B.SC ZOOLOGY

FIRST YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Hindi	100	3
2.	English	100	3
3.	Invertabrata	100	3
4.	Botany	100	3
5.	Practical 1: Invatabrata	100	3
6.	Practical 2 : Botany	100	3

SECOND YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Hindi	100	3
2.	English	100	3
3.	Chordata	100	3
4.	Allied Microbiology	100	3
5.	Practical 3 : Chordata	100	3
6.	Practical 4 : Allied Microbiology	100	3

THIRD YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Embryology	100	3
2.	Ecology, Animal Physiology	100	3
3.	Genetics	100	3
4.	Evolution	100	3
5.	Embryology & Ecology	100	3
6.	Practical 5 : Ecology, Genetics & Evolution		

SYLLABUS

FIRST YEAR

Paper – 1

HINDI- I

Paper – 2

ENGLISH PAPER – I

Detailed Text

PROSE

1. In Prison – Jawaharlal Nehru
2. What is Science? – George Orwell
3. On Marriages – Nirad Chaudari
4. The Luncheon – N. Somerset Maugham
5. The Mourners – V. S. Naipaul
6. The Plane Crash – Juliane Koepcke
7. Better Late – R.K. Narayan

POETRY

1. Polonius' Advice t his Son – William Shakespeare
2. Every Town a Home Town - Kaniyan Purkunran
3. The Village Schoolmaster – Oliver Goldsmith
4. The Solitary Reaper – William Wordsworth
5. On his Blindness – John Milton
6. The Tyger – William Blake

Non-Detailed

Text : THE GIFTS AND OTHER STORIES abridged and simplified by Anthony Toyne – Oxford University Press, 1997.

The following stories

1. The Gifts – O. Henry
2. The Two Friends – Guy de Maupassant
3. The Bear Hunt – Leo Tolstoy
4. The Goblins and the Grave Digger – Charles Dickens
5. The Nightingale and the Rose – Oscar Wilde

GRAMMER

1. Articles and Prepositions
2. Infinitives and Gerunds
3. Five basic sentence patterns (SV SVC, SVO, SVOO, SVOC(A))
4. Arranging the component parts so as to form a sentence
5. Language work at the end of all lessons
6. Language work at the end of all lessons
7. Question Tag, Active and Passive Voice
8. Degrees of Comparison

COMPOSITION

1. Letter Writing (Formal and Informal)
2. Developing the hints
3. Comprehension
4. Writing Telegram
5. Completion of a passage
6. Precis Writing

Paper 3

INVERTAEBRATA

Unit – I ARTHROPODA

Penaeus and Cockroach,

Peripatus and limulus: Structure and affinities.

Unit – II

Larval forms in crustacea and parasitic crustacean, Prawn cluture, Insect mouth parts and their modifications, social life and economic importance of Insects, Arthropod Vectors of Human Welfare.

Unit – III MOLLUSCA:

Pila, Freshwater Mussel and sepia.

Unit – IV

Food modification and Respiratory organs in Mollusca, Torsion in Gastropoda, Economic importance of Mollusca.

Unit – V ECHINNODERMATA

Starfish, Sea cucumber, Sea Urchin and Sea lilly. Water Vascular system, Echinoderm larvae and their significance.

References:

1. Robert D Barnes, 1987 invertebrate Zoology, Saunders College Publication.
2. Barrington E.J.W, 1981, Invertebrate Structure and Function, ELBS Edition.
3. R.L Kotpal 1996 Modern text book of Zoology Invertebrates, Rastogi Publication.
4. Ekambranatha Ayyar 1993, Manual of Zoology Vol.1 S.Vishwanathan Pvt.Ltd.,=

Paper – 4

ALLIED I BOTANY

UNIT – I Introduction:

1. Broad classification of plants – cellular organization, outline classification and economic importance of bacteria, virus, algae and fungi.
2. Study of, structure, life cycle and economic importance of the following :
    a) Algae – Nostoc, Chlamydomonas, Oedogonium, Chara, Ectocarpus.
    b) Fungi – Albugo, Yeast, Polyporus, Puccinia, Alternaria.
    c) Bryophytes – Marchantia, Anthoceras.

d) Pteridephytes – Selaginella, Equisetum.

e) Gymnosperms – Pinus.

UNIT – II 1. Anatomy

Tissues – Maristems - permanent tissues – tissue system – Primary structure of Dicot stem, Dicot root, monocot stem and monocot root – Secondary structure of Dicot stem and root – Anomalous Secondary growth – Structure of dicot leaf.

2. Cytology and Embryology :

a) Structure of cell – cell organelles – Nucleic acids – cell inclusions – cell divisions – types and stages.

b) Structure and development of anther, male gametophyte, ovule and female gametophyte – Fertilization – Development and structure of dicot embryo.

UNIT – III : 1. MORPHOLOGY

a) Root – types, modifications and functions.

b) Stem – functions, modifications.

c) Leaf – Phyllotaxy, simple and compound leaves – modifications of leaves.

d) Flowers – parts, functions, inflorescence, racemose, cymose and special types.

e) Fruit – simple, aggregate, multiple fruits – fleshy, dry fruits – dry dehiscent and indehiscent fruits, dispersal of seeds and fruits.

2.TAXONAMY OF ANGIOSPERMS:

Outline classification of Linneaus and Bentham and Hooker – study of characters and economic importance of the following families:

1. Annonaceae.
2. Leguminosae.
3. Cucurbitaceae.
4. Asteraceae.
5. Apocyanaceae
6. Solanaceae
7. Lamiaceae
8. Euphorbiaceae.

9. Liliaceae.
10. Archidaceae.

UNIT – IV Plant physiology

1. Biological significance of water – osmosis, absorption of water – transpiration – types, significance, Ascent sap.
2. Micro and macro nutrients – deficiency symptoms.
3. Photosynthesis – Light and dark reactions – Respiration – glycolysis , krebs cycle, ETS. Nitrogen cycle – Biological nitrogen fixation. Protein synthesis – plant hormones – auxins, cytokinins, Abscicic acids.. Plant movements.

UNIT – V Plant ecology, genetics and evolution :

1. Ecological factors – biotic, abiotic and climatic factors – Ecosystem – Concept – pond is an ecosystem – Classification of water based on water relationship – hydrophyte, mesophyte and xerophyte – vegetational types of Tamil Nadu.
2. Mendelism – mono – dihybrid cross – multiple alleles – linkages and crossing over.
3. Evidences of organic evolution – Theories of Lamarck, Darwin and Devries.

Reference:

1. College Botany, Henry Holt & Co, Fuller, H.J. & Tippo. O.
2. General Botany Vol. I & Vol.II, Gangully, A.K. The New book Stall Calcutta.
3. Ancillary Botany, Rao, K.N. Krishnamoorthy, K.V. & Row G.S. Viswanathan Private Ltd., Madras.

Practical – INVERTABRATA

1. Studies of Museum Specimens and Slides relevant to the types studied in theory.
2. **Dissection of:-**
    a. Earthworm : Nervous system
    b. Cockroach : Digestive, Nervous and Reproductive Systems.
    c. Pila : Digestive system
3. **Mounting of:**

a. Body and Penial Setae in Earthworm
b. Mouth Parts of:
    i. Mosquito
    ii. Cockroach
    iii. Honey Bee
c. Salivaryglands of Cockroach
d. Appendage of prawn
e. Redula of Pila

4. **SPOTTERS**

The student must be through with the following mounted slides and specimens. As this is the minimum number of specimens to be studied these should be procedure well in advance and kept ready for practical examination.

List of mounted Slides and Specimens

a. Classify Giving Reasons:

Entamoeba, Polystomella, Paramoecium, Sycon, Spongilla, Physalia, Tubipora, Gogonia, Chaetopterus, Arenicola, Leech, Aplysia, Chiton, Doris, Loligo, Nautilus, Holothuria, Sealily, Starfish.

b. Drawn Labelled Sketches:

Obelia Colony, Oblia-modusa, Ephyralarva. Sea Anemone T.S., Liver fluker T.S., Taenia T.S., Matured Proglottid. Ascaris-male and female T.S., Leech T.S., Neris Parapodium, Nereis T.S., Mouth Parts of female Anophe'es, Bipinnaria, Earthworm – T.S.

c. Comment on Biological Significance:

Entamoeba, sponge gemmule, Physalia, Heteronereis, Chaetopterus, Sacculina, Peripatus, Limulus, Nautilus, Bipinnaria larva.

d. Relate Structure and Function

Spicules (sponges), Taenia-Scolex, Nereis-Parapodium, Antenule of Prawn, Pila-radula, Sepia-arm, Pedicellaria.

e. Comment on Respiration Arrnngement:

Chaetopterus, Ascaris, Prawn, Limulus, Chiton, Seaurchin, Holothurian, Starfish.

5. **Record**

The record must include a brief report of a filed study, Un-dertaken by the student during the course of the year.

References:

1. Banerjee V.A Textbook of Invertebrate Practical Zoology – Bharati Bhavan Patna.
2. Dr.Rastogi V.B A Manual of Invertebrate Practical Zoology, Kedarnath Ramanath, Meerut.

Practical – 2

ALLIED BOTANY PRACTICALS ;

1. To make suitable micro preparations – for algae, fungi, bryophytes, Pteridophytes, Angiosperms and Gymmosperms given in the syllabus.
2. To make preparation for microscopial observation for anatomical specimens.
3. Observation of anther and ovule - structure and developments.
4. To describe technical terms of plants, belonging to the families prescribed and their identification.
5. Dissection of flower and construction of floral formula and floral diagram.
6. To describe simple experiment set up in plant physiology part of the syllabus.

SECOND YEAR

Paper – 5

, HINDI- I

Paper – 6

ENGLISH PAPER – II

Detailed Text

PROSE

8. A Visit to India – Julian Huxley
9. University Days – James Thurber
10. I Have a Dream – Martin Luther King

11. The Story Teller – H.H. Munro (Saki)
12. George Bernard Shaw – Bertrand Russel
13. Only then shall we find Courage – Albert Einstein

POETRY

7. The Day is Done – Henry Wadsworth Longfellow
8. King Arthur's Farewell – Alfred Tennyson
9. O Captain! My Captain! – Walt Whitman
10. My Last Duchess – Robert Browning
11. Ode to a Nightingale – John Keats
12. Lochinvar –Walter Scott

Non-Detailed

A collection of One Act Plays -

1. Remember Ceasar – Gordon Daviot
2. The Proposal – Anotn Chekov
3. The Miracle Merchant – Saki
4. The Stepmother – Arnold Bennet
5. The Mahatma – Rama Sarma

GRAMMER

1. Relative Clauses
2. Conditional Sentences
3. Modal auxiliaries
4. Reported Speech
5. Transformation of Sentences
    a. Affirmative, Negative and Interrogative Sentences
    b. Simple, Compound and Complex Sentences
6. a,b,r clauses
7. Correction of Sentences based on

a. Subject, Verb and Concord
b. Tenses
c. Articles and Prepositions.
d. Question Tags

COMPOSITION

7. Paraphrasing
8. Dialogue Writing
9. Report Writing
10. Note Making
11. General Essay
12. Expansion of Idea.

Paper – 7
CHORDATA

Unit – I

General characters and outline classification of phylum-chordata - Origin of chordates, Structure and affinities of Balanoglossus, Ascidian, and Amphioxus, Characters and classification of sub-phylum Hemichordata, Urochordata and Cephalochordata

Unit – II

Class: Pisces - Characters and classification of Fishes up to order level with examples - Structure of Shark – Structure and affinities of Dipnoi – Types of Fins, Types of Scales – Accessory respiratory organs in Fishes – Migration of Fishes – Parental care in Fishes.

Class: Amphibia – General character and classification of Amphibia up to order level with examples. Origin of limbs. – Organization of Frog, Biology and Adaptive feature of Anura and Apoda. – Parental care in Amphibians. – Origin of Amphibia.

Unit – III

Class: Reptilia - General characters and classification of Reptilia up to order level. – Organization of Calotes. – Types of Skull in Reptiles.

Class: Aves. – General characters and Classification of Aves. - Organization of Pigeon. – Flight Adaptation of Pigeon. –Palaeognathae, the flightless birds- Palate in birds Origin of Birds – Migration Birds

Unit – IV

Class: Mammaila – General Characters and Classification of Mammals – Structural organization of Rat, Bilogy and distribution of Prototheria, Metatheria and Eutheria – Dentition Mammals – Adaptive Radiation in Mammals – Flying and Aquatic Mammals Adaptations.

Unit – V

Comparative anatomy of the organ systems of vertebrates in relation to their adaptations and evolution – Integument, Digestive, Respiratory , Circulatory nervous, Urogenital and Skeletal systems. Study of poisonous and non-poisonous snakes and their identification. – Poisonous and Biting mechanism in Snakes. – Mesozoic reptiles – Affinities of Sphenodon.

References:

1. Ayyar E & Anathakrishnan, Manual of zoology. Vol-11 Part 1 S. Viswanathan & co.,
2. Jordan, E.L & Verma, P.S Chrodate Zoology 11/e, S.chand & co.
3. Kenneth V.Kardong, Vetebrates 2/e Tata McGraw Hill.
4. Romer, AS Vertebrate Body, Wb Saunder Co., Philadelphia.
5. Waterman, AJ., et al. Chordate Stucture and Function, Ma Millan co.
6. De Beer Vrtebrate Body, Sidgwich & Sons Ltd., London.
7. Yound, J.Z Life of Vertebrates.
8. Dr.Rastogi V.B Vertebrate Zoology, Kedarnath Ramnath, Meerut.
9. Parker & Haswell, Vol 11 Chordata.
10. Adam Sedgwick. A Student's Text Book of Zoology, Vol – 11 Central Book Depot. Allahabath
11. Young J.Z Life of mammals.
12. George C.Kent & Larry Miller Comp Area of the Vertebrates 8/e Tata McGarw Hill

13. Newman H.H Phylum Chordata. Me Millan.
14. Smith H.M Evolution of Chordate structure Holt Rinehart & Winston Inc., N.Y.

Paper – 8

ALLIED II MICROBIOLOGY

UNIT – I

1. Introductory Microbiology: Definition, History and evolution of microbiology – Taxonomy and classification of Micro-Organisms – Types of microscopes – Light, Dark ground – Phase contrast - Electron microscopes.
2. Stains and staining methods – simple, differential and special stains – sterilization – Moist heat, dry heat, ionization, Radiation, filtration, disinfectants.

UNIT – II

Ultra structure of microbial cell – Bacteria, fungi, and virus – sub cellular structure and their function.

Growth regulation – Nutritional requirements – Micro and Macro nutrients – Nutritional groups Growth curve – factors affecting growth – Batch, continuous and synchronous culture – Types of culture media.

UNIT – III

Soil and Agricultural Microbiology :

1. Types of Soil micro organisms – Bio-geo chemical cycles – Nitrogen cycle – Phosphorous cycle and carbon cycles – their importance and role of micro organisms in bio-geo chemical cycles.
2. Microbial interaction – Mycorrihizae, Rhizosphere, Lichens, Bio-fertilizers and Bio pesticides.

UNIT – IV Food, Diary and Industrial Microbiology

Microbial food spoilage – methods of food preservation – Food poisoning and food borne diseases – Gasteroentistics – by Solmonella, Staphylococcus and Clostridia.

Bacterial flora of milk and milk products. Microbial production of organic acids, Citric acids, Acetic acids – Amino acids – Vitamin B_{12} & C, alcoholic beverages – wine and beer.

UNIT – V Medical and Environmental Microbiology

1. Medical Microbiology – Respiratory tract infection – Urinary tract infection – Sexually transmitted diseases – Pyrexia of unknown origin – control of micro organisms – Antibiotics, Antiseptics, Chemo therapeutic agents.
2. Environmental Microbiology – Microbiology of air – enumeration of microbes from air – Air samplers and sampling techniques – microbiology of water – bacteriological techniques for the examination of water – BOD, COD.

Reference:

1. Text book of Microbiology, Ananthanarayanan and Jayaram Paniker.
2. General microbiology – R.F. Boyd.
3. Text book of microbiology – W.Burrows.
4. Microbiology – P.L. Carpenter.
5. Micriobiology – Pelzar & Reid.
6. Industrial Microbiology – J.E. Casida.
7. Food Microbiology – W.C. Frazier.
8. Fundamental principles of bacteriology – A.J. Salle.
9. Soil micro organisms and plant growth – N.S. Subba Rao.

Practicals

Major Chordata

1. Identification of specimens studied in the theory
2. Shark – V, VII, IX and X cranial nerves, mounting of placoid scales and brain.
3. Frog – Digestive, arterial venous and urogenital systems
4. Calotes – Digestive, arterial venous and urogenital systems
5. Mounting of brain and tryoid apparatus in frog.
6. Identification of prepared skeletal structures of vertebrate
7. Spotters.

ALLIED II MICROBIOLOGY PRACTICALS :

1. Handling of light microscopes.
2. Preparation of Media – Liquid and solid media.
3. Plating techniques – streak plate and pour plate methods.
4. Staining of bacteria – Simple and gram staining.
5. Staining of Fungi – Lactophenol cotton blue staining.
6. Hanging drop method.
7. Effect of temperature on the bacterial growth.
8. MBRT – for milk.
9. Isolation of nitrogen fixing organism Azotobacter and Rhizobium.
10. Estimation of bacterial contamination of air by open plate method.
11. Antibiotic sensitivity test.

THIRD YEAR

Paper – 9

EMBRYOLOGY

UNIT – I

History of embryology – Theories of perforation – epigenesis and pangenesis – Van Baer's Law – Biogenetic law – Germ plasm theory - Mosaic theory – Regulative theory – Branches of embryology.

UNIT- II : Gametogenesis and fertilization:

1. Definition, process and significance of spermatogenesis and oogenesis – types of sperms – types of eggs and egg membranes – Polarity and symmetry.
2. Fertilization – definition and significance – entry of sperm – egg activation – post fertilization changes – theories of fertilization.

UNIT – III : Cleavage and Gastrulation :

1. Cleavage – Definition – Significance – Patterns of cleavage (Amphioxus, Frog, Bird and Mammal) – influence of yolk in cleavage – Morula and Blastula – Radial and spiral cleavage.
2. Gastrulation – Definition – Significance – Gastrulation in Amphioxus, frog, bird, and mammal – organ forming areas – Fate maps.

UNIT – IV : Tubulation and organogenesis :

1. Tubulation – definition, process and significance – primary organ rudiments – Notogenesis – Neurogenesis – Mesoderm formation in amphioxus, Frog and Birds.
2. Organogenesis – Development of brain, heart, eye and ear in frog and chick. Development of fetal membranes in chick and mammal placenta – definition and significance – different types.

UNIT – V

Experimental embryology – Definition and significance – Induced ovulation – artificial fertilization – fertility control – cell linkage – gradient theory – Nuclear transplantation – cell differentiations organizers – primary and secondary theories – Parthenogenesis – Natural and artificial, Haploid and Diploid parthenogenesis – Regeneration.

Reference:

1. Verma – P.S. Agarwal, V.K. Chordate embryology – S. Chand & Co.
2. Balinsky B.C. Introducion to embryology – W.B. Saunder Co. Philadelphia.
3. Developmental Biology – Rastogi V.B. & Jayaraj M.S., Kedarnath, Ramnath, meerut.
4. Pattern foundations of Embryology.

Paper – 10
ECOLOGY

UNIT – I

Introduction – Definition – concepts – Importance of the study of ecology – Environmental factors – Biotic and abiotic factors – physical, chemical factors.

UNIT – II Ecosystem:

Characteristics, components, producers, consumers, decomposers and transformers. Energy flow in ecosystem – Food chain – Food web – Ecological pyramids – Pond and Grass land as the ecosystem.

UNIT – III : Population and Population Interactions

1. Population – characteristics – natality, morality, density and age distribution. Population control; Life tables.
2. Population interaction :
    i) Intra specific interactions – Aggregation, Social organization, divisions of labour and Social behavior, Territorialism, migration.

ii) Intra specific interaction – Neutralism, commensalism, synergism, mutualism, symbiosis, Ammensalism, Antagonism, parasitism, competition and predation.

UNIT – IV : Habitat ecology

1. Biosphere – Lithosphere, Hydrosphere and atmosphere.
2. Habitats – Terrestrial, Aquatic - Marine and Fresh water habitats.
3. Biomes – Fresh water biomes – lakes and rock pools, springs, steam and rivers; marshes and swamps. Marine biomes – characteristics, and divisions, Pelagic and benthic life, their adaptations; rocky, muddy and sandy stores; estuaries; mangroves. Terrestrial biomes, Soil, forests, grass land, deserts, tundra, tropical rain forests, scrub jungles.

UNIT – V : Applied ecology

1. Natural resources and their management.
2. Aquaculture and fisheries.
3. Forests – Protest action of forests, Chipko movement aforestation, social forests, and biomass production.
4. Wildlife management – wildlife sanctuaries, National parks and Bio-reserves in India.
5. Environment pollution – Air, water, soil, noise and radioactivity – source, effect and control measures.
6. Green house effect and ozone layer – pesticides and residual effects.

Paper – 11

ANIMAL PHYSIOLOGY

UNIT – I

Introduction – Scope – fields of physiology – cellular, comparative and general physiology - Functional aspects of the various organ systems.

UNIT – II : Nutrition & Metabolism

1. Nutrition – Definition, Types – modes of food procurement in animals – Food constituents – protein, carbohydrate, minerals, fat, salt and Vitamins - significance of each food constituents; Balanced diet.
2. Enzymes – general characters, classification and their mode of action – role of inhibitors.
3. Metabolism - Energy production from carbohydrates, proteins and fats – regulation of metabolism.
4. Digestion – In man – cellulose digestion absorption and assimilation.

UNIT – III : Respiration and Excretion

1. Respiration - Oxygen processing mechanisms in animals – skin, gills, lungs, trachea – properties and functions of respiratory pigment – Hemoglobin – role in human respiration – transport of O_2 and CO_2 mechanism – adaptations to dividing control of respiration – and anaerobiosis.
2. Excretion – general organs in mammals formation of nitrogenous wastes – Deamination and ammonotelism, ornithene cycle and ureotelism, citric acid exeretion and its significance, structure of human kidney – mechanism of urine formation ; micturition; osmotic and ionic regulations – passive and active transports – osmoregulations in fishes and hormonal control of osmotic balance.

UNIT – IV : Circulatory system & Nervous System

1. Body fluids and their circulation – Blood – Properties , composition and functions, blood coagulation – Lymph – Circulation and functions – Anemia, Haemolysis – types and functions of heart – structure of mammalian heart – pace makers and the endogenous nature of cardiac rhythm and its control – BP and ECG.
2. Nervous system – components, types of neurons – nerve fibers – human brain – structure and its functions – conduction of nerve impulse and Reflexes – receptors of Neurosensory mechanism – photoreceptors and phonoreceptors – chemo receptors, mechano receptors – equilibrium receptors – Muscular system – Types of muscles – ultra structure – properties of vertebrate skeletal muscle – physical chemical changes taking

place during muscle contraction – theories of muscle contraction – muscle twitch, summation, Tetanus, fatigue, electric organs and luminescent organs.

UNIT – V : Thermo regulation and chemical co-ordination

1. Thermo regulation – Temperature relations of homiotherms and poikilotherms – Thermo regulation in man, adaptations met with in animals ride over temperature extreme – Hibernation, Oestivation, diapauses, thermal immigration .
2. Chemical co-ordination – Endocrine organs of man, their secretion and significance – pituitary, thyroid, parathyroid, Adrenal, Pancreas, thymus, pineal body, hypothalamus, gastro intestinal hormones – feedback mechanisms – hormones of moulting ad metamorphosis of insects - Role of endocrines in reproduction, Bioluminescence and its significance, biorhythms in animals.

References:

1. Hoar WS (1987) General and Comparative Physiology Prentice-Hall.
2. Processor, CL Comparative Animal Physiology. Saunders
3. Giese, Ac (1973) Cell Physical, WB Saunders Company
4. Parameswaran and Anantha Krishnan (1991) S.anantha Subramanian. Outlines of Animal Physiology. Viswanathan & co.
5. Verma,PS 7 Tyagi, BS Animal Physical 6/oS. Chand 7 co .,
6. Agarwal, Vk, agarwal RA Srivatsava, Ak & Kaushal Kumar, Animal Physiology and Biochemistry S.Chand & Co.,

Malcolm S.Gordon (1997) Animal Physiology. Macmillan Publising Co., Inc

Paper – 12

CELL BIOLOGY AND GENETICS

UNIT – I

1. Introduction – Definition – cell theory – History of cell biology.

2. Methods – Light, Phase contrast and Electron Microscopy (TEM/SEM) – Ocular and stage micrometers – Camera Lucida cell homogenization – Fractionation – centrifugation and isolation of cellular components. Fixation, Stains and staining methods – vital staining – cell and tissue culture – paper chromatography.

UNIT – II

Structure of cell – structure of Prokaryotic and Eukaryotic cells – their differences – structure composition and functions of cell organelles – cell membrane, Golgi apparatus, Endoplasmic reticulum, microsomes , chloroplasts, centrioles, cell appendages – cilia – flagella etc – Nucleus.

UNIT – III

Structure, composition and functions of chromosomes – Giant chromosomes – Nucleic – acids – DNA and RNA – structure, composition types and functions – Z DNA, B DNA C DNA – mRNA, t RNA, r RNA – Replication of DNA & RNA – DNA & RNA as the material – Genetic code –Protein synthesis - Gene regulation – Operan concept -Cell division and cell cycle – mitosis and meiosis their significance.

Genetics

UNIT – IV

1. Introduction – contributions of Mendel – Mendel laws – Gene interaction – Epistasis – complementary genes – Atavism, Lethal genes multiple alleles – coat colour in rodents – Blood group inheritance in man.
2. Chromosomal genetics: Linkage and crossing over – mechanism – types and theories – chromosome mapping – sex determination in man, drosophila, honey bee. Sex linked inheritance – Hemophilia and colour blindness – Mutation – Mutagenesis, mutagen, mutants – In breeding and out breeding – Heterosis and extra chromosomal inheritance.

UNIT – V

Experimental genetics and population genetics – Hardy Weinberg law – microbial genetics – conjugation, transduction & transformation – Genetic engineering and Biotechnology.

Paper – 13

EVOLUTION

UNIT – I

Introduction – origin of life – Evolution of solar system, Earth – biogenesis and abiogenesis – Theories – cosmozoic theory – meteorite theory – theory of special creation – chemical evolution and origin of life – origin of self replicating systems and their evolution.

UNIT – II

Evidences for evolution – paleonotological, biochemical, morphological, taxonomical, physiological and embryological evidences – Geological time scale – Fossils – dating of fossils – fossils in India.

UNIT – III

Theories and concepts of evolution – Theories of Lamark, Darwin, and Devries – New Lamarckism and Neo Darwinism.

UNIT – IV

Modes of evolution

1. 1.Evolution in man – biological and cultural evolution – fossils history of man, human races and their distribution
2. Convergent, Divergent parallel and co-evolution – adaptive radiation – living fossils.
3. Distribution of animals – Zoo geographical realms.

UNIT – V

Species and speciation – Factors – isolation mechanisms – distribution of species – mimicry and animal evolution – mutations and selection - Polymorphism.

Practical – III Practicals covered in the subjects EMBRYOLOGY AND ECOLOGY

EMBRYOLOGY

Study of the prepared slides, museum specimens and materials of the

1. Sections of testis and ovary showing the maturation stages of gametes.
2. Slides of mammalian sperm and ovum.
3. Study of egg types – cockroach Ootheca – Eggs of Frog and Hen.
4. Slides of cleavages stages of eggs of Frog and Chick.
5. Slides of blastula and gastrula of Frog and Chick.
6. Slides of different developmental stages of chick embryos.
7. Slides of different stages of brain, heart and eye in chick embryo.
8. Placenta of sheep or pig or rat.

ECOLOGY

1. Estimation of dissolved Oxygen, Salinity, pH, free CO_2 in aquatic environment.
2. Estimation of measuring parameters of terrestrial environment – Rain gauge – maximum and minimum thermometer – wet and dry hygrometer – Photometer – Anemometer and Barometer.
3. Study of fresh water and marine planktons.
4. Adaptations in aquatic and terrestrial animals based on the study of museum specimens such as rocky and sandy shore animals, planktonic and Benthic animals – Flying and burrowing animals.
5. Visit to near by wild life sanctuary or national park or bioreserve or marine – Practical record and field report should be submitted.

Practical – IV

Practicals covered in the subjects ANIMAL PHYSIOLOGY, CELL BIOLOGY, GENETICS AND EVOLUTION

ANIMAL PHYSIOLOGY

1. Study of digestive enzymes in cockroach.
2. Detection of nitrogenous waste in fish tank water, bird excretes and mammalian urine.
3. Study of blood pressure.
4. Study of Hemoglobin concentration.
5. Use of kymograph unit.

CYTOLOGY

1. Use of microscopes- Camera Lucida, stage and ocular micrometers.
2. Counting of RBC and WBC using hemocytometer.
3. Study of mitotic division by onion root tips.
4. Study of meiotic division using insect testis.
5. Study of prepared slides of different tissues.

GENETICS

1. Observation of common mutants of drosophila.
2. Preparation of mounts of the salivary gland chromosomes of drosophila.
3. Human blood grouping.

Evolution : 1. Study of fossil evidences.(Spotters)