placent

2. Chick embryology: Unfertilized egg, different stages cleavage, morula, blastula, gastrula, development of Structure of 8, 16, 21, 24, 33,48 and 72 hrs.

3. To prepare temporary mounting of chick embryo by Window's preparation.

4. Study of projects – Wild ass, Tiger, Crocodile and Black buck-their locations inmap of India, present status and significance.

5. Wild life Illegal trades, practices and its control measures of following:

- Tiger (Claws, Bones, Skins and Whiskers)
- Rhino (Horns)
- Elephant (Tusks)
- Musk Deer (musk)
- Turtle (Shells)

Reference books:Z-504

(1) Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.

(2) Degroot, L.J. and Jameson, J.L. (eds). Endocrinology. W.B. Saunders and Company.

(3) Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.

(4) Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

(5) Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

(6) Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

(7) Chordate Embryology - P S Verma S.Chand Delhi.

(8) Embryology - N. Arumugam , Saras Publication, KanyaKumari

(9) Embryology A. K. Berry

(10) A Textbook of Embryology By G. S. Sandhu, Sharad Srivastava and C. K. Arora

(11) Wild life Protection Act(1972) - Publish by Wildlife Trust of India

(12) Remote Sensing – Schowengerdt

(13) The Wild Life of India By E. P. Gee An imprint of Harper Collins publishers india

(14) Call of the wild by B. Seshadri

(15) The wild animals of India by B. N. H. S.

(16) Vanya jeev vigyan by Gujarat Granth nirman board, Gujarat

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B.Sc. Semester-VI

Zoology Paper – Z - 604

(Entomology)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1:Introduction to Entomology (08 Hours)

- History, Development, Scope and Applications of Entomology
- Branches of Entomology
- General characteristics of class Insecta

U nit – 2:Agricultural Entomology (08 Hours)

- Pests of field crops and their management:
- **Sugarcane** – Stem borer, Leaf aphids and Shoot borer
- **Cotton** – Spotted ball worm, Leaf roller, Red cotton bug and Jassids
- Pests of Horticultural crops and their management:
- **Vegetables:** Brinjal (Shoot and Fruit borer, Leaf eating beetles, Jassids, Leaf roller), Cabbage (moth and maggot fly)
- Insect pests of stored grainsand their management (Rice weevil, SawToothed Grain beetle, Khapra beetle, Rice moth and lesser grain borer)

U nit – 3:Medical Entomology (07 Hours)

- Morphology, Vectorship, Pathogenicity and Control of: Mosquito, Housefly, Ratfleas and Head louse
- Morphology, Vectorship, Pathogenicity and Control of: Pests of domestic animals - Dogs, Cats and Cattles

U nit – 4:Economic Entomology (07 Hours)

- **Beneficial Insects** (Economic importance of Honey bee, Silkworm, Lac insect, Pollinators, Scavengers, Insect as a source of drugs and dyes)
- **Household pests:** Morphology, Damage caused and Control measure of: Cockroach, Ants and Termites and Bed bugs

- **Insect pest control methods:** Bio control,Integrated pest management, Insecticides and Pesticides
- Appliances used for pest management (Hydraulic Sprayers: Hand, Knapsack and Foot., Pneumatic Sprayers: Hand and Knapsack)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Practicals (Based on paper Z-604)

(Entomology)

(Revised Syllabus Effective from JUNE - 2022)

To study the following practicals with the help of charts/ models/photographs/ specimens/slides etc.

1. Branches of Entomology, Its scope, Applications, Development.
2. Identification, Pathogenicity and Control of pests
   - Cereals - Khapra beetle (*Trogoderma granarium*), Locust
   - Cotton - Spotted ball worm
   - Sugarcane (*Saccharum officinarum*) – Stem (node-internode) borer
   - Vegetables - *Hellula undalis*

3. Morphology, Vectorship, pathogenicity and control of – Anopheles (male – female), Culex (male-female) and Aedes (male-female).

4. Pests of domestic animals: Dogs- Dog flea (*Ctenocephalidies canis*), *Trichodectes canis*, Cats- Cat flea (*Ctenoce felis*), Cattles – Cattle tick (*Boophilus microplus*), *Haemaphysalis cuspidate, H.minuta*.

5. Economic importance of arthropods /insects – Silk worm, Lac insects, Honey bees and Butterflys **as Pollinators**; Lady bug and Dermestid beetle **as Scavengers**; Cochinial Insects and Kermes insects(of oak tree) **as Dyes**; Honey bees, Blow fly maggots, Centipedes and Cantharisfly (*Canth vesictoria*) **as Drugs /Medicine**s; Ants, Termites, Dermestid beetles and Bed bugs as **Harmful insects.**

6. Pests management appliances- Insect repellents,Hydraulic Sprayers: Hand, Knapsack and Foot; Pneumatic Sprayers: Hand and Knapsack), Traps (electric and chemical). Biological pests controller- Spiders, Lizards, Frogs, Green bee-eater, Ladybug beetle and Bats.

Reference books: Z-604

(1) General and Applied Entomology- Nayer, K.K. , T. Anant Krishnan and B.W. David

(2) Metcalf, G.L. and W.P. Fling : Destructive and Useful Insects

(3) Hemsingh Pruthi : A Text Book of Agricultural Entomology

(4) Wigglesworth : Principles of Insect Physiology

(5) ESSIG : College Entomology

(6) M.S. Mani : A Text Book of General Entomology

(7) Fradt, R.E. : Fundamentals of Applied Entomology

(8) Smith, K.G.V.: Insects and Other Arthropods of Medical Importance

(9) Ray, D.N. and A.W.A. Brown: Entomology Medical & Veterinary

(10) Shrivastava, K.P.: A Text Book of Applied Entomology (Vol.I–H)

(11) Ross, H.A.: Text Book of Entomology

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-V

Zoology Paper – Z-505

(Forensic science and Toxicology)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Definition, Scope, History and Development of Forensic science, Basicprinciples, Forensic science in international perspectives including RFSL, CFSL and INTERPOL, Dactylography, Foot prints, Tattoo marks, Occupational marks, Speech and Voice. **(07Hours)**

Unit – 2: Morphology and Structure of hair: Human and other animals (Dog, Cat, Cow,Buffalo, Horse, Goat), DNA Fingerprinting, Wildlife and forensic science **(08 Hours)**

Unit – 3: Concept and Scope of Toxicology: Introduction, History, Disciplines of toxicology, Toxicants and their classification, Toxicity **(07 Hours)**

Unit – 4: Food-Additives: General account, Incidental(indirect) additives, Intentional(direct)additives, Terms related to adverse reactions to food, Food-borne molds and Mycotoxins (food contaminants), Testing of food additives **(08 Hours)**

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-V

Zoology Practicals (Based on paper – Z-505)

(Forensic science and Toxicology)

(Revised Syllabus Effective from JUNE - 2022)

To study the following practical with the help of charts/models/photographs/ specimens/slides/simple methods without using live animals.

1. Study of different types of Finger prints and Tattoo marks

2. Study the morphology of different hairs- Man, Dog, Cat, Cow, Buffalo, Horse, Goat

3. Study of various samples of food additives/preservatives and their usages (Vinegar, Benzoic acid, Formic acid, Citric acid and Gelatin)

4. Study of food contaminants on - Bread, Chapati, Curd and Fruits

5. Tests (only two tests to be performed) of adulterated milk, black pepper, khoya (maava of milk),edible oil, coconut oil, ghee, rabdi

6.To study DNA finger printing method

Reference books: Z-505

(1) Fundamentals of Toxicology-K.Pandey,J.P.Shukla and S.P.Trivedi.

(2) Environmental Biology and Toxicology-P.D.Sharma.

(3) Aquatic Pollution and Toxicology-R.K. Trivedi.

(4) Toxicology-P.D. Sharma.

(5) Introduction to General Toxicology-E.J.Ariens, A.M.Simonis and J.Offermerier.

(6) Modern Toxicology,vol.I,II,III - P.K.Gupta and D.K.Salunkhe.

(7) Basic Toxicology- C.Lu Frank

(8) Toxicology, A Basic Science of Poisons,2nd edition- L.J.Casarett and J.Doull

(9)Text book of forensic science and toxicology- Narayan Reddy

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Paper – Z-605

(Cell Biology and Bioinstrumentation)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Microscopy **(08 Hours)**

- Introduction
- Magnification, Resolution
- Light microscope (Simple and Compounding Microscope)
- Electron microscope
- Phase Contrast microscope

Unit – 2: Cytological Techniques **(08 Hours)**

- Examination of living cells (Teasing, Smear preparation, Squash preparation, Whole mount and Microtomy)
- Fixation
- Cytological staining

Unit – 3: Biochemical techniques (**07 Hours)**

- Paper chromatography
- Centrifugation
- Electrophoresis
- PCR
- Spectrophotometry

Unit – 4: Cell cycle and Cellular transportation(**07 Hours)**

- Cell Cycle
- Interphase
- Mitosis
- Meiosis
- Cell membrane structure and function: Structure of cell membrane,Lipid bilayer and membrane protein diffusion, Osmosis,Ion channels, Active transport, Ion pumps, Mechanism of sorting and regulation of intracellular transport

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Practicals (Based on paper Z - 605)

(Cell Biology and Bio instrumentation)

(Revised Syllabus Effective from JUNE - 2022)

1. Types of microscope
2. Micro technique preparation of permanent slides of different organs
3. To perform paper chromatography for separation of amino acids
4. Permanent slides of mitosis and meiosis
5. To prepare different stages of mitosis from onion root tip
6. To study electrophoresis, Centrifuge machine, PCR andSpectrophotometry through charts/models

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Reference books:Z-605

(1) Basic Separation Techniques in Biochemistry, 1998, Okotore R. O., New Age International, New Delhi.

(2) Cytological techniques: The Principles Underlying Routine Methods, 1963, Baker J.R, Methuen & Co, London

(3) Davenport H. A.: Histological and Histochemical techniques.

(4) Handbook of basic Microtechnique, 1958, 2nd Edn., Gray P., McGraw-Hill, USA

(5) The microscope and how to use it, 1970, George Stehli, Dover Publications Inc., New York.

(6) Histopathological technique and Practical Histochemistry, 1976, 4th Edn, Lillie R.D McGraw-Hill, USA

(7) Notes on Microscopical Techniques for Zoologist, 1964, Pantin C. F.A.: Cambridge University Press

(8) Elementary Microtechnique, 1973, 4th Edn., Peacock H.A., Edward Arnold Publ. Ltd., UK

(9) Histochemistry, 1968, Pearse A.G.E., Vol. I & II., W.B. Saunders Company (WBS) of Philadelphia

(10) Microscope and microscopic life, 1979, 2nd Edn., Peter Healey, Hamlyn, UK

(11) Biological Instrumentation and methodology, 2008, 2nd Revised Edition, P.K. Bajpai, S. Chand and Co. Ltd., New Delhi

(12) Cell and molecular biology By P. K. Gupta., Rastogipublication, Meerut, New Delhi

(13) Cell biology A laboratory handbook Volume 2., Edited by Julio E. Celis

(14) Fundamentals of Biochemistry By Dr. A. C. Deb.

(15) Biochemistry By. Geoffrey L. Zubay

(16) Text book of Biochemistry By A. K. Berry

(17) Cell biology Genetics Molecular Biology Evolution and Ecology By P. S. Verma and V. K. Agrawal., S. Chand publicationMeerut.

(18) Handbook of Exprerimental Physiology and Biochemistry By Dr. P. V. Chadha., Jaypee publication

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Paper – Z - 506

(Genetics and Molecular Biology)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: Gene Structure and Functions **(08 Hours)**

Gene concept, Location of and size of genes, Role of genes, Chemicalcompositionand numbers of genes, Ultra structure of genes, Jumping genes, Split genes and Sexchromatin

Unit – 2: Central Dogma and Biotechnology **(08 Hours)**

Genetic code, DNA replication, Transcription and Protein synthesis, DNA Repair, Recombinant DNA technology

Unit – 3: Human Cytogenetics and Mutation **(07 Hours)**

Karyotyping, Chromosomal banding techniques – G, Q, C and R banding, Chromosomal aberrations and syndromes, Gene mutations

Unit – 4: Oncology **(07 Hours)**

Cancer: Overview of Tumour growth and development, Metastasis

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Practicals (Based on paper Z - 506)

(Genetics and Molecular Biology)

(Revised Syllabus Effective from JUNE - 2022)

1. To study Barr body(dosage compensation) from cheek epithelial cells
2. Preparation of DNA,RNA by models
3. To study DNA replication using photographs or charts
4. Normal human karyotype and syndromes (Down syndrome, Patau, Edward, Cri du chat, Jacob's, Klinefelter, Turner, Super female, Philadelphia)
5. To study types of cancer – Blood cancer, Skin cancer with charts/photos
6. Study of Transgenic animal (Dolly sheep)

Reference books: Z-506

(1) Principles of Genetics- F.J. Gardner.

(2) Molecular cell biology- H.S. Bhamra and KavitaJuneja,

(3) Fundamental molecular biology- Lizabethallison.

(4) Thomas A. P (Editor), (2012). *Genetics and Biotechnology- The Fundamentals. Green Leaf Publications*, TIES, Kottayam.

(5) Vijayakumaran Nair K. (2012). *Genetics and Biotechnology*. Academica, Trivandrum.

(6) Robert A. – Biology of Cancer Weinberg. 2nd edition

(7) Weinberg R A. 2014. Biology of Cancer. 2nd edition. Garland Science, Taylor & Francis

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Paper – Z-606

(Ecology, Ethology and Evolution)

(Revised Syllabus Effective from JUNE - 2022)

Unit – 1: (A) Animal relationship: **(08 Hours)**

- Types of interactions
- Communication in Animal

(B) Biogeography:

- Zoogeography
- Zoogeographical Regions of world

Unit – 2: Social Organization: **(07 Hours)**

- Costs and Benefits of group living
- Characteristics of Social Insect
- Social Behavior in Insects (Honey bee, Wasp, Ants and termite)
- Social Behavior in Mammals.

Unit – 3: Bioluminescence, Biological Clock and Insect Pheromones **(08 Hours)**

Unit – 4: Direct Evidences of Evolution: Fossils **(07 Hours)**

- Introduction
- Branches of Palaeontology
- Earth's structure (Classification of Rocks)
- Fossils formation
- Conditions of Fossilization
- Determination of age of Fossils
- Types of Fossils
- Significance of Fossils
- Conclusions drawn From Fossil record
- Imperfection of Fossil record

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Semester-VI

Zoology Practicals (Based on paper Z - 606)

(Ecology, Ethology and Evolution)

(Revised Syllabus Effective from JUNE - 2022)

1. Estimation of Alkalinity and Hardness
2. Estimation of free CO_2 and dissolved O_2
3. Study of Habituation of mosquito larva
4. Study of Antennal grooming behavior (Chemotoxis)
5. Study of alarming, attractant, aggression behavior
6. Types of Fossils by photo graphs/charts
7. **Education excursions:**

(There shall be major educational excursion or minor excursions submission which is compulsory. The observation made by the candidates during the educational excursion will be recorded in the relevant journal for the practical. Such excursion shall be arranged on the working days of the collage. The submission will be produced at the time of examination and these will be taken in to consideration while assigning the marks)

Reference books: Z-606

(1) Ecology and Environment- P.D.Sharma

(2) Modern concepts of Ecology- H.D.Kumar

(3) Fundamentals of Ecology- E.P.Odum

(4) Animal Ecology- S.P.Singh

(5) Cytology, Genetics and Evolution-P.K.Gupta.

(6) Cell Biology, Genetics and Evolution-N.Arumugam.

(7) Cell biology, Genetics, Molecular Biology, Evolution and Ecology. – P.S. Verma, and V.K.Agarwal
(8) Animal Behaviour-M.P.Arora
(9) Animal Behaviour-E.G.Boulenger
(10) Animal Behaviour-Vinod Kumar
(11) A Textbook of Animal Behaviour-H.S.Gundevia &H.G.Singh
(12) Insect Behaviour-M.Prakash.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology - Fisheries – E.G.

(Revised Syllabus Effective from JUNE - 2022)

Unit- 1: Natural and cultivated ponds-construction, layout, Management and productivity **(05 Hours)**

Unit- 2: Induced breeding methods in major carp **(05 Hours)**

Unit- 3: Fish seed collection and transportation **(05 Hours)**

Unit- 4: Study of aquarium fishes and its management **(05 Hours)**

Unit- 5: Crafts and Gears used in fresh and marine water fisheries **(05 Hours)**

Unit- 6: Larvivorous Fishes **(05 Hours)**

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-VI

Zoology – Fisheries –E.G.

(Revised Syllabus Effective from JUNE - 2022)

Unit -1: Fish migration **(05 Hours)**

Unit- 2: Schooling of fish **(05 Hours)**

Unit- 3: Electric organs in fishes **(05 Hours)**

Unit- 4: Preservation, processing and by-products of fishes **(05 Hours)**

Unit -5: Fish pathology: bacterial, fungal, ectoparasitic and protozoan diseases of fishes **(05 Hours)**

Unit- 6: Global warming and its effects on Fisheries **(05 Hours)**

Reference books: Fisheries – E. G. (Semester – 5 and 6)

(1) An Introduction to fishes-S.S.Khanna.

(2) Fish and Fisheries of India-V.G.Jhingran.

(3) Fish and Fisheries –A.R.Shukla

(4) Fish and Fisheries-B.N.Yadav.

(5) Ichthyology-Lagler,Bardach,Passino & Miller

(6) Fundamentals of Ichthyology-Gupta,Guhalwat,Yadav,Jain

(7) Fundamentals of Ichthyology-S.P.Biswas

(8) General and Applied Ichthyology-S.K.Gupta,P.C.Gupta.

(9) An Introduction to fishes-G.S.Sandhu.

(10) Fish Biology-C.B.L.Srivastava

(11) A Textbook of Fish Biology and Fisheries- S.S.Khanna and H.R.Singh

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology- Food Hygiene and Sanitation – E.G.

(Revised Syllabus Effective from JUNE - 2022)

UNIT – 1: **(08 H0urs)**

- Definition of Public Health and Hygiene
- Social and preventive medicine
- Basic aspects of personal hygiene
- Epidemiology methods
- Introduction to Analytical
- Experimental and Descriptivemethods
- Diseases transmission

UNIT – 2: **(08 Hours)**

- Food Borne Disorders:

- Food borne infections-
- Typhoid
- Para typhoid,
- Cholera
- Infective hepatitis
- Amoebiasis

- Food borne intoxications:

- Disorders caused by-
- Natural toxins
- Chemical toxins
- Microbiological toxins in food- Staphylococcal intoxication
- Botulism
- Clostridium
- Perfringens
- Mycotoxins.

UNIT – 3: **(08 Hours)**

- Food handling and Public Health:

- Preventing food borne illness and the speed ofcommunicable disease
- Sanitation of food serving institution
- Environmental sanitation
- hygiene in food handling and personal hygiene of food handler
- Water- sources, Impurities- Principles of water purification- commercial anddomestic

UNIT – 4: **(06 Hours)**

- Food adulteration:
- Common, adulterants, and health hazards
- Food standardsand food laws - National and International;
- PFA,FPO,FAO,MMPO,Agmark,Codex,FSSAI,HACCP,ISO Certification;
- Consumer guidance society
- Consumer rights
- Consumer court
- Central facilitiesfor assessing food adulteration
- Role of food inspectors

Reference Books: Food Hygiene and Sanitation – E.G.
(Semester – V)

(1) Food hygiene & sanitation- Roday.S ,tataMcGraw hill publishing company ltd.

(2) Food science- B.Srilakshmi.

(3) MohiniSethi, catering management, New age international publishers.

(4) Sri Lakshmi.B – Food science, New Age International Publishers.

(5) Park K (2011). Park's Textbook of Preventive and Social Medicine, 21st EditionM/sBanarasidasBhanot Publishers, Jabalpur, India.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-VI

Zoology- Public Health – E.G.

(Revised Syllabus Effective from JUNE - 2022)

UNIT – 1: **(08 Hours)**

- Health and Nutrition:
- Education-definition
- Components
- Principles of health education

- Methodology:
- Individual
- Group and mass methods use of audio visualaids

UNIT – 2: **(08 Hours)**

- Medical entomology
- Control of household pest with special reference toMosquito and Housefly
- Environmental, chemical, biological and generic control

UNIT – 3: **(07 Hours)**

- Immunity:
- Classification, specific and non-specific immunity
- Immunoglobulins
- Cellular and hormonal, immune response
- Immunization active and passive immunization schedule
- Immunizing agents
- Hazards of immunization

UNIT – 4: **(07 Hours)**

- Primary health care system with special reference to Maternal and Child Healthcare
- Primary health system functioning in rural areas, health indicators mortality (Infantand Maternal), morbidity,disabilityand various health organizations
- Malaria and AIDS Control-NHP, WHO, UNICEF