VEER NARMAD SOUTH GUJARAT UNIVERSITY SURAT

T.Y.B.Sc.

Zoology

2005

This Syllabus is to be completed by assigning three periods of 55 minutes per paper per week for theory and one practical of four periods per paper per week.

For practicals the class should be divided in batches of fifteen students only. There will be one paper in written examination of three hours duration and one practical of more than five hours duration.

Pattern of Examination

(1) Theory Written (Ext.**280** Marks & Int. **120** Marks)

(2) Practical (Ext.**140** Marks & Int. **60** Marks)

(3) Theory Written in I. D. S./ CAN (Applied Zoology) (Ext.**70** Marks & Int. **30** Marks)

Theory Written	Duration	Marks System	
		External	Internal
Paper – VI	3 Hrs.	70	30
Paper – VII	3 Hrs.	70	30
Paper – VIII	3 Hrs.	70	30
Paper – IX	3 Hrs.	70	30
I. D. S. (Applied Zoology)	3 Hrs.	70	30

Practical	Duration	Marks System	
		External	Internal
Practical – I (Based on Paper – VI)	More than 5 Hrs.	35	15

Practical – II (Based on Paper – VII)	More than 5 Hrs.	35	15
Practical – III (Based on Paper – VIII)	More than 5 Hrs.	35	15
Practical – IV (Based on Paper – IX) and	More than Educational Excursion etc.	35	15

At least one short excursion must be arranged in the local areas and atleast one long excursion must be arranged in other than Gujarat State which will be compulsory. The observations made by the candidates during the educational excursion will be record in the relevant journal for the practicals. Such excursion shall be arranged on the working days of the College.

The candidate will record the observation relating to practical and these will be signed periodically by a member of the laboratory staff. The candidate will have to produce a certificate from the Head of the Department that he / she has carried out the experiment satisfactorily.

The candidate shall prepare at least 25 permanent preparation and submit these in relevant practical at the time of examination. The journal as well as permanent preparation will be produced at the time of examination and these will be taken into consideration while assigning the marks.

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Paper - VI

Unit I Taxonomy of non-chordates phyla to be studied upto order. Structural organization of different classes of non-chordates.

Unit II Study of the following animal types with reference to the structure and functions of various organs of all systems : Scorpion , Sepia & Star fish.

Unit III Amplification of non-chordate phyla

Protozoa : Locomotion, nutrition, reproduction & economic Importance.

Porifera : Canal system & reproduction.

Coelenterata : Polymorphism, coral & coral reefs.

Helminthes : Parasitism & morphological adaptations.

Annelida : Metameric segmentation, coelomoducts & nephridia.

Arthropoda : Cephalization, respiration, excretion, neurohormonal regulation of moulting and ecdysis, crustacean larvae and significance thereof, Social Insects: Honey Bee, Termite, Ant & Wasp.

Mollusca : Torsion & detorsion in gastropoda.

Echinodermata : Water - vascular system, larval forms & evolutionary significance thereof.

Hemichordata : General organization and affinities of Balanoglossus.

Unit IV Phyllogenetic relationships of the following minor phyla and General organization : Brachiopoda, Chaetognatha, Endoprocta, & Ectoprocta.

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Practical – I (Based on paper VI)

A - Classification of following animals upto order.

Volvox, Ceratium, entamoeba, polystomella, plasmodium, opalina, balantidium, leucosolenia, hyalonema, euspongia, obelia,millipora, physalia, valella, aurelia, rhizostoma, tubipora, alcyonium, cerianthus, pennatula, virgularia, adamsia, zoanthus, favia, fungia, astrea, clinorches, filaria, trichinella, sabella, serpula, arenicola, eurythoe, aphrodite, polynoe, acanthobdella, apus, daphnia, cyclops, argulus, lepas, cypris, squilla, hippa, sacculina, limulus, mantis, dragon fly, ear-wig, mosquito, ant, bettle, tick, mite, dentalium, heliotis, patella, nautilus, oyster, mytilus, doris, cyprea, teredo, solen, octopus, loligo, astropecten, strongylocentrotus, synapta, sand-dollar, holothurian, balanoglossus, sagitta, bugula, pleurobranchia.

B - Dissections :

Cockroach :- Sympathetic nervous system, temporary preparations of giant nerve cell & neurosecretory cells.

Scorpion :- Digestive , reproductive & nervous system. Mountings of pectenes & book - lungs.

Sepia :- Digestive & nervous system. Mountings of chromatophore, spermatophore, jaws & radula.

Star fish :– water vascular and digestive system.

C - Study of permanent slides :

L. S. & T. S. of sycon & leucosolenia, sponge spicules and gemmules, crustacean larva & echinoderm larva, tornaria.

D - Study of some aquatic invertebrates like euglena**,** paramoecium, vorticella, hydra, Daphnia & cyclops from the culture.

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Zoology

Paper - VII

Chordates , Comparative Anatomy and Histology.

Unit – I

A. Taxonomy of chordate to be studied upto order, including Protochordata.

B. Origin of chordates.

Unit – II Study of the following animal types :

A. (1) Labeo (2) Calotes (3) Pigeon.

B. Cranial nerves in scoliodon.

Unit – III Comparative Anatomy :

A. (1) Aortic arches (2) Vertebral column
(3) Brain.

B. Integuimentary derivatives like scales, feathers and Tooth.

Unit – IV Amplification of Chordates :

(1) Protochordata : Affinity only.

(2) Cyclostomata : Phyllogeny & Affinity.

(3) Pisces : Dipnoi, Coelocanth, Parental care, air bladder.

(4) Amphibia :- Origin and evolution.
:- Adaptive radiation.
:- Parental care.
:- Neoteny.

(5) Raptilia :- Mesozoic reptiles.
:- Rhyncocephalia and its phyllogenetic importance.
:- Origin and evolution.
:- Structure of plastron and carapace in turtle.

(6) Aves :- Migration, Ratitae, Air sacs.
:- Modification of beak and feet.

(7) Mammalia :- Placenta in mammals.
:- Dentition.
:- Cetacea.
:- Marsupilia.
:- Primates.
:- Proboscidia.

Unit – V Histology:-

:- Pituitary.
:- Thymus.
:- Thyroid.
:- Parathyroid.
:- Adrenal.
:- Ovary.
:- Testis.

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Practical – II (Based on paper VII)

A - <u>Classification of following animals upto order.</u>

* Oikopleura, salpa, Doliolum, Lampry, myxine, Hammer - headed shark, Trunk fish, pristis, protopterus, exocoetus, pipefish, Anabus, solefish, polyodon, Eel, siren, pterois, Necturus, Triton, urotyphlops, Alytes, Rhacophorus, pipa, Tortoise, Chamaeleon, uromastix, sea-snake, echis, Archaeopteryx, woodpecker, parrot, Roller, kite, Robin, Kiwi, Horn owl, Rabbit, Hedge hog, Loris, Mongoose, scaly ant eater.
* Study of mesozoic reptiles like Brotosaurus, Stegosaurus, Iguanadon, Dimetrodon, Allosaurus, and Rhamphorhynches.

B - <u>Study of following animal types.</u>

* <u>Scoliodon</u> :-Cranial nerves, Internal ear and eye muscles,
* <u>Bony fish</u> :- Digestive & Urinogenital system, Brain.
* <u>Calotes</u> :- Digestive , Arterial, Venous, urinogenital and Brain. mounting of pecten and Hyoid apparatus.

C -

(1) <u>Histology</u> :- Study of permanent slides of pituitary, Thyroid, Thymus, Parathyroid, Adrenal, Testis and ovary.

(2) Micro technique preparation of permanent slides from mammalian tissues.

D - <u>Comparative Study :-</u>

(1) Vertebral column in shark, frog, varanus, pigeon and Rabbit.

(2) Dentition in Dog, Cat, Horse, Rabbit, Rat & man.

(3) Types of feather.

(4) Types of scales.

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Paper - VIII

(Bio Chemistry and Animal Physiology)

I - Biochemistry

An elementary knowledge of carbohydrates, Proteins, Lipids and Enzymes.

(A) Carbohydrates

(i) Introduction, Classification and importance of Carbohydrates.

(ii) Monosaccharides :- General structure, definition, nomenclature and classification Asymmetry, Isomerism and Mutarotation. Importance of Monosaccharides.

(iii) Oligosaccharides :- Definition and Classification.

(iv) Disaccharides :- Occurrence, Formation and structure of Maltose, Lactose, Sucrose. Importance of Disaccharides.

(v) Polysaccharides :- Definition and Classification.

(a) Homopolysaccharides :- Starch; glycogen; cellulose; chitin.

(b) Heteropolysaccharides :- Mucopolysaccharides.

* **Importance of polysaccharides**

(B) Proteins

(i) Introduction and definition

(ii) Amino acids :- Structure, Classification (on the basis of the composition of the side chains or R group) and properties.

(iii) Peptides :- Peptide formation ; naming of peptide chain and properties.

(iv) Classification of protein based on the increasing complexity of structure :-

(a) Simple protein

(b) Conjugated protein

(c) Derived protein

(v) Properties of proteins :-

Physical ; Colour ; Taste ; Odour ; Viscosity ; Molecular weight ; Hydrolysis ; hydration ; Coagulation.

(vi) Biological Functions of proteins.

(C) <u>Lipids</u>

(i) Introduction and definition.

(ii) Components :-

(a) Alcohols :- Different types

(b) Fatty acids :- Nomenclature.

(iii) Types :- Saturated :- Butyric ; Palmitic ; Stearic.

Unsaturated :- Crotonic ; oleic.

(iv) Classification of Lipids :-

(a) Simple :- (1) Triglycerides :- Fats ; oils

(2) Waxes (Formula not required)

(b) Compound or Complex lipids :-

(1) Phospholipids :- Lecithins ; Cephalins ; Plasmalogens.

(2) Glycolipids.

(c) Derived lipid steroids :-

(Formula not required)

Basic steroid nucleus.

(v) Biological importance of lipids.

(D) <u>Enzymes.</u>

(i) Introduction, Definition and chemical nature.

(ii) Nomenclature and classification.

(iii) Properties of enzymes.
(iv) Mechanism of enzyme action.
(v) Factors affecting enzyme activity.
(vi) Enzyme inhibition.
(vii) co-enzymes.

II - Physiology

(A) Metabolism

(i) Introduction :- General account

(a) Carbohydrate metabolism.

- Glycogenesis
- Glycolysis
- Gluconeogenesis
- Glycogenolysis
- HMP Shunt
- Oxidative phosphorylation (ETS or Biological oxidation)
- Hormonal control of carbohydrate metabolism.

(b) Protein metabolism :-

- Deamination
- Transamination
- Decarboxylation
- Urea formation (Ornithine cycle)
- Hormonal control of protein metabolism.

(c) Lipid metabolism :-

- Glycerol metabolism
- Fatty acid metabolism and lysis by β- oxidation
- Hormonal control of lipid metabolism

(B) Respiration

(i) Aquatic and terrestrial respiratory mechanism.
(ii) Respiratory pigments and transport of respiratory gases.

(iii) B. M. R.
(iv) R. Q.
(v) Hypoxia
(vi) O_2 dissociation Curve.

(C) <u>Circulation</u>

(i) Structure of mammalian heart and internal circulation (systematic ; pulmonary and coronary)
(ii) Cardiac cycle and cardiac output.
(iii) Stroke volume
(iv) Blood pressure
(v) E. C. G
(vi) Blood coagulation
(vii) Properties of cardiac muscles
(viii) Hormonal, ionic and nervous regulation of heart beat.

(D) <u>Physiology of endocrine glands</u>

(i) Definition
(ii) Chemical nature and kinds of hormones.
(iii) Mechanism of hormone action.
(iv) Regulation of hormone secretions.
(v) Hormones of Pituitary gland, Thyroid gland, parathyroid gland, Islets of Langerhans, Adrenal gland, Gastrointestinal hormones ; Testis and ovary.

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Practical - III

Based on Paper - VIII

(A) Detection of Carbohydrates and proteins :- Glucose ; Fructose ; Maltose ; Lactose ; Sucrose.
Albumin and Caesin.

(B) Estimation (Colorimetric)
- Estimation of Glucose
- Estimation of proteins

(C) Preparation of Atomic models :-
Glucose ; Fructose ; Galactose ; Maltose ; Lactose ; Sucrose ; valine ; Threonine ; Glycine ; Alanine ; Glycerol.

(D) Separation of amino acids by paper chromatography.

(E) Haematology :-
(a) Total RBC Count in human blood
(b) WBC differential count.

(F) Identification :-
(a) Study of charts
- Osazone test(Slide)
- Glycogenesis
- Glycolysis
- Gluconeogenesis
- Glycogenolysis
- HMP Shunt
- Oxidative phosphorylation.

(b) Study of laboratory equipment such as :
- Water bath
- Centrifuge
- Colorimeter
- Microtome
- Balance
- Lactometer
- Sphygmomanometer
- Thoma pipette for RBC count
- Haemocytometer.

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(New Course revised from June 2005)

Paper - IX

(Cytology, Genetics, Embryology and Environmental Biology)

UNIT – I **CYTOLOGY**

(A) Tools and Techniques :

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

(B) Methods for Cytological and Cytochemical Analysis :

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

Summary : Observation of living and Fixed cells.

UNIT – II **GENETICS**

(A) Gene structure and Functions :

Gene concept : Location and size of the gene, role of genes, chemical composition and the numbers. Fine (ultra) structure of the genes, Jumping genes, split genes, Sex chromatin.

(B) Mutations

(i) Chromosomal Abberations
(ii) Polyploidy
(iii) Metabolic disorders, Gene mutations.

(C) Genetic code and protein synthesis.

UNIT – III EMBRYOLOGY AND REPRODUCTIVE BIOLOGY

(A) Gametogenesis, Fertilization, Oestrous and Menstrous cycles, Placenta and Placentation.

(B) Study and Development of chick.

(i) Fertilization, cleavage, Blastulation, Gastrulation, Formation of germ layers and primitive streak.
(ii) Structure of 24 hours chick embryo.
(iii) Structure of 36 hours chick embryo.
(iv) Structure of 42 hours chick embryo.
(v) Structure of 48 hours chick embryo.
(vi) Structure of 50 hours chick embryo.
(vii) Structure of 60 hours chick embryo.
(viii) Structure of 72 hours chick embryo.

UNIT – IV ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

(i) Introduction to environmental pollution air, water, soil and green house effect.
(ii) Introduction to toxicology, definition of Toxicology, classification of toxicants.
(iii) Toxic agents and mode of action :
Pesticides, metals, solvents, radiation, carcinogens, poisons.
(iv) Environmental Toxicology :
Food additives, air, water and soil pollutants.
(v) Applications of Toxicology.
(vi) Human Toxicology and Medical ethics.

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PRACTICAL NO. IV

(Based on Paper - IX)

(I) **Cytology** :
(a) Preparation of Barr body
(b) Preparation of temporary mount of Giant Chromosome from Drosophila or Dipteran larvae.

(II) **Genetics** : Karyotyping : (Abberations in Human chromosomes by chart study)
- Klinefelter's syndrome, Down's syndrome, philadelphia's syndrome, Turner's syndrome, Cri-du-chat syndrome.

(III) **Chick Embryology** : (i) Preparation and study of permanent slides of chick embryo up to 60 hours.

(IV) Estimation of Alkalinity, Hardness, Free CO_2 and Dissolved O_2,

(V) Microtechnique Preparation of permanent slides of planktons, different organs, parts, whole mounts, preparation of Invertebrates and vertebrates.

REFERENCE BOOKS

1.	Fundamental of Ecology	:	By Odum
2.	Animal Ecology	:	By S. P. Singh
3.	The early embryology of chick	:	By B. M. Pattern
4.	Embryology	:	By Arumugam
5.	Introductory Cytology	:	By Veer Bala Rastogi
6.	Cell Biology	:	By De Roberties
7.	Cytology, Genetics and Evolution	:	By P. K. Gupta
8.	Cell Biology, Genetics and Evolution	:	By Arumug
9.	Cell and Molecular Biology	:	By E. O. P. De Roberties By E. M. F. De Roberties, (Jr.)

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I.D.S. (New Course from June 2004)

(Applied Zoology)

T.Y. B.Sc.

(Medical, Zoology, Relation & Mankind, wild life, Fisheries, Bioinformatics)

(I) Medical Zoology

(1) Introduction to parasitology.

(2) Brief accounts life history, mode of infection and pathogenicity of the following pathogens with reference to man prophylaxis and treatment.

(a) Protozoans :- Entamoeba, Trypanosoma.

(b) Helminthes :- Wuchereria, Dracunculus, Trichinella.

(3) Brief account of arthropods as direct agents of disease or discomfort.

Arthropods :- - Aedes aegypti (Dengue)
- Culex (Filariasis).

(4) Brief introduction to human defence mech :- Antigens, Antibodies.

(II) (a) Radiation and Mankind :-

- Types of radiations
- Useful radiation
- Hazards of radiations

(b) Cancer and Mankind :-

- Types
- Morphology and biochemical aspect of cancer
- Cancer therapy

(c) Biotechnology :-

- Biotechnology in relation to animal and human welfare

- Tissue cuttare
- Immuno technology – AIDS
- Role of biotechnology in medicine

(III) <u>Wild life</u> :-

<u>Wild life (Conservation and management)</u>

(b) Introduction to wild life :-

Following topics to be taught :

(i) What is wild life?

(ii) Causes of wild life depletion, importance of its conservation, wild life protection Act 1972.

(iii) Introduction to National Parks (NP) and Sanctuaries (s) with special reference to

- Ghana (Bharatpur)
- Sundarbans (Tiger reserve)
- Gir NP and S
- Marine NP and S

(c) Some important National Parks (NP), Sanctuaries and Conservation projects.

(Elementary knowledge only)

- Dudhava NP
- Dalma NP
- Dachigam NP (Kashmir)
- Bandipur NP (Madhumalai)
- Kanha NP
- Ghana (Bharatpur) S & NP.
- Sundarbans Tiger Reserve
- Corbet Park
- Kaziranga
- Peryar S.

Projects :-

(1) Project Tiger

(2) Gir Lion Sanctuary Project

(3) Musk Deer Project

(c) Some National Parks and Sanctuaries of Gujarat :-

- Gir NP & S
- Velavedar
- Marine NP & S
- Vansda NP
- Wildass S
- Ratanmahal Sloth bear S.
- Hingolgadh Nature Education S
- Khijadia bird S.
- Nalsarovar bird S

(d) Wildlife Management :-

- Tools & Techniques for wildlife management

(IV) <u>Fisheries</u> :-

(i) <u>Fish Processing</u> :-Various methods of preservations like deep freezing , cold storage, canning, smoking, salting & sun-drying.

(ii) <u>Fish Pathology</u> :- Study of various diseases caused by bacteria, fungi, protozoa, worms & crustaceans and their preventive measures.

(iii) Pond construction & lay out.

- Natural and cultivative ponds
- Induced breeding methods in fishes, their collection and transport.

(iv) Effects of pollution on fresh water & marine fisheries.

(V) <u>Bioinformatics</u> :-

- Historical perspective on computers and their applications to biology.
- Operating systems – WINDOWS.
- Introduction to Programming.
- Sequence analyses- Basic concepts and operational aspects.

Candidate's No : _____
Centre : _____
Date : _____

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Third Year B.Sc.
Examination April/Oct. 200___
Zoology Practical No. I (Based on Paper - VI)

Total Mark : 35 **Time : 11:30 A.M. 5 : 00 P.M.**

Q : 1 Dissect the given Animal so as to expose its _____(12)

Q : 2 Prepare a temporary mount of _____ from the given animal (06)

OR

Q : 2 Prepare live mount of animals from given material. (06)

Q :3 Indentify the specimen 1 to 4 as per the instructions. (08)

(1) Identify and classify giving reasons.
(2) Identify & make a labeled sketch
(3) Identify, classify & describe giving habitat.
(4) Identify & describe.

Q : 4 Viva -Voce based on Paper - VI (07)

Q : 5 Journal _____ (02)

Candidate's No : _____

Centre : _____
Date : _____

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Third Year B.Sc.
Examination April/Oct. 200___
Zoology Practical No. II (Based on Paper - VII)

Total Mark : 35 Time : 11:30 A.M. 5 : 00 P.M.

Q : 1 Dissect the given Animal so as to expose its _____(12)

Q : 2 Prepare a temporary mount of _____ (06)

OR

Q : 2 Prepare a temporary mount of the given slide & describe its histology in the given Supplementary (06)

Q :3 Identify the specimen 1 to 4 as per the instructions. (08)

(1) Identify and classify giving reasons.
(2) Identify & classify giving reasons.
(3) Identify & comments on its peculiarity.
(4) Identify & describe.

Q : 4 Viva -Voce based on Paper - VII (07)

Q : 5 Journal _____ (02)

Candidate's No : _____

Centre : _____
Date : _____

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Third Year B.Sc.
Examination April/Oct. 200___
Zoology Practical No. III (Based on Paper - VIII)

Total Mark : 35 Time : 11:30 A.M. 5 : 00 P.M.

Q : 1 Detect any two constituents from the given sample with confirmatory tests and show it the examiners. (12)

OR

Q : 1 Perform amino acid seperation by paper chromatography & Atomic models (Structures) Preparation (12)

OR

Q : 2 Perform the Colorimetric estimation of Glucose / Protein (10)

OR

Q :2 Count the total number of R.B.Cs. from your blood (10)

OR

Q: 2 Differential count of W.B.C. from your blood. (10)

Q :3 Identifications : (04)

(1) Identify & give its uses
(2) Identify & describe.

Q : 4 Viva -Voce based on Paper - VIII (07)

Q : 5 Journal _____ (02)

Candidate's No : _____

Centre : _____
Date : _____

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Third Year B.Sc.
Examination April/Oct. 200___
Zoology Practical No. IV (Based on Paper - IX)

Total Mark : 35 **Time : 11:30 A.M. 5 : 00 P.M.**

Q : 1 Detect the _____ from the gieven sample of water. (12)

OR

Q : 1 Prepare a Stained temporary mounting of chick - embryo from the given egg. (06)

Q : 2 Identify & describe the chromosomal anmaly from the given karyotype. (06)

OR

Q :2 Prepare a Stained slide of Barrbody/ giant chromosome. (06)

Q : 3 Attending long Educational excursion

OR

Attending (Two) short Educational excursion

OR

Project / Report (12)

Q : 4 Viva -Voce based on Paper - IX & Educational Excursion

OR

Project & Submission (09)

Q : 5 Journal _____ (02)