Government College for Women (Autonomous) Kumbakonam

PG & Research Department of Zoology

B.Sc., Zoology – Revised course structure under CBCS

(For the candidates admitted from the Academic year 2012 – 13 onwards)

Sem	Course code	Course Title	Inst, Hrs/ Week	Credits	Marks
I	U1T1	Part I Language Tamil	6	3	100
	U131E1	Part II Language English	6	3	100
	UZC101	Part III Core Course 1 - Invertebrate Theory	6	5	100
	UZC202P1	Part III Core Course II - Invertebrata and Chordata Practical	3	-	-
	U1ACH2: P	Part III Allied Course I - Biology of Invertebrate and Chordata Theory	6	4	100
		Part III Allied Course II - Practical	3	-	-
		Total	**30**	**15**	**400**
II	U2T2	Part I Language Tamil	6	3	100
	U132E2	Part II Language English	6	3	100
	UZC202P1	Part III Core Course II - Invertebrate and Chordata Practical	3	5	100
	UZC203	Part III Core Course III - Chordata Theory	5	5	100
		Part III Allied Course II - Practical	2	3	100
		Part III Allied Course III - General Principles of Zoology and Commercial Zoology.	4	3	100
	UVE	Part IV Value Education Yoga	2	2	100
	UGCES	Part IV Environmental Studies	2	2	100
		Total	**30**	**26**	**800**
III	U3T3	Part I Language Tamil	6	3	100
	U133E3	Part II Language English	6	3	100
	UZC304	Part III Core Course IV - Cell Biology Theory	6	5	100
	UZC405P2	Part III Core Course V – Cell Biology And Animal Physiology Practical	3	-	-
	U3AB1	Part III Allied Course V – Botany Theory	5	4	100
	U4AB2P	Part III Allied Course II - Botany Practical	2	-	-
	UG3NMEC1	Part IV Non – Major Elective Public health and Hygiene	2	2	100
		Total	**30**	**17**	**500**

Sem	Course code	Course Title	Inst,	Credits	Marks

			Hrs/ Week		
IV	U4T4	Part I Language Tamil	6	3	100
	U134E4	Part II Language English	6	3	100
	UZC405P2	Part III Core Course V - Cell Biology, Genetics and Molecular Biology Practical	2	5	100
	UZC406	Part III Core Course VI - Genetics and Molecular Biology Theory	5	4	100
	U4AB2P	Part III Allied Course II - Botany Practical	3	4	100
	U4AB3	Part III Allied Course III - Botany Theory	4	3	100
	SBECI	Part IV Skilled Base – Agricultural Pest management	2	2	100
	UG4NMEC2	Part IV Non – Major Elective course I- Apiculture	2	2	100
		Total	**30**	**26**	**800**
V	UZC507	Part III Core Course VII - Evolution	6	6	100
	UZC508	Part III Core Course VIII - Developmental Biology and Immunology	5	5	100
	UZC509	Part III Core Course IX – Animal Physiology	5	5	100
	UZC510P3	Part III Core Course X- Evolution , Developmental Biology & Immunology and Genetics Practical	5	5	100
	UZ5EC3	Part III Elective Course I - Biostatistics	5	5	100
	SBEC2	Part IV Skill Based Aquaculture	2	2	100
	SBEC3	Part IV Skill Based Vermiculture	2	2	100
		Total	**30**	**30**	**700**
VI	UZC611	Part III Core Course XI - Ecology	6	5	100
	UZC612	Part III Core Course XII - Biotechnology and Microbiology	6	5	100
	UZC613P4	Part III Core Course XIII -Ecology, Biotechnology and Microbiology, Practical	6	5	100
	UZ6EC3	Part III Elective Course II - Biochemistry	5	5	100
	UZ6EC4	Part III Elective Course III -Basic Medical Knowledge	6	4	100
	-	Extension Activities	-	1	-
	UGS	Gender Studies	1	**1**	**-**
		Total	**30**	**26**	**600**

Total no of Papers : 38

Total Hours : 180

Credit : 140

Marks : 3800

I – SEMESTER

CORE COURSE I – INVERTEBRATA

UNIT – I

Phylum: Protozoa – General characters and classification up to class level with suitable examples.

Detailed Study: Paramecium.

General Topics: 1. Human Protozoan Diseases: Amebeosis, Diaharrea, Trypanosomiasis, Leishmaneosis, Malaria

2. Locomotion in Protozoa.

UNIT – II

Phylum: Porifera and Coelenterata General characters and classification up to class level with suitable examples.

Detailed Study: Sycon and Aurelia.

General Topics: 1. Canal system in Porifera.

2. Coral and coral reefs.

UNIT – III

Phylum: Platyhelminthes and Aschelminthes. General characters and classification up to class level with suitable examples.

Detailed Study: Liver fluke - Ascaris.

General Topics: 1. Parasitic adaptation in helminthes.

2. Human Nematode parasites.

UNIT – IV

Phylum: Annelida and Arthropoda. General characters and classification up to class level with suitable examples.

Detailed Study: Nereis and Prawn.

General Topics: 1. Larval forms in Crustacea.

2. Economic Importance of (Honey Bee, Silk Worm, Mosquito and Housefly)

UNIT – V

Phylum: Mollusca and Echinodermata. General characters and classification up to class level with suitable examples.

Detailed Study: Pila and Starfish.

General Topics: 1. Torsion in Gastropoda.

2. Larval forms of echinoderms.

Reference books:

1. Ekambaranatha Iyer and T.N. AnanthaKrishnan. 1992 A manual of Zoology Vol-I (Invertebrata) Part I and 2 Viswanathan & co.
2. Barrington E.J.W. 1979 Invertebrates structure and function 2nd edn. ELBS and Nelson.
3. Jordon E.Z and P.S Verma 1995 Invertebrate Zoology 12th ed. Sultan Chand and co.
4. Kotpal R.L., (All series) Protozoa Porifera Coelenterata Annelida, Arthropoda, Mollusca and Echinodermata – Rastogi publications.
5. Barnes R.D. 1940 – 1995. The invertebrates volume I to 4 Mc graw hill book co.

Core course III - INVERTEBRATA AND CHORDATA PRACTICAL

INVERTEBRATA:

Dissections: 1.Earthworm – nervous system, Digestive system
2.Pila – Digestive system

Mountings: 1.Earthworm – body setae and pineal setae.
2. Prawn – appendages.
3. Pila Radula mounting
4. Mouthparts of Housefly / Honeybee / Mosquito

Spotters:

1. Protozoa: Paramecium, Paramecium conjugation, Paramecium binary fission.
2. Porifera: Sponge, Sponge spicules, Sponge Gemmule
3. Coelenterata: Obelia entire, Physalia, Porbita, Sea anemone, Aurelia, Madrepora, Fungia.
4. Platyhelminthes: Liver fluke, Tape worm, Tape worm scolex, Planaria.
5. Nemathelminthes: Ascaris (male and female), Enterobius.
6. Annelida: Nereis, Nereis Parapodium, Heteronereis, Cheatopterus, Leech.
7. Arthropoda: Prawn, Nauplius larva, Zoea larva, Mysis larva, Limulus, *Bombyx mori,* Honeybee, Peripatus , Scolopendra.
8. Mollusca: Pila, Mytilus, Chiton, Dentalium, Sepia, Octopus.
9. Echinodermata: Starfish, Pedicellaria, Sea urchin, Bipinnaria larva, Aristotle's lantern, Ophiuroid.

CHORDATA:

Dissections: Fish – Digestive system, Reproductive system – Male and Female.
Frog / calotes – digestive and nervous system using video clippings.
Rat-demonstration of digestive, arterial, venous & urino genital systems using video clippings.

Mountings: 1.Shark Placoid scales.

Spotters:

1.Prochordata: Amphioxus, Ascidian, Tornari larva and Petromyson
2.Pisces:Shark, Clarius, Echeneis, Hippocampus, Eel, Exocoetus, and Gambusia.
3.Amphibia: Alytes,. Axolotl larva, Hyla and Ichtyophis
4.Reptilia: Naja naja ,Viper,Draco and Chelone mydas,
5.Aves: Pigeon, Quill feather
6.Mammalia: Bat, Rabbit
7.Dentition: Rabbit, Dog and Man
8.Osteology: Frog pectoral pelvic girdles, forelimb and hindlimb bones,skull.

Students will be introduced to learning of dissections / anatomy adapting CDs/web sources.

ALLIED ZOOLOGY course I

BIOLOGY OF INVERTEBRATES AND CHORDATES

UNIT- I

Phylum: Protozoa, Porifera and Coelenterata - General characters and classification up to class level with suitable examples.

Detailed Study: Paramecium.

General Topic : Canal system in Sponges.

UNIT- II

Phylum: Platyhelminthes and Annelida - General characters and classification up to class level with suitable examples.

Detailed Study: Earthworm.

General Topic: Human nematode parasites (Ascaris and Enterobius)

UNIT- III

Phylum: Arthropoda, Mollusca and Echinodermata - General characters and classification up to class level with suitable examples.

Detailed Study: Starfish.

General Topic: 1. Mouth parts in Insects (Honey Bee and Mosquito)

UNIT- IV

Class: Pisces, Amphibia and Reptilia - General characters.

Detailed Study: Shark.

General Topic: 1. Identification of Poisonous and non poisonous snakes.

UNIT- V

Class: Aves and Mammalia - General characters.

Detailed Study: Rabbit.

General Topic: Migration of Birds.

Reference books:

1. Outlines of Zoology – M. Ekambaranatha Ayyar – Viswanathan Publication.
2. A Manual of Zoology, Vol I & 2 M.E.K. Ayyar - Viswanathan Publication.
3. Invertebrate Zoology – E.L. Jordan – S. Chand and co.,
4. Chordate Zoology – E.L. Jordan - S. Chand and co.,
5. Modern Text book of Zoology – R.L Kotpal – First edition Invertebrates, Rastogi publications.
6. The Invertebrates Vol-I – Hyman.I.H, McGraw Hill Publications in the Zoological Sciences.
7. The Invertebrates Vol-II – Hyman.I.H, McGraw Hill Publications in the Zoological Sciences.
8. The Chordates – Alexander, R.M., Cambridge University press. 1st Edition.

ALLIED ZOOLOGY COURSE II - PRACTICAL

1. DISSECTIONS

Earthworm: Digestive System, Nervous System.

2. MOUNTINGS

Earthworm: Body and Penial setae.

Honey Bee, Mosquito – Mouth parts.

Shark – Placoid scales.

3. SPOTTERS

Amoeba, Paramoecium, Sponge, Obelia colony, Sea Anemone, Ascaris, *Faciola hepatica*, *Taenia solium*, Earthworm, Nereis, Leech, Prawn, Fresh water Mussel, Pila, Starfish, Amphioxus, Shark, Frog, Calotes, Pigeon, Rabbit.

4. Blood Grouping – ABO & Rh

5. Monohybrid and dihybrid crosses.

6. Frog egg, Blastula.

7. Onion root tip – Squash preparation and study of mitotic stages.

8. Spotters: Epithelial, Muscular, Vascular tissues.

9. Spotters: Newton's bee hive, Honey extraction apparatus. Honey, Identification of caste: Queen, Drone, Worker, Natural Bee Hive and Bee Wax.

II – SEMESTER
Core Course III CHORDATA

UNIT – I

Sub Phylum: Prochordata - General characters and classification up to class level with suitable examples.

Detailed Study: Ascidian and Amphioxus (Exclusive of endoskeleteon).

General Topic: 1. Origin of Chordates.

2. Retrogressive metamorphosis in ascidians.

UNIT – II

Class: Pisces: General characters and classification up to class level with suitable examples.

Detailed study: Scoliodon (Exclusive of endoskeleteon).

General topics: 1. Accessory respiratory organs in fishes.

2. Migration in fishes.

UNIT – III

Class: Amphibia: General characters and classification up to class level with suitable examples.

Detailed study: Frog (Exclusive of endoskeleteon).

General topics: 1. Parental care in Amphibia.

2. Neoteny in Amphibia.

UNIT – IV

Class: Reptilia: General characters and classification up to class level with suitable examples.

Detailed study: Calotes (Exclusive of endoskeleteon).

General topics: 1. Identification of poisonous and non poisonous snakes.

2. Dianosaurs.

UNIT – V

Class: Aves and Mammals: General characters and classification up to class level with suitable examples.

Detailed study: Pigeon and Rabbit (Exclusive of endoskeleteon).

General topics: 1. Migration in birds.

2. Dentition in mammals.

Reference Books:

1. Ekambaranatha Iyer and T.N. AnanthaKrishnan. 1992 A manual of Zoology Vol-I (Invertebrata) Part I and 2 Viswanathan & co.
2. Dhami, D.S and J.K Dhami 1978. Chordate Zoology R. Chand and co.
3. Jordon, E.L., and P.S. Verma 1995. Chordate Zoology and elements of animal physiology.S. chand and co.
4. Muthukumarasamy, P and K. Palanivel 1990. Thandudaiya vilangugal. BARD.

II - SEMESTER

AZC II – GENERAL PRINCIPLES OF ZOOLOGY & COMMERCIAL ZOOLOGY

UNIT – I

Human Physiology: Circulation: Structure and function of Heart. Respiration – Mechanism of transport of gases.

Excretion – Structure of kidney and Urine formation.

UNIT – II

Genetics: Mendelism – monohybrid and dihybrid crosses. Multiple alleles: ABO and Rh, Blood groups.

Evolution: Theories of Evolution- Lamarckism, Darwinism.

UNIT – III

Developmental Biology: Gametogenesis, Types of egg, Cleavage in Frog.

Cell Biology: Comparison of prokaryotic and Eukaryotic cells. Types of tissues – epithelial,vascular and muscular.

Cell Division – Mitosis and Meiosis.

UNIT – IV

Apiculture: species of Honey Bees- Types of Bee hives – Care and management – honey extraction – nutritive and medicinal value of honey.

UNIT –V

Vermiculture and Vermicomposting – types of earthworm- Vermicomposting Methods – Pit, heap, tank - economic importance – Vermiwash.

Reference Books:

1. Lehninger L., 1990 Biochemistry, W.H.Freeman & co.,
2. Hoar W.S. 1983. General and comparative physiology. Prentice Hall of India.
3. David Freidfelder, Molecular bilolgy IInd ed., Narosa publication house.
4. Balinsky, B. I. 1981. An introduction to embryology. W.B. Saunders Company Philadelphia.
5. Michael. J. Pelczar, JR. E.C.S Chan Noel R. Krieg Microbiology Vth ed. Tata Mc Graw – Hill publishing company limited.
6. Gupta P.K – Elements of Biotechnology.
7. Goldsky etal, Kuby immunology, W.H. Freeman publication company.

III SEMESTER

Core course IV CELL BIOLOGY

UNIT I:

The cell – Definition, Cell theory, types of cells, size, shape, volume, number.
Detailed study of cell structure. Prokaryotic and eukaryotic cells.
Microscopy-simple, compound, and Electron microscope, SEM, TEM.
Principle and applications of centrifuge and Electrophoresis.

UNIT II:

Plasma membrane – Ultra Structure & Functions.
Cytoplasm – Composistion and physicochemical properties
Golgi complex – Ultra Stucture & Functions.

UNIT III:

Ultra structure and functions of Endoplasmic reticulam, ribosomes – mitochondria and Lysosome.

UNIT IV:

Interphase nucleus : Ultra structure and functions.
Chromosomes – Ultra structure. Types and functions - giant chromosomes.

UNIT V:

Cell cycle – cell division – Amitosis, Mitosis
and Meiosis cell growth and Aging.
Cancer: Types and Characters.

Reference Books:

1 De Roberties, E.D.P and E.M.F . De Roberties 1987 cell and molecular biology.
2 Power, C.B., 1989. Essentials of cytology. Himalaya publishing house.
3 Verma, P.S and Agarwal , 1985, Cytology, S.Chznd & Co.,

Core Course – V – CELL BIOLOGY AND GENETICS PRACTICAL

CELL BIOLOGY:

1. Operation of compound and dissection microscopes.

2. Preparation and observation of squamous epithelial smear.

4. Onion root tip- Squash preparation and study of mitotic stages.

5. Spotters: Epithelial, muscular, Vascular and nervous tissues.

6. Spotters: Centrifuge, Camera Lucida, Micrometer.

GENETICS:

1. Recording of Mendelian traits in Man.
2. Drosophila – Culture and Lifecycle.
3. Study of mutants in Drosophila.
4. Male and female identification of Drosophila.
5. Human Karyotype – Normal – Male and Female.
6. Chromosomal abnormalities – Autosomal (Down's syndrome) and sex chromosomal (Turner & Kleinfilters syndrome).
7. Pedigree analysis – Colour blindness, Polydactyly, Haemophilia.
8. Blood Grouping – ABO & Rh.
9. DNA Model.

PART IV – NON ELECTIVE COURSE - I
PUBLIC HEALTH AND HYGIENE

UNIT- I

Introduction to health and hygiene – Types of Health, Mental and Physical. Hygiene and disease - TB, Typhoid, Cholera, Jaundice and HIV.

UNIT- II

Epidemiology of communicable diseases – air borne (small pox, tuberculosis) food and water borne diseases (food poisoning, amoebiasis) zoonoses (leptospirosis) arthropod borne (filariasis)

UNIT- III

Epidemiology of non - communicable diseases – Cancer, Diabetes.

UNIT- IV

Individual health – nutritional requirements (balanced diet, malnutrition) Mental health, personal hygiene, hazards of drugs, tobacco and alcohol.

UNIT- V

Community health – environment, housing plan, occupational health hazards, family planning, maternity and child care, health education.

Reference Books:

K. Park – Text book of Social and Prevention medicines.

CORE COURSE IX – GENETICS AND MOLECULAR BIOLOGY

UNIT I:

Genetics : Mendal laws

Interaction of genes – complementary, supplementary, inhibitory and lethal.
Multiple alleles – ABO blood group system.
Linkage and Crossing over.

UNIT II:

Sexdetermination – Man, drosophila and Bonellia.
Sex linked inheritance, Sex limited and Sex influence inheritance

Extra chromosomal inheritance – Shell coiling in Limnae, Kappa particles in paramecium

UNIT III:

Human Genetics, Karyotype, Pedigree analysis – Autosomal and Sex chromosomal syndromes in man.

Inborn errors of metabolism with reference to phenylalanine metabolism, sickle cell anemia. Eugeneics and Human betterment.

UNIT IV: Molecular Biology:

DNA as the genetic material. Gene concept, Fine structure of DNA and RNA – DNA Replication.

UNIT V:

Transcription – Genetic Code – Translation.

Gene expression and regulation in prokaryotes.

Lac operon model.

Reference Books:

1. Winchester A. Genetics, Oxford & IBH Publications
2. Sinnot Dunn & Dobzhansky, principles of genetics – Mc Graw Hill Co, London.
3. Elden J. Gardner – Principles of Genetics – Wiley Eastern Publication.
4. Veer Bala Rastogi, A text book of Genetics – Kerdarnath Ramnath Publication
5. Verma, P.S and V.K.Agarwal. 1997 Genetics S.chand & Co. New Delhi.

AGRICULTURAL PEST MANAGEMENT

UNIT – I

Introduction – Types of damage to plants by Insects – Direct and indirect effects – Types of insect pest – Assessment of insect population.

UNIT – II

Insect pests of crops – paddy, sugar cane, Coconut and Cotton.

UNIT – III

Methods used in pest control – Physical, mechanical, chemical and Biological methods used to control insect pests, IPM, -Biological pesticides NPV, CVP-Predators Bell.

UNIT – IV

Birds: Damage causing birds - Parakeet, Munia, sparrow, Pigeon, teals biological control measures – Beneficial birds: bee –eater, drango and owls.

UNIT – V

Filed Rodents – Biology and control measures of Bandicoot, soft fured filed rat, Filed mouse, Indian gerbil, and house rats.

Reference Books:

1. Chapman R.F., 1993. The Insects. Structure and Functions. ELBS. London
2. Chandler A.C. and Read C.P. 1961. Introduction to Parasitology. John Wiley and Sons, New York.
3. David, B.V., Muralirangan, N.C and Meera Muralirangan. 1992. Hamful and beneficial Insects. Popular book Depot.
4. David, B.V and T.Kumaraswami. 1998. Elements of Economic Endomology. Popular Book Depot.,Chennai.
5. David,B.V., 1992. Pest management and Pesticides: Indian Scenario Namrutha publications.
6. Krishnan, N.T., 1993. Ecolomic Entomology. J.J. Publications, Chennai.
7. Mani, M.S., 1973. General Entomology. Oxford and Delhi.
8. Nayar K.K., Ananthakrishnan T.N and David, V.D 1990. General and applied Entomology. Tata Mc Grow Hill. New Delhi.
9. Ramakrishnan Ayyar, T.V., 1984. Handbook of Economic Entomology for south India. International Books and Periodicalos supply service, New Delhi.

NMEC - APICULTURE

UNIT - I

Honey Bee: Systematic position – species of honey Bees. Bee Colony, Castes. Natural colonies.

UNIT - II

Types of Bee hives – Structure of natural beehive. Artificial beehive – different types.

UNIT - III

Apiary care and Management – selection of sites – Catching and transforming a colony – Handling and maintenance of the colony – Natural enemies and diseases of honey bees and control methods.

UNIT - IV

Instruments employed in Apiary. Newtan's hive, honey extractors and smokers.

Honey: Extraction and apiculture used – Chemical composition – nutritive and medicinal values.

UNIT - V

Present studies of apiculture in India. Prospect of apiculture as self employment venture. Preparing proposal (Layout and budget) for financial assistance of funding agencies.

Reference Books:

1. Cherian, R and K.Ramanathan. 1992. Bee Keeping in India.
2. Mishra, R.C., 1985. Honey bees and their management in India. ICAR.
3. Morse, R.A., 1990. The ABC nd XYZ of Bee culture. 40th edn.A.I.Root and Co., Ohio.
4. Rare, S., 1998. Introduction to Bee keeping. Vikas Publishing House.
5. Singh, S., 1982. Bee keeping. ICAR.
6. Sharma, P and Singh, L. 1987. Hahd book of bee keeping. Controller printing and Stationer, Chandigarh.

V SEMESTER
CORE COURSE VII – EVOLUTION

UNIT – I:

Theories of Origin of life abiogenesis, biogenesis, cosmozoic theory, special creation theory, organic evolution theory.
Theories of Evolution : Lamarckism, Neo Lamarckism, Darwinism, Neo Darwinism, Devries theory of mutation modern synthetic theory of evolution.

UNIT – II:

Evidences of evolution –Anatomical, Embryological, Biochemical - Patterns of evolution – convergent, divergent, straight-line evolution.
Geological time scale.
Fossils and fossilization.

UNIT-III

Species – Concept.
Speciation – types, factors influencing speciation.
Isolating mechanisms.
Mimicry and coloration.

UNIT- IV

Mutation : Gene Mutation, Chromosomal mutations – Structural and numerical.
Gene in population: Hardy Weinberg principle – Factors affecting, Hardy Weinberg equilibrium.

UNIT-V

Animal distribution – continuous & discontinuous. Evolution of horse. Human evolution – Biological & Cultural evolution of man.

Reference Books:

1. Darwin, C 1872, The origin of specis, Grolier Enterprises Corp, USA.
2. SAVAGE, G.M., 1979. Evolution, CMS Printing press.
3. Rastogi,VB, 1985. Organic Evolution, Kedarnath and Ramnath press.
4. Strickberger, M.W.2000, Evolution, jones and Barlett publishers.
   Concepts of Evolution – Verma and Agarwal

CORE COURSE VIII – DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

UNIT – I

Historical perspective – Aim and scope of Developmental Biology.

Gametogenesis – Spermatogenesis and Oogenesis, Vitellogenesis, Egg membranes.

Fertilization – Sperm – Egg interaction- biochemical events – post Fertilization events, parthenogenesis.

UNIT – II

Types of animal eggs.

Patterns of cleavage, Blastulation and gastrulation in frog and chick.

Cell lineage, fatemap. Differentiation- Organizer concept Nuclear transplantation.

UNIT – III

Organogenesis of eye and ear in frog.

Extra embryonic membranes in chick and physiology of placenta in Mammals.

Metamorphosis in frog - Regeneration in Invertebrates and Vertebrates - Concept of Test tube baby.

UNIT – IV

Lymphatic System: Immunity – Types of Immunity.

Lymphoid organs – Types, Function, Organization

Lymphoid cells, Antigen – Antibody – structure and type,

Antigen antibody reaction.

UNIT – V

Immune Response : Humoral and cell Mediated.

Transplantation Immunology : Types of Grafts, host V Graft reaction. Mechanism of Allograft rejection IDD – SCID,(Sevene combined Immuno deficiency diseases)

Auto Immunity – Romatoid Arthrotitis.

Reference Books:

1. Balinsky, Introduction to Embryology.
2. Berril, N.J., Developmental Biology.
3. Davenport, An outline of animal development.
4. Subramaniyan, T., Developmental Biology (Narosa Publishing house).
5. Verma, P.S., Chordate Embryology.
6. Waddington, C.H., Principles of Embryology.
7. Huttner, A.F., Fundamentals of Comparative embryology of vertebrates.
8. Barrington – Invertebrate structure & funvtion (metamorphoses).

Core Course VI – ANIMAL PHYSIOLOGY

UNIT – I

Food and Nutrition: Physiological importance of carbohydrates. Proteins, Lipids, Vitamins and Minerals, Balanced diet – Malnutrition.

Digestion: Feeding mechanisms – Microphages, Liquid Feeders. Types of Digestion, Mechanism of Digestion, Gastro Intestinal Hormones - Absorption and assimilation in Man.

UNIT – II

Respiration: Respiration pigments in animals.

Transport of O_2 and CO_2 in man.

Circulation: Composition of blood, function, clotting, working of Heart – structure and function.

UNIT – III

Excrection: Types of Excretion – Excretory products.

Excrection in man – Structure of Kidney, nephron. Mechanism of Urine formation.

Osmoregulation: Euryhaline, stenohaline, osmoregulators and Osmo conformers. Osmoregulation in freshwater, marine and terrestrial animals.

UNIT – IV

Muscles: Types of muscles, ultra structure of skeletal musle – Properties and mechanism of muscle contraction – sliding filament theory.

Nervous system: Types of neuron – structure of neuron – conduction of nerve impulse – reflex action – Neurotransmitters

Receptor – Types of Receptors – Structure of photo and phono receptors.

UNIT – V

Endocrine gland – structure and functions of pituitary, thyroid, parathyroid, Islets of lanerhans, adrenal, sex glands thymus, pineal gland

Reproduction: Types of reproduction – reproduction in man.

Reproductive cycle – Hormonal control.

Reference Books:

1. Textbook of Medical physiology. Guyton and Hall, IX ed WB. Saunders Publication.
2. Hoar W.S. 1983. General and Comparative physiology. Prentice Hall of India.
3. Harper, H.A. 1993. Review of Physiological chemistry. Muruzen Asian Ed.

Core Course X

PRACTICAL

EVOLUTION, DEVELOPMENTAL BIOLOGYAND IMMUNOLOGY,

ANIMAL PHYSIOLOGY

EVOLUTION

1.Animal of evolutionary significance – Peripatus, Archaeoptergys.

2.Homologous organ – Fore Limb modification.

3. Analogous organ – Wings of insect and bird.

4. Colouration – Chameleon, Lycodon and Krait.

5. Mimicry – Leaf insect, Stick insect, Monarch and Viceroy Butterfly.

DEVELOPMENTAL BIOLOGY

1.Observation of prepared microslides to study the following

Frog: Egg, Cleavage, Blastula, Yolk Plug stage.

Chick: Egg, Developmental stages 24, 48, 72, 96, Yolk sac placenta.

ANIMAL PHYSIOLOGY

1. Salivary amylase activity of human saliva in relation to Temperature.

2. Qualitative tests for carbohydrates, proteins and lipids.

3. Qualitative tests for Amonia, Urea and uric acid.

4. Enumeration of RBC

5. Enumeration of WBC

6. Haemoglobinometer, Kymograph, Sphygmomanometer (Spotters).

7. Models of haemoglobin and ATP.

IMMUNOLOGY

Dissections – Immunological Organs in fish.
Immuno diffusion, Immunoglobulin Molecule
Thymus

ELECTIVE COURSE I

BIOSTATISTICS

UNIT - I

Biostatistics: Introduction, Definition and Scope. Methods of data Collection - primary and secondary data, Variables and its types, Sampling techniques. Stages of statistics, Functions of statistics and limitations of statistics.

UNIT - II

Processing of data: classification and tabulation of data and organisation.

UNIT - III

Presentation of Data. Diagramatic and graphical presentation. Analysis of Data: Measures of central tendency - mean, median, mode.

UNIT - IV

Measures of dispersion: SD, SE, Variance and Co-efficient of Variation – Correlation and Regression.

UNIT - V

Hypothesis testing: Introduction to test of significance Chi square test - Students t-Test (based on mean with two samples Testing correlation co-efficient and paired t-Test). Introduction to statistical packages SPSS – ANOVA one way.

Reference Books:

1. Arora, P.N., 1998 Biostatistics. Himalaya publishing House.
2. Ramakrishnan, p., 1996 Biostatistics saras publications, Nagercoil.
3. Sokal R.J. and Rohlf S.J 1981 Introduction to Biostatistics, W.H. Freeman, Landon.
4. Zar, J.H., Biostatistical analysis. 1983 McGraw Hill, London.

PART IV – NON ELECTIVE COURSE - I
PUBLIC HEALTH AND HYGIENE

UNIT- I

Introduction to health and hygiene – Types of Health, Mental and Physical. Hygiene and disease - TB, Typhoid, Cholera, Jaundice and HIV.

UNIT- II

Epidemiology of communicable diseases – air borne (small pox, tuberculosis) food and water borne diseases (food poisoning, amoebiasis) zoonoses (leptospirosis) arthropod borne (filariasis)

UNIT- III

Epidemiology of non - communicable diseases – Cancer, Diabetes.

UNIT- IV

Individual health – nutritional requirements (balanced diet, malnutrition) Mental health, personal hygiene, hazards of drugs, tobacco and alcohol.

UNIT- V

Community health – environment, housing plan, occupational health hazards, family planning, maternity and child care, health education.

Reference Books:

K. Park – Text book of Social and Prevention medicines.

VERMICULTURE

UNIT- I

Earthworms - Introduction, General Character, External Features. Ecological Classification – Saprophages, Geophagus, epigeic, Endogeic forms, Humans Formers, Humans Feeders.

UNIT - II

Importance of Earthworm in Agriculture, Fishery, Pollution Control, Medicine, as food- Physical, Chemical and Biological changes brought about by earthworm in soil – burrows, drilospeare – earthworm casts.

UNIT - III

Vermiculture: Rearing of Earthworms - Importance – Preparation of Biocompost and Vermicompost. Types of Vermicompost – Vermiwash – Method (Small scale, large scale), Requirements, phases, types (Pit method, Box method, Heap method, window method).

UNIT - IV

Harvesting: Vermicompost – collection – Factors involving Vermicomposting - Precaution to be taken, Organic wastes – sources of organic wastes.

UNIT- V

Advantages of Vermicomposting, Economics of Vermiculture and Composting, Financial supports for Vermiculture.

Applications: Vermicompost – soil application – cost benefit analysis.

Vermiwash – soil, trip irrigation and foliar spray.

References Books:

1. Edwards. C.A and P.J. Bohlen. 1996. Ecology of Earthworms. 3rd Edition. Chapman and Hall.
2. Ismail, S.A., 1970. Vermicology. The Biology of Earthworms. Orient Longman, London.
3. Lee, K.E., 1985, Earthworms – Their ecology and Relationship with soil and Land use. Academic Press. Sydney.

VI - SEMESTER

CORE COURSE XI – ECOLOGY

UNIT I:

Ecology: Definition, scope and branches. Abiotic factors: water, soil, temperature, light. Biotic factors:Animal relationship – symbiosis, commensalisms, mutualism, antagonism, antibiosis, parasitism, predation and competition.

UNIT II:

Ecosystem: Definition, A typical ecosystem: Pond ecosystem, Primary production, Secondary production, food chains, food web, Trophic levels, energy flow, pyramids of biomass, pyramids of energy –Biogeochemical cycles–nitrogen and phosphorus.

UNIT III;

Community ecology: Types and characteristics – stratification – community interdependence – ecotone – edge effect – ecological niche – ecological succession. Population ecology: Definition, density, natality, mortality, age distribution, age pyramids, population growth, population equilibrium, biotic potential, dispersion, regulation of size.

UNIT IV:

Habitat Ecology: Habitat characteristics and fauna and its adaptation in rivers, muddy, rocky deep sea, mangroves and estuaries.
Habitat characteristics and fauna and its adaptation in forest, desert, cave.

UNIT V:

Environmental pollution – sources, effects of, Marine, Thermal pesticide and Radio active pollution. Green house effect, ozone and its importance, global warming acid Rain.
Bio accumulation, bio magnification, bio remediation.

Reference Books:

1. Odum E.P 1971 Fundamentals of ecology W.B Saunders Company, Philadelpnia.
2. Kendeigh S.C 1961 Animal ecology, Prentice Hall.
3. Clarks GL 1954 Elements of Ecology, John Wiley and sons Newyork.
4. Purohit S.S Shami DH and Agarval A.K 2004 – Environmental sciences- A new approach, Agrobi, Jodhpur.Krishnamurthy K.V 2003, Introduction to Biodiversity Oxford and IBH.

Core course - XII
BIOTECHNOLOGY AND MICROBIOLOGY

UNIT - I

Biotechnology: Scope and importance.
Genetic Engineering : Gene cloning: Isolation of desired DNA – insertion of

DNA into vector – introducing rDNA into host – identification, selection and expression of cloned DNA.

Tools - Tools of genetic engineering: Restriction endonucleases (Eco R1, Hind III, B and H1) and DNA ligases.

Vectors – Plasmids – pBR322, Cosmids.

Transgenic animals.

UNIT - II

Molecular probes : Blotting techniques - Southern, Northern and Western blotting PCR, DNA finger printing.

Gene bank and libraries.

Monoclonal Antibodies: production and uses.

Stem cell technology.

UNIT - III

Application of biotechnology in Medicine: Gene Therapy, Vaccine production, knowledge bases drug designing.

Biotechnology and future: patenting and ethical concerns.

UNIT - IV

Outline classification of microorganisms – General structure of Bacteria, virus and fungi.

Sterilization techniques, bacterial growth, methods of culturing bacteria – pure culture and culture characteristics.

Food microbiology – food poisoning, food spoilage, food preservation.

UNIT - V

Recombination in bacteria, transformation, conjugation, sexduction,

Recombination in bacteriophage, transduction, lytic and lysogenic cycles of bacteriophage.

Medical microbiology – Tuberculosis, leprosy and AIDS.

Reference Books:

1. Old and Prim Rose, Principles of Gene Manipulation., Latest Edition.
2. Balasubramania, D., 1996. Concepts in Biotechnology. University Press (India) Ltd., Hyde
3. Chopra, V. Land A. Nasim. 1996. Genetic Engineering and Biotechnology. Oxford & IBH, New Delhi
4. Dharmarajan, M., 1989. Genetic Engineering. S.Viswanathan & Co.,
5. Dubey, R, C., 1995. Text book of Biotechnology. S.Viswanathan & Co.,
6. Glick, B.R., J.J. and Pastemak. 1998. Molecular Biotechnology. SSM Press, Washington.
7. Gupta – Principles of Biotechnology.
8. Micheal J. Pelczar, JR E.C.S Chan Noel R. Krieg Microbiology Vth ed. Tata Mc Graw- hill Publishing Company limited.
9. Ananthanarayanan – Text book of microbiology, Orient Longmen.
10. Lansing M.Press Cott, John P.Harley Donald Arlein, WBC Mc Graw Hill publications.
11. L.E. Casida JR-industrial microbiology – New age international Delhi publications.
12. Microbial genetics – David Freifelder – Narosa Publishing house.

13. **ELECTIVE COURSE II**

14.

15. **BIOCHEMISTRY**

16.

17. **UNIT - I**

18.

19. Introduction, Definition, and Scope of biochemistry. Water – physical properties – Structure and role of water in life – pH and Buffers – Biological buffer systems.

20.

21. **UNIT - II**

22.

23. Biomolecules – structure and classification of carbohydrates – Metabolism – Glycolysis, Glycogenolysis – TCA cycle and Oxydative phosphorylation.

24.

25. **UNIT - III**

26.

27. Structure and classification of amino acids and proteins. Protein configuration - Primary, Secondary, Tertiary, Quaternary.

28. Protein metabolism – Oxidative deamination, transamination, Decarboxylation and Transmethylation.

29.

30. **UNIT - IV**

31.

32. Structure and Classification – Fatty acids and Lipids.

33. Metabolism – β-oxidation.

34. Structure of Nuclic acid components.

35.

36. **UNIT -V**

37.

38. Biochemistry of Enzymes, Classification, Characteristics, Three dimentional structure of Lysozyme.

39. Mechanism of Enzyme action – Lock and key.

40. 41. Biochemical Classification and characteristics of Hormones – Structure of Insulin.

42.

43. **Reference Books:**

44.

1. Fundamentals of Biochemistry. J.L.Jain, Sunjay Jain & Nithay Jain – Chand Publications.

45.

2. Fundamentals of Biochemistry. J.L.Jain
3. Fundamental of Biochemistry for Medical students – Ambika, Shanmugam.
4. Text Book of Biochemistry – Abraham Mazur, Benjamin Harrow.
5. Harper's Biochemistry – Rabert, K.Murray
6. Principles of Biochemistry – Lehninger.

46.

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