BHARATHIDASAN UNIVERSITY
TIRUCHIRAPPALLI- 620 024

B.Sc. ZOOLOGY

(For the candidates admitted from the academic year 2014 -15 onwards offered through Centre for Distance Education)

Course Duration: 3 Years – (Non-Semester System)

Eligibility: Higher Secondary (+2) Pass with Biology

Year	Paper	Title of the Paper	Exam Hours	Marks
I YEAR	Language Paper – I		3	100
	English Paper –I		3	100
	Major Paper –I	Invertebrata	3	100
	Major Paper –II	Invertebrata **(Practical)**	3	50
	First Allied (Chemistry) (Theory 75 Practical 25)	Theory Practical	3 3	75 25
				450
II YEAR	Language Paper – II		3	100
	English Paper –II		3	100
	Major Paper –III	Chordata & Developmental Biology	3	100
	Major Paper –IV	Chordata & Developmental Biology **(Practical)**	3	50
	Second Allied - Botany (Theory 75 Practical 25)		3	75 25
				450
III YEAR	Major Paper –V	Environmental Biology & Evolution	3	100
	Major Paper –VI	Cell Biology & Genetics	3	100
	Major Paper –VII	Animal Physiology	3	100
	Major Paper –VIII	Microbiology & Biotechnology	3	100
	Major paper - IX	**Practical –** (Theory papers covering V & VI)	3	100
	Major paper X	**Practical –** (Theory papers covering VII & VIII)	3	100
				600
	TOTAL MARKS			**1500**

Note 1: FOR ALL THEORY and PRACTICAL PAPERS **passing minimum is 40 % .**

2. Compulsory Record should be submitted at the time of practical examination.
3: Environmental Studies UGC paper is compulsory to study in 1st year

PAPER –I-
INVERTEBRATA

Unit I: Protozoa and Porifera - Charecteristic features and classification up to classes with two examples for each class
Detailed study- Paramecium and Sycon
General topic- Protozoan parasite and human diseases; Economic importance of sponges

Unit II: Coelenterata and Platyhelminthes- Charecteristic features and classification up to classes with two examples for each class
Detailed study- Aurelia and Tapeworm
General topic- Coral reef and importance; Parasitic adaptation in Platyhelminthes.

Unit III: Aschelminthes and Annelida- Charecteristic features and classification up to classes with two examples for each class
Detailed study- Ascaris and Earthworm
General topic- Human diseases (Ascariasis, filariasis, Schistosomiasis); Metamerism in annelids

Unit IV: Arthropoda-Charecteristic features and classification up to classes with two examples for each class
Detailed study- Cockroach and Prawn. General topic- Beneficial insects (Pollinator,Scavenger,Predator, Parasite,); Crustacean larvae and importance.

Unit V: Mollusca and Echinodermata-Charecteristic features and classification up to classes with two examples for each class Detailed study- Pila and Starfish. General topic- Economic importance of Molluscs; Echinoderm larvae and their importance.

Reference Books:

1. Ekambaranatha Iyar and T.N.Ananthakrishnan. 1992. A Manual of Zoology, Vol.I(Invertebrata). Parts I & II. Viswanathan & Co.
2. Barrington, E.J.W.1979. Invertebrates. Structure and Function 2nd edn. ELBS and Nelson.
3. Jordon, E.L. and P.S.Verma. 1995 Invertebrate Zoology. 12th edn. Sultan Chand & Co.
4. Barnes, R.D. Invertebrates. W.B.Saunders.
5. Kotpal, R.L., (All Series) Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca & Echinodermata - Rastogi Publications.
6. Nair.N.c,N.Soundarapandian, N.Arumugan S.Leelavathy, T.Murugan 1992. A Text Book of Invertebrates. Saras Publications.

PAPER-II-

PRACTICAL-I-

INVERTEBRATA

Dissections:

1. Earthworm – Nervous system
2. Cockroach – Nervous system

Mountings:

1. Earthworm : Body setae,
2. Cockroach : Mouth parts. Salivary glands.
3.. Honey bee: Mouthparts.

Spotters:

1. Protozoa : Paramecium, Paramecium. Conjugation, Euglena
2. Porifera : Sponge spicules,
3. Coelenterata : Obelia entire, Physalia, Sea anemone, Aurelia, Fungia
4. Platyhelminthes: Liverfluke, Tapeworm, Tapeworm scolex, Planaria
5. Nematyhelminthes: Ascaris (Male and female), Filarial worm, Enterobius
6. Annelida : Nereis, Nereis parapodium, Heteronereis, Cheatopterus, Leech, Trocophore larva.
7. Arthropoda : Prawn, Nauplius larva, Zoea Larva, Mysis larva, Crab, Limulus, Bombyx mori, Honey bee, Lac insect,
8. Mollusca : Pila, Radula, Pearl oyster, Sepia, Octopus.
9. Echinodermata : Starfish, Pedicellaria, Sea urchin, Bipinnaria larva,

PAPER - III

CHORDATA & DEVELOPMENTAL BIOLOGY

UNIT I

General characters and classification of chordates upto order level with examples. **PROCHORDATES :** Detailed anatomy of Amphioxus, Retrogressive metamorphosis in Ascidian. **CYCLOSTOMATA:** Distinctive feature of cyclostomes and their affinities.

UNIT II

Detailed study of Frog.
1. Migration in fishes, 2. Parental care in Amphibia.

UNIT III

Poison apparatus of snakes, biting mechanism and first – aid for Snake bite. Salient features and distribution of Ratitae. Flight adaptations in birds. Aquatic Mammals. Dentition in mammals.

UNIT IV

Definition and scope of embryology, Gametogenesis – Spermatogenesis and Oogenesis in mammals. Cleavage – Blastulation and Gastrulation in frog.

UNIT V

Embryonic membranes in chick. Placentation in mammals – type of placenta and physiology of placenta, Embryonic induction, concept of organizer. Test tube baby.

References :

1. NIGAM, H.C., 1996, Zoology of Chordate, S. Nagin & Co., New Delhi.
2. JORDAN, E.L. 2007, Chordate Zoology, S. Chand & Co. New Delhi.
3. EKAMBARANATHA AYYAR. M and ANANTHAKRISHNAN, T.N. 2000, Manual of Zoology, (Volume II – Chordata), S. Viswananthan Pvt. Ltd.
4. MAJUPURIA, T.C., 2002, Introduction of Chordates, S. Nagin & Co., New Delhi
5. YOUNG, T.Z., 1981. The Life of Vertebrates, Oxford University Press.
6. BALINSKY, B.I., 1981. An Introduction to Embryology, Holt Saunders, New York.
7. BERRILL, N.J., 1986, Developmental Biology, McGraw Hill, New Delhi.
8. PATTEN, B.M., 1986, Foundations of Embryology, McGraw Hill, New Delhi.

PAPER – IV

PRACTICAL

CHORDATA

Dissections:

Rat – Demonstration of Digestive, Arterial, Venous & Reproductive Systems.

Mountings: Placoid scales,

Spotters:

1. Prochordata : Amphioxus, Ascidia Balanoglossus, Tornaria larva.

2. Pisces : Shark, Ray, Clarius, Echnies, Hippocampus

Exocoetus, Gambusia, Carp

3. Amphibia : Alytes, Axolotl larva, Hyla, Salamander, Icthlyophis

4. Reptilia : Naja naja, viper, Draco, Chelone mydas

5. Aves : Pigeon, quill feather

6. Mammalia : Bat, Rabbit

7. Dentition : Rabbit, Dog & Man

8. Osteology : Pigeon - Synsacrum

Rabbit – pectoral & pelvic girdles, forelimb

& hind limb bones

Students be introduced to learning of dissections / anatomy adapting CDS / Web sources.

PAPER – V

ENVIRONMENTAL BIOLOGY AND EVOLUTION

UNIT - I

Definition – Abiotic and biotic factors – Temperature, light, water, soil, - Flora and Fauna Physicochemical properties of soil and water. Nutrients- micro and macro nutrients. Hydrological, Nitrogen, Carbon-di-oxide and oxygen cycles.

UNIT - II

Ecosystem – Definition, types. Structure and function – Pond, River, Lake, Grass land, Forest and Desert ecosystem. Ecological succession. Ecological Niche, Biomass, Pyramids-types, Community ecology- Climax Community, Food chains, Food web, Edge effect.. Habitat ecology-pelagic, benthic, sandy, muddy and rocky shore- Community Ecology – Animal Association- Mutualism, Commensalism and Parasitism.

UNIT - III

Renewable and non-renewable resources. Forest, soil, water and fossil fuels.
Pollution and its biological effects. Air, Water, soil and noise pollution. Thermal, and Nuclear reactor and radiation effects. Eutrophication, Green House Effect, Ozone, Acid rain, Pollution indicators, Biomagnification, Sewage management - industrial waste disposal and management. Biodiversity – Endangered species- Depletion of wild life, wild life management, Conservation of wild life- Sanctuaries and National parks.

UNIT IV

Theories of evolution – Principles of Lamarck - Darwinism - De Vries- Natural selection- Origin of species, Concept of Urey - Miller – Evidences for evolution- Biological, chemical, Embryological and Morphological – Fossil evidences

UNIT – V

Mutation, Speciation, isolation, isolating mechanisms, mimicry and colouration, genetic drift, genetic basis of evolution, Evolution of horse and man.

Text Books

1. Odum, E.P. (1983). Basic Ecology. Saunder's CollegePublishing, New York.
2. Verma and Agarwal, 1985 Concept of Ecology.
3. Arumugam (2000), Ecology, Saras Publication
4. Golbert (1975), Evolution, Tata McGraw Hill Publication
5. Rastogi (1980), Evolution, Oriental publications.

PAPER – VI

CELL BIOLOGY & GENETICS

UNIT I

General structure of prokaryotic (E.coli) and eukaryotic cell. Plasma Membrane – Ultrastructure – unit membrane model, fluid mosaic model, Functions – Specialization. Ultrastructure and functions of Endoplasmic Reticulum, Golgi Complex, Lysosome, Mitrochondria, Ribosome.

UNIT II

Interphase Nucleus – Ultrastructure and functions, Chromosomes, giant chromosomes. Cell cycle and cell division – Mitosis and Meiosis.

UNIT III

DNA as Genetic material. Nucleic acids – DNA – structure and replication. Types of RNA – mRNA, tRNA and rRNA – structure. Genetic Code – Protein synthesis – transcription and translation.

UNIT IV

Mendel's laws – Monohybrid and dihybrid experiments. Multiple alleles – characteristics – Blood groups in man. Linkage and crossing over – examples from Drosophila. Mechanisms of crossing over – Theories, cytological evidences, Mutation.

UNIT V

Sex determination – Sex chromosomes, chromosomal theory, genic balance theory – gynandromorphs – environmental determination of sex, hormonal theory of sex determination – Sex – linked inheritance. Syndromes – Klinefelter's syndrome, Turner's syndrome, Down's syndrome, Sickle cell anaemia – Inborn errors of metabolism – Karyotype and idiogram.

Tex books :

1. Cell Biology – N. Arumugam – 2010 – Saras Publications.
2. Cell Biology – P.S. Verma & V.K. Agarwal – 2009 – S. Chand & Co., New Delhi.
3. Genetics – P.P. Meyyan – 2010 – Saras Publication.
4. Genetics – P.S. Verma and Agarwal – 2009 – S. Chand and Company Pvt. Ltd.

Reference books :

1. Cell and Molecular Biology – De Robertis, 7th Edition, 1980 – Holt Saunders Int.
2. Essential of Cytology, C.B. Powar 2008- Himalaya Publishing House, Bombay.
3. Genetics – Goodenough et al. 1990 – Holt, Reinhart & Winston, Montreal.
4. Genetics – P.K. Guptha – 2010 – Rastogi Publicatins.
5. Genetics – Kavitha B. Aluwalia – 1998 – Wiley Eastern Company.

PAPER - VII

ANIMAL PHYSIOLOGY

UNIT - I
Nutrition - digestion and absorption of proteins, carbohydrates and lipids – Vitamins- Minerals.

UNIT - II
Respiration in Invertebrates and Vertebrates – physiology of respiration in Man - respiratory pigments

UNIT - III
Circulation - types of hearts - physiology of heart - heart beat and its regulation - composition of blood and coagulation.

UNIT - IV
Excretion – Structure and function of kidney, excretion in different habitat – ornithine cycle and urine formation in man – Osmoregulation in fishes of fresh water and marine teleosts.

UNIT – V

Structure and function of neurons, CNS, PNS and ANS, Reflex action. Endocrine glands in vertebrates – Pituitary, Thyroid and Adrenal glands endocrine control of reproduction in vertebrates with reference to Man - endocrine related disease and disorder in Man.

REFERENCE / BOOKS

1. Hoar, W.S. (1968) : General and Comparative

Physiology, Prentice Hall.

2. Prosser, C.L. (1973) : Comparative Animal Phsyiology,

3rd edn. W.B. Saunders & Co., Philadelphia.

3. Arumugam. N. (2000). Animal Physiology, Saras Publication.

4. Verma and Agarwal, (1985), Animal Physiology Sultan Chand, New Delhi.

PAPER – VIII

MICROBIOLOGY AND BIOTECHNOLOGY

UNIT I

History and Scope of Microbiology – Prokaryotes and Eukaryotes – Morphology and Ultra structure of bacteria fungi and viruses – classification of microbes (bacteria, virus, Actinomycetes and fungi)
Bacterial growth and nutritional requirements – culture techniques and types of culture media – media preparation – sterilization techniques – preservation – staining (Gram's staining)

UNIT II

Food and Dairy Microbiology: Microbes of milk and food and its role in food production – Food poisoning and Food preservation
Industrial Microbiology: Microbes in fermentation: Production of Alcohol, fuel. Antibiotics.

UNIT III

Medical Microbiology: Causative agents – modes of transmission, symptoms, diagnosis and control of Polio, HIV, Tuberculosis, HBV A and B-
Environmental Microbiology: Role of microorganisms in the productivity of ecosystem – Biology of Nitrogen fixation and nitrogen fixers.

UNIT IV

History of Biotechnology – sources and isolation of gene methods – genomic and DNA library – vectors, plasmids, cosmids, phages – viruses – yeast – Restriction endonucleases – types and functions.

UNIT V

DNA sequencing, DNA finger printing – Human genome projects – Gene transfer – Transgenic plants and applications – Transgenic animals and application – Biosafety

Recommended Text Books

1. PELCZER, M.J., REID, R.D. and CHAN, E.C.S. (1996), Microbiology, V Ed., Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. ANANTHANARAYANAN, T and JAYARAM PANIKER, C.K. (2000), Text Book of Microbiology, VI Ed., Orient Longman Ltd., Madras.

References

1.DAVID FREIFELDER (1998), Microbial Genetics, Narosa Publishing House, New Delhi.

2. POWAR, C.B. and DIGINAWALA, H.F. (1982), General Microbiology Volume I &II, Himalaya Publishing House, Bombay.

PAPER - IX

PRACTICAL – III

ENVIRONMENTAL BIOLOGY, EVOLUTION, CELL BIOLOGY AND GENETICS

ENVIRONMENTAL BIOLOGY

1. Estimation of Dissolved oxygen, Carbon-di-oxide.
2. Collection and identification of Planktons.

Spotters

Commensalisms, - Hermit crab and Sea anemone,
Mutualism – Fish
Parasitism- Ascaris, Liver fluke.

Sandy shore fauna- Nereis, Crab, Molluscs,
Muddy shore fauna – Clams, Fish
Rocky shore fauna - Balanas, Zooanthus, Mytilus

EVOLUTION

Spotters
1. Mimicry and colouration animal models
2. Fossils: Nautiloids, Amoniods, Trilobites.

CELL BIOLOGY
1. Onion root tip – squash preparation and study of mitosis
2. **Spotters** : Columnar, Ciliated, squamous epithelium, Cardiac, striated, Nonstraited Muscle, Nervecell, Blood of man and frog. Compound Microscope, Centrifuge, Micrometer, Camera lucida

GENETICS
1. Drosophila – male and female identification, Mutant forms (from pictures),Genetic importance.
2. Observation of simple Mendelian traits in man.
3. Human Karyotypes : normal, Down's, Klinefelters and Turner, is syndrome.
4. Recording of Mendelian traits in humans.