

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**

**T.Y.B.Sc. - Sem-V**

**Zoology Paper - I**

**(Non chordates Taxonomy, Animal types)**

**(Effective from JUNE-2013)**

Unit I Taxonomy of non-chordates phyla to be studied up to order.

Structural organization of different classes of non-chordates.

(Protozoa to Annelida)

Unit II Study of the following animal types with reference to the structure and functions of various organs of all systems :

**Scorpion**

Unit III Amplification of non-chordate phyla

➤ Protozoa : Locomotion, Nutrition & Economic Importance.

➤ Porifera : Canal system, skeletal system & reproduction.

➤ Coelenterata : Polymorphism, coral & coral reefs.

➤ Helminthes : Parasitism & morphological adaptations.

➤ Annelida : Metameric segmentation, coelomoducts & nephridia.

Unit IV Phyllogenetic relationships of the following minor phyla and

General organization :

➤ Brachiopoda

➤ Chaetognatha,

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc (Sem-V)

## Zoology Practical – I (Based on paper I)

(Effective from JUNE-2013)

### 1 – Classification of following animals upto order.

Volvox, ceratium, entamoeba, polystomella, plasmodium, opalina, balantidium, leucosolenia, hyalonema, euspongia, obelia, millipora, physalia, valella, rhizostoma, tubipora, alcyonium, cerianthus, pennatula, virgularia, adamsia, zoanthus, favia, fungia, astrea, clinorches, trichinella, sabella, serpula, arenicola, eurythoe, polynoe, acanthobdella,

2 – Study of some aquatic invertebrates like euglena, paramoecium, vorticella, hydra, daphnia & cyclops from the culture.

### 3 – Study of permanent slides :

L. S. & T. S. of sycon & leucosolenia, sponge spicules and gemmules.

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

1) Digestive system

2) Nervous system

3) Reproductive system & Pectin as a mounting

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. - Sem-VI**

**Zoology Paper - I**

**(Non chordates Taxonomy, Animal types)**

**(Effective from JUNE-2013)**

- Unit I Taxonomy of non-chordates phyla to be studied upto order. Structural organization of different classes of nonchordates. (Arthropoda to Echinodermata)
- Unit II Study of the following animal types with reference to the structure and functions of various organs of all systems :  
**Sepia & Sea star.**
- Unit III Amplification of non-chordate phyla.
- Arthropoda:Respiration,excretion,Neurohormonal regulation of moulting and ecdysis, crustacean larvae and significance thereof, Social Insects: Hony Bee, Termite, Ant & Wasp.
  - Mollusca:EconomicImportance, Torsion and detorsion in gastropoda.
  - Echinodermata : Water - vascular system, larval forms & evolutionary significance thereof.
- Unit IV Phyllogenetic relationships of the following minor phyla and General organization :
- Endoprocta
  - Ectoprocta.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

T.Y.B.Sc (Sem-VI)

## Zoology Practical – I (Based on paper I)

(Effective from JUNE-2013)

### 1 - Classification of following animals upto order.

Apus, Daphnia, Cyclops, Cypris, Squilla, Hippa, Sacculina, Limulus, Mantis, Dragon fly, Ear-wig, Mosquito, Ant, Beetle, Tick, Mite, Dentalium, Heliotis, Patella, Nautilus, Oyster, Mytilus, Doris, Cypraea, Teredo, Solen, Octopus, Loligo, Astropecten, Strongylocentrotus, Synapta, Sand-dollar, Holothurian, Sagitta, Bugula.

2 - Dissections : The following practicals of **Sepia** to be studied preferably with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc. (OR) Demonstrations of dissection of preserved animal should be given at the ratio of 1 animal per 5 students.

**Sepia:** 1) Digestive system, Mountings of chromatophore and spermatophore

2) Nervous system, Mountings of jaws & radula

### 3 - Study of permanent slides :

Crustacean larva & Echinoderm larva

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## **Reference books:**

- (1) Invertebrates Zoology - R. W. Hegner.
- (2) A Text book of Invertebrate Zoology - S. N. Prasad.
- (3) The Invertebrates (only) - Boradale & Potts.
- (4) Invertebrate Zoology- E. L. Jordan and P.S.Verma.
- (5) A manual of Zoology vol. I - E. Ayyer.
- (6) A Text book of Invertebrate Zoology - R. C. Kotpal.
- (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. Barington.
- (11) A Textbook of Practical Zoology Invertebrate -S.S.Lal
- (12) A Textbook of Practical Zoology- Ghos & Manna.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc.**

**Zoology Sem V**

**Zoology Paper - II**

**(Chordates Taxonomy, Animal types & Comparative Anatomy)**

**(Effective from JUNE-2013)**

**Unit –I** Taxonomy of chordate to be studied upto order, including Protochordata, cyclostomata, pisces & amphibia.

**Unit – II** Study of the following animal types :

**Labeo**

**Unit – III Comparative Anatomy :**

(1) Aortic arches            (2) Vertebral column

(3) Heart.

**Unit – IV Amplification of Chordates :**

➤ Protochordata: Origin of chordates.

➤ Cyclostomata: Phyllogeny & Affinities.

➤ Pisces: Dipnoi, Types of scales, Air bladder.

➤ Amphibia: Origin and evolution,

Parental care in amphibian, Neoteny.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc (Sem-V)**

**Zoology Practical – I (Based on paper II)**

**(Effective from JUNE-2013)**

**1. Classification of following animals up to order.**

Oikopleura, Salpa & Doliolum, Lamprey & Myxine.

Pristis, Anabas, Polyodon, Eel, Pterois, Siren, Uraeotyphlus, Bufo.

**2. Study of Bony fish as animal types**

1) Digestive system.

2) Urinogenital system.

3) Brain.

4) Prepare temporary mounting of scales from scoliodon (placoid),

Labeo (cycloid) & mullet (ctenoid)

**3. Study of parental care in Amphibia (charts/models/photographs)**

**4. Comparative Study**

Vertebral column in Shark, Frog, Varanus, Pigeon and Rabbit

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Zoology Sem VI**

**Paper - II**

**Chordates Taxonomy, Animal types & Histology**

**(Effective from JUNE-2013)**

Unit- I Taxonomy of chordate to be studied upto order, including Reptilia , Aves & mammalia

Unit – II Study of the following animal types :  
**Calotes.**

Unit III- **Amplification of choradates**

- Reptilia:- Mesozoic reptiles.  
Rhyncocephalia and its phyllogenetic importance.  
Poisonous & non poisonous snakes
- Aves :- Bird Migration , Types & development of feathers  
Modifications of beak & feet, Ratitae
- Mammals:- Dentition ,Structure & development of tooth  
Metatheria, Cetacea, Proboscidea, Primates

Unit IV **Mammalian Histology**

Pituitary,  
Thyroid,  
Parathyroid  
Adrenal,  
Thymus,  
Gonads

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Zoology-Sem VI**

**Practical – II (Based on paper - II)**

**Chordates Taxonomy, Animal types & Histology.**

**1. Classification of following animals up to order**

Tortoise, Uromastix & Sphenodon.

Kite, Robin & Kiwi

Scaly anteater, Purcupine & Loris,

**2. Scoliodon**

1) Cranial nerves.

2) Internal ear and

3) Eye muscles,

**3. Study of Mesozoic reptiles like**

Brontosaurus, Stegosaurus, Iguanodon, Dimetrodon,

Allosaurus, and Rhamphorhynchus (by Models).

**4. Poisonous & non poisonous snakes**

**5. Types of feather & Dentition in Dog, Cat, Horse, Rabbit,**

Rat & man.

**6. Study of permanent slides of pituitary, Thyroid,**

Thymus, Parathyroid, Adrenal, ovary & testis

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## **Reference books**

- (1) Vertebrate Zoology- E. L. Jordan and P.S.Verma.
- (2)Phylum Chordates - H. H. Newman.
- (3) Vertebrate body - Romer.
- (4) Biology of the Vertebrates - Walter & Sayles.
- (5) Zoology of Chordates - Nigam.
- (6)A Text book of Zoology - Arumugum & Narayanan.
- (7)Outlines of Comparative Anatomy Verterbrate - J. S. Kingsley.
- (8)Comparative Vertebrate anatomy - Hyman.
- (9)Compatative Anatomy of Vertebrates - Eaton.
- (10)Histology - Arthur W. Ham.
- (11)Bailey's Text book of Histology - Wiffrd M. Capenchartr.
- (12)A Text book of Human Histology - Inderbir Singh.
- (13)A Text book of Histology - A. K. Berry.
- (14)Histology - R. O. Greep.
- (15)A Text book of Histology - Majumdar.
- (16) A Textbook of Practical Zoology Vertebrate -S.S.Lal
- (12) A Textbook of Practical Zoology- Ghosh & Manna.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

T.Y.B.Sc.-Sem-V

## Zoology Paper – III (BIOCHEMISTRY)

(Effective from JUNE-2013)

Composition, structure and function of biomolecules

### Unit- I **Enzymes :-**

- Definition and chemical nature,
- Properties, nomenclature and classification,
- Mechanism of enzyme action,
- Factors affecting enzyme action
- Enzyme inhibition, Co-enzymes.

### Unit- II **Carbohydrates :-**

- Definition Classification monosaccharide, disaccharides, oligosaccharides and polysaccharides.  
Metabolism: - Glycolysis, TCA & oxidative phosphorylation ((ETS or Biological oxidation), gluconeogenesis, Glycogenesis, Glycogenolysis.

### Unit- III **Proteins :-**

- Definition , classification -simple , conjugated and derived proteins,
- Structure of proteins: - Primary, secondary, tertiary and quaternary.
- Metabolism: - Deamination and transamination. Ornithine cycle
- Hormonal control of protein metabolism

### Unit- IV **Lipids: -**

- Definition, classification- simple, compound and derived lipids.
- Metabolism: -  $\beta$  oxidation and synthesis of long chain fatty acids
- Glycerol metabolism , Hormonal control of lipid metabolism.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Zoology- Sem-V**

**Practical – III (Based on paper - III)**

**BIOCHEMISTRY**

- 1) Qualitative test for organic compound.  
carbohydrates - glucose, fructose, maltose, lactose & sucrose
  - a. proteins: - albumin and casein.
- 2) Preparation of atomic models :-
  - a. glucose, fructose, galactose, maltose, lactose, sucrose, valine,
  - b. threonine, glycine, alanine & glycerol.
- 3) Factors affecting enzymes activity (temperature and pH).
- 4) To study the digestive enzymes from Human Saliva
- 5) Detection of amino acid by paper chromatography.

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## **Reference books**

- ( 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 ) Rangnatha Rao 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.

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# **VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-VI**

**Zoology Paper – III ( PHYSIOLOGY)**

**(Effective from JUNE-2013)**

## **Unit- I Respiration:-**

Aquatic & terrestrial respiratory mechanism.

Hypoxia, O<sub>2</sub> dissociation Curve. Respiratory quotients ,BMR

Transport of gases, exchange of gases, Respiratory pigments,

Neural and chemical regulation of respiration.

## **Unit- II Circulation:-**

Structure of mammalian heart, Properties of cardiac muscles

internal circulation (systemic, pulmonary & coronary)

Cardiac-cycle and cardiac output, Stroke volume,

Blood pressure, ECG ,Blood coagulation,

Hormonal, ionic & nervous regulation of heart beat.

## **Unit- III Chemical coordination:-**

Chemical nature and kinds of hormones,

Mechanism of hormone action, Regulation of hormone

secretions, Introduction: - Definition of endocrine, Paracrine

and Autocrine system.

Significance of endocrine and neuro - endocrine system.

Hormones of pituitary gland, thyroid gland, Parathyroid gland,

pancreas, adrenal gland, gastrointestinal hormones , testis and

ovary.

## **Unit- IV Thermoregulation:-**

Heat production and heat loss, Temperature regulating

Mechanism.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Zoology-Sem-VI**

**Practical – III (Based on paper - III)**

**PHYSIOLOGY**

1. Study of analytical instrument principle and applications.  
  
pH meter, Colorimeter, Centrifuge, Waterbath, lactometer,  
sphygmomenometer, thoma pipette of haemocytometer,  
RBC count, microtome, balance,
  2. Hematology:-
    - (a) Total RBC count in human blood
    - (b) WBC differential count.
  3. Experiments on Human : Measurement of systolic blood pressure,  
diastolic pressure, pulse pressure, mean pressure of an individual with the  
help of sphygmomanometer and stethoscope.
  4. determination of pH of different solutions- acid, milk, water,  
Iso electric point of casein.
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**Reference books**

- |  |                   |
|--|-------------------|
| (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.     |
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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-V**

**Zoology Paper - IV (Embryology and Wild life Biology)**

**(Effective from JUNE-2013)**

**Unit I- The Nature and Scope of embryology**

The value of developmental Zoology, Branches of embryology –Scope and application.

**Unit II- Gametogenesis and fertilization**

(i) Spermatogenesis: Formation of spermatids, Spermiogenesis, Factors controlling spermatogenesis, Structure of a typical sperm. Significance of spermatogenesis.

(ii) Oogenesis: Formation of egg (ovum)-multiplication phase , growth phase (previtellogenesis and vitellogenesis) ,maturation phase.

(iii) Fertilization : External and internal fertilization - mechanism of Fertilization , - capacitation and contact – acrosomal reaction and penetration – activation of ovum migration of pronuclei and amphimixis –theories of fertilization -significance of fertilization.

(iv) Estrous and menstruous cycles, placenta and placentation

**Unit III- Study and development of chick**

(i) fertilization, cleavage, blastulation, gastrulation, formation of germ layers and primitive streak

(ii) structure of 24,36,42,48,50,60 &72 hours of chick embryo

**Unit IV-Wild life Biology**

(i) Introduction, wild life conservation and management

(ii) Conservation projects: wild ass,tiger, crocodile, black buck.

(iii) Endangered, vulnerable, threatened species

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-V**

**Practical – IV (Based on paper - IV)**

**(Effective from JUNE-2013)**

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

- 1) Different types of mammalian placenta
- 2) Chick embryology: Unfertilized egg, different stages cleavage, morula, blastula, gastrula, primitive streak, development of 24,36,42,48,50,60 and 72 hrs.
- 3) Study of projects – wild ass, lion, tiger, crocodile, black buck-their locations in map of India, present status and significance.
- 4) Educational excursion/ visits/basic –primary project write up/other submissions etc.

**Reference books:**

1. Developmental Biology- Gilbert
2. A Textbook of Developmental Biology- S .Banerjee
3. Introduction to Embryology- Balinsky B.I.
2. Developmental Biology- Veerbala Rastogi and M.S.Jayaraj
3. Developmental Biology- O.P. Jangir.
4. Embryology- Arumugam.
5. The early embryology of chick- B.M.Pattern.
6. Wild life of India- Conservation and Management-K.C.Agrwal.
7. Threatened Animals of India- Conservation and Management-K.C.Agrwal.
8. Indian Wild life Sanctuaries and National Parks-S.K.Tiwari.
9. The essentials of Forensic medicine and Toxicology-K.S.Narayan Reddy

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

## B.Sc. Sem-VI

### Zoology Paper - IV (Entomology)

(Effective From JUNE-2013)

#### **Unit -I: Introduction to Entomology**

- History, development, scope & applications of Entomology
- Branches of Entomology
- Evolution of Insects & their position in animal kingdom
- General characteristics of phylum Arthropoda & classification till order in brief.

#### **Unit-II: Agricultural Entomology**

- Pests of field crops (cereals, tobacco, sugarcane, cotton, oilseed etc) & their management
- Pests of horticultural crops (fruits & vegetables) & their management
- Insect pests of stored grains & their management
- Arthropod vectors & plant diseases (aphids, beetles, mites, whiteflies etc.)

#### **Unit -III: Medical Entomology**

- Morphology, Vectorship, Pathogenicity & Control of : Mosquito, housefly, Ratfleas, head louse.
- Morphology, Vectorship, Pathogenicity & Control of: Pests of domestic animals, Horse and Cattles.

#### **Unit -IV: Economic Entomology**

- Beneficial Insects (economic importance of honey bee, silkworm, lac insect, pollinators, scavengers, Insect as a source of drugs and dyes, Insects in forensic entomology).
- Household pests: Morphology, damage caused & Control measure of: Cockroach, Ants and termites & Bed bugs
- Insect pest control methods (Biocontrol, Integrated pest management, insecticides, pesticides)
- Appliances used for pest management

**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-VI**

**Practical – IV (Based on paper - IV)**

**(Effective From JUNE-2013)**

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

- A) Branches of entomology, its scopes, applications, development.
- B) Outline classification of phylum arthropoda upto order level.
- C) Identification, pathogenicity and control of pests of – 1) cereals- khapra beetle (*Trogoderma granarium*), locust. 2) Tobacco- Rove beetle (*bledius latiusculus*), mole cricket. 3) Sugarcane- *Saccharum officinarum*. 4) Fruits- *Drosophila melanogaster* 5) Vegetables- *Hellula undalis*.
- D) Morphology, vectorship, pathogenicity and control of – *Anopheles* (male – female), *Culex* (male-female) and *Aedes* (male-female).
- E) Pests of domestic animals : dogs- dog flea (*Ctenocephalides canis*), *Trichodectes canis*. Cats- cat flea (*Ctenocephalides felis*). Cattle – Cattle tick (*Boophilus microplus*), *Haemaphysalis cuspis*, *H. minuta*.
- F) Economic importance of arthropods /insects – silk worm, lac insects, honey bees and butterflies as pollinators; lady bug and dermestid beetle as scavengers; Cochinal insects and kermes insects (of oak tree) as dyes; Honey bees, blow fly maggots, centipedes and cantharis fly (*Canth vesicatoria*) as drugs /medicines; Ants, termites, dermestid beetles and bed bugs as harmful insects.
- G) Pests management appliances- foggers, insect repellents, sprayers (agri.use and household uses), traps (electric and chemical). Biological pest controller- lizards, frogs, bee eater birds, ladybug beetle and bats.

**Reference books:**

- (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

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-V**

**Zoology Paper - V (Forensic science and Toxicology)**

**(Effective From JUNE-2013)**

Unit I- Definition, scope, history and development of forensic science, basic principles, dactylography, foot prints, tattoo marks, occupational marks, speech and voice

Unit II- Morphology and Biochemistry of human and other animal hair, DNA Fingerprinting, wildlife and forensic science.

Unit III- Concept and scope of toxicology: Introduction, history, disciplines of toxicology, toxicants and their classification, toxicity

Unit IV- 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.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-V**

**Practical – V (Based on paper - V)**

**(Effective From JUNE-2013)**

To study the following practicals 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,horse,cow,buffalo,goat.
- 3) Study of various samples of food additives/preservatives and their usages.  
(vinegar, benzoic acid, formic acid, citric acid, gelatin )
- 4) Study of food contaminants on - bread, chapati, curd, fruits.
- 5) Tests (only two tests to be performed) of adulterated milk, black pepper, khoya ( maava of milk),edible oil, coconut oil, ghee, rabdi, butter.
- 6) To study DNA finger printing method.

**Reference books:**

- (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,2<sup>nd</sup> edition- L.J.Casarett and J.Doull
- (9)Text book of forensic science and toxicology- Narayan Reddy

- (10)Text book of forensic science,toxicology and jurisprudence- Parikh
- (11)Essentials of Forensic Science; 7 Volumes - Hueske, Houck, Bohan, Bell  
& Gaensslen
- (12)Viva-Facts On File Encyclopedia of Forensic Science -Suzanne Bell
- (13)DNA Evidence and Forensic Science -David Newton
- (14) Forensic Science : Modern Methods of Solving Crime - Max M Houck
- (15)Investigative Forensic Hyponsis - Niehaus
- (16)Essentials Of Forensic Medicine And Toxicology - Reddy
- (17)DNA In Forensic Science - Robertson
- (18)Forensic DN Technology - Farley
- (19)An Introduction Forensic DNA Analysis - Inman
- (20)DNA Technology In Forensic Science - N R C
- (21)Forensic Geology - Murry
- (22)Forensic Science Handbook Volume 1 - Saferstein
- (23)Forensic Science Handbook Volume 2 - Saferstein
- (24)Forensic Science Handbook Volume 3 - Saferstein
- (25)Textbook Of Forensic Medicine Principles And Practice - V I J
- (26)Forensic Entomology, The Utility Of Arthropods In Legal Investigations -  
Byrd
- (27)Forensic Art And Illustration - Taylor
- (28)Environmental Forensic : A Glossary Of Terms - Morrison
- (29)Classifying Finger Print ( Real Word Mathematics Through Science) –  
Cook
- (30)Finger Print Detection With Lasers - Menzel
- (31)Advances In Finger Print Technology, 2nd Edition - Lee
- (32)Forensic Science In India : A Vision For The Twenty First Century - Nanda

# **VEER NARMAD SOUTH GUJARAT UNIVERSITY**

## **T.Y.B.Sc. Sem-VI**

### **Zoology Paper - V (Cytology)**

**(Effective From JUNE-2013)**

#### **Unit I- Tools and Techniques:**

- (i) Electron microscope
- (ii) Fluorescence microscope
- (iii) Phase contrast microscope
- (iv) Paper chromatography
- (v) Electrophoresis
- (vi) Centrifugation
- (vii) DNA Staining

#### **Unit II- Methods for cytology and cytochemical analysis:**

- (i) Examination of living cells
- (ii) Fixation
- (iii) Embedding and sectioning
- (iv) Cytological staining

#### **Unit III-Cellular organization:**

- (i) 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.
- (ii) Ultra structure and function of intracellular organelles: nucleus, mitochondria, golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles.

#### **UNIT IV-Cell ageing and cell death:**

Ageing in cells-mechanism of cell death- purpose of cell death.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-VI**

**Practical – V (Based on paper - V)**

**(Effective From JUNE-2013)**

1. Study of cell organelles by microphotographs: nucleus, mitochondria, golgi bodies, endoplasmic reticulum, chloroplasts.
2. Microtechnique preparation of permanent slides of different organs,
3. Whole mounting of invertebrates and vertebrates
4. Electrophoresis ( With the help of chart ).
5. Centrifugation ( With the help of chart ).
6. DNA Staining ( With the help of chart ).

**Reference books:**

1. Cell biology, Genetics, Molecular Biology, Evolution and Ecology. - P.S. Verma, and V.K.Agarwal
2. Biotechniques theory and practices. - S. V.S. Rana.
3. Cell biology.- S.C. Rastogi.
- 6.Introductory Cytology-Veer Bala Rastogi.
- 7.Cell Biology-De Roberties
- 8.Cytology, Genetics and Evolution-P.K.Gupta.
- 9.Cell Biology, Genetics and Evolution-N.Arumugam.
- 10.Cell and Molecular Biology-E.P.O. De Roberties.

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# **VEER NARMAD SOUTH GUJARAT UNIVERSITY**

## **T.Y.B.Sc. Sem-V**

### **Zoology Paper - VI (Genetics and Molecular biology)**

(Effective From JUNE-2013)

#### **Unit I- Gene structure and functions:**

Gene concept, location of and size of genes, role of genes, chemical composition and numbers of genes, ultra structure of genes, jumping genes, split genes, sex chromatin.

#### **Unit II-Mutations:**

Human cytogenetics- Techniques in human chromosomal analysis-  
Human  
Karyotype-chromosomal aberrations and syndromes, Polyploidy,  
Metabolic disorders, gene mutations. Genetic code and protein  
synthesis.

#### **Unit III-Molecular biology:**

- (i) Structure of atoms, molecules and chemical bonds
- (ii) Composition , structure and formation of biomolecules  
[carbohydrates, lipids, proteins, nucleic acids, vitamins]

#### **Unit IV- (i) Principles of biophysical chemistry[pH, buffer, reaction**

kinetics, thermodynamics, colligative properties]

- (ii)Principles of catalysis, enzymes and enzyme kinetics, enzyme  
regulation, catalysis, mechanism of enzyme, isoenzymes

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-V**

**Practical – VI (Based on paper - VI)**

**(Effective From JUNE-2013)**

- 1.Karyotyping study (Aberations in human chromosomes by charts.  
(Klinefelter's syndrome, Down's syndrome, Philadelphia's syndrome, Turner's syndrome, Cri-du-chat syndrome)
- 2.Preparation of Adanine, Thiamine, Guanine, Cytosine  
By models
3. Preparation of DNA,RNA by models
4. Preparation of Triose,Tetrose,Pentose,Hexose,Triglycerides,Casin,  
Mucin, water soluble vitamins, fat soluble vitamins
5. Study of Transgenic animal (dolly sheep)

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**Reference books:**

1. Principles of Genetics- F.J. Gardner.
2. Molecular cell biology- H.S. Bhamra and Kavita Juneja,
3. Fundamental molecular biology- Lizabethallison.
4. Cell and Molecular Biology-E.P.O. De Roberties.
5. Cell and Molecular Biology-P.K.Gupta.
6. Cell biology, Genetics, Molecular Biology, Evolution and Ecology - P.S. Verma, and V.K.Agarwal
7. Concepts of Genetics-R.L.Kotpal.
8. A Textbook of Genetics-Veer Bala Rastogi
9. Genetics- P.K.Gupta.
- 10.Principles of Genetics-Sinnott and Dunn.
- 11.Genetics-Edgar Altenberg.
- 12.A Textbook of Genetics- H.S. Bhamra and C.M.Chaturvedi.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**B.Sc. –Sem-VI**

**Zoology Paper – VI (Ecology, Evolution and Ethology)**

(Effective From JUNE-2013)

Unit I- Species interactions :Types of interactions, interspecific competition,  
Herbivory, carnivory, symbiosis

Unit II- Biogeography: Major terrestrial bioms, theory of island biogeography,  
Biogeographical zones of India

Unit III- Emergence of evolutionary thoughts: Lamarck; Darwin-concepts of  
variation, adaptation, struggle, fitness and natural selection

Unit IV-Approaches and methods in study of behavior, insect pheromones

Bioluminescence, biological clocks, development of behavior, social  
communication, social dominance.

**Reference books:**

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.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

**T.Y.B.Sc. Sem-VI**

**Practical – VI (Based on paper - VI)**

**(Effective From JUNE-2013)**

1. Estimation of Alkalinity and hardness
  2. Estimation of free CO<sub>2</sub> and dissolved O<sub>2</sub>
  3. Study of Habituation of mosquito larva
  4. Study of Antennal grooming behavior(chemotaxis)
  5. Study of alarming, attractant, aggregation behavior
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**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.**

**SYLLABUS FOR T. Y. B. Sc.SEM-V**

**ZOOLOGY- FISHERIES- EG**

**( Effective From JUNE-2013)**

Unit- 1 Natural and cultivated ponds-construction, layout,management& productivity.

Unit- 2 Induced breeding methods in major carp.

Unit- 3 Fish seed collection and transportation

Unit- 4 Study of aquarium fishes and its management.

Unit- 5 Crafts and gears used in fresh and marine water fisheries.

Unit- 6 Sea / marine pollution

**SYLLABUS FOR T. Y. B. Sc. SEM-VI**

**ZOOLOGY- FISHERIES- EG**

**( Effective From JUNE-2013)**

Unit -1 Fish migration

Unit- 2 Parental care in fishes

Unit- 3 Electric organs in fishes

Unit- 4 Preservation, processing and by-products of fishes.

Unit -5 Fish pathology: bacterial,fungal,ectoparasitic and protozoan diseases of fishes.

Unit- 6 Dangerous and venomous sea animals.

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**Reference books:**

1. An Introduction to fishes-S.S.Khanna.
2. Fish and Fisheries-B.N.Yadav.
3. Ichthyology-Lagler,Bardach,Passino & Miller
4. Fundamentals of Ichthyology-Gupta,Guhalwat,Yadav,Jain
5. Fundamentals of Ichthyology-S.P.Biswas
6. General and Applied Ichthyology-S.K.Gupta,P.C.Gupta.
7. An Introduction to fishes-G.S.Sandhu.
8. Fish Biology-C.B.L.Srivastava
9. A Textbook of Fish Biology and Fisheries- S.S.Khanna and H.R.Singh
10. Fish and Fisheries of India-V.G.Jhingran.