

DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

POST GRADUATE PROGRAM

MASTER OF ZOOLOGY

FIRST SEMESTER

COURSE TITLE : MASTER OF ZOOLOGY
DURATION : 2 YEARS
MODE : SEMESTER
TOTAL MARKS : 700

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL MARKS
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Principles of Molecular Biology & Biotechnology	MSCZ/S/110	40	60	NA	NA	100
Invertebrates - Structure & Function	MSCZ/S/120	40	60	NA	NA	100
Principles of Biosystematics And Taxonomy	MSCZ/S/130	40	60	NA	NA	100

Paper – 1

Paper Code- **MSCZ/S/110**

PRINCIPLES OF MOLECULAR BIOLOGY & BIOTECHNOLOGY

UNIT I:

1. DNA replication: Prokaryotic and eukaryotic DNA replication, Mechanics of DNA replication, Enzymes and accessory proteins involved in DNA replication,
2. Recombination and repair : Holiday junction, FLP/FRT and Cre-Lox recombination, Rec A and other recombinases, DNA repair mechanisms.

UNIT II:

3. Transcription: Prokaryotic transcription, Eukaryotic transcription, Regulatory elements and mechanisms of transcription regulation, Transcription termination – attenuation and antitermination, Gene silencing.
4. Post-transcriptional modifications in RNA: Cap formation, End processing and polyadenylation, Splicing and editing, Nuclear export of mRNA, RNA stability.

UNIT III:

5. Translation: Genetic code, Prokaryotic and eukaryotic translation, Regulation of translation, Co- and post-translation modifications of proteins.
6. Protein sorting Organelle biogenesis and protein synthesis: Synthesis and targeting of mitochondrial and chloroplast proteins, Synthesis and targeting of peroxisomal proteins, Secretory pathways, Translocation of secretory proteins across the ER membrane, Insertion of

membrane proteins in the ER membrane, Post-translation modifications in rER, Protein glycosylation in ER and Golgi complex, Golgi and post-Golgi protein sorting and proteolytic processing, Receptors-mediated endocytosis and sorting of internalized proteins, Molecular mechanisms of vesicular traffic, Protein sorting Organelle biogenesis and protein synthesis.

UNIT IV

7. Molecular mapping of genome: Genetic and physical maps, Southern hybridization, fluorescence in situ hybridization(FISH) for genome analysis, Molecular markers in genome analysis(RFLP, RAPD and AFLP), Application of RFLP in forensic, disease prognosis, genetic counseling and pedigree analysis.

8. Transgenic animals and knock-outs: Production, Applications, Embryonic stem cells, Bioethics.

9. Assisted reproduction technologies: Embryo sexing and cloning., Screening for genetic disorders, ICSI, GIFT etc., Cloning of animals by nuclear transfer.

SUGGESTED BOOKS

• Molecular Cell Biology, J. Darnell H. Lodish and D. Baltimore Scientific American Books, Inc., USA.

• Molecular Biology of the cell. B. Alberts, D.D. Bray, J. Lewis, M. Rafif, K. Roberts and J.D. Watson. Garland Publishing inc., New York.

• Gene IV, Benjamin Lewin. Oxford University Press, UK.

• Molecular Biology and Biotechnology. A comprehensive desk reference, R.A. Meyers (Ed.), VCH Publishers, Inc., New York.

• Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press, New York.

• Introduction to Practical Molecular Biology, P.D. Dabre, John Wiley & Sons Ltd. New York.

• Molecular Biology Lab Fax, T.A. Brown (Ed.), Bios Scientific Publishers Ltd., Oxford

Paper –2

Paper Code-**MSCZ/S/120**

INVERTEBRATES: STRUCTURE AND FUNCTION

UNIT I :

- Origin of metazoa
- Organization of Coelom: Acoelomates, Pseudo coelomates, Coelomates
- Locomotion : Amoeboid, Flagellar and Ciliary movement in protozoa, Hydrostatic movements in Coelenterata , Annelida and Echinodermata

UNIT II

- Nutrition and Digestion
- Patterns of Feeding and digestion in lower metazoa, Mollusca,
- Echinodermata, Filter feeding in polychaeta.
- Respiration
- Organs of respiration : Gills, lungs and trachea.
- Respiratory pigments.

- Mechanism of respiration.

UNIT III

Excretion in lower invertebrates

Excretion in higher invertebrates.

Mechanism of Osmoregulation.

UNIT IV

Nervous System

a. Primitive Nervous systems:-Coelentrata and Echinodermata.

b. Advanced nervous system :- Annelida, Arthropoda (Crustacea and Insecta) and Mollusca (Cephalopoda)

UNIT V

1. Invertebrate larval forms and their evolutionary significance

a. Trematoda and Cestoda

b. Larval forms of Crustacea

c. Larval forms of Mollusca

d. Larval forms of Echinodermata.

2. Structure affinities and life history of the following minor Phyla

a. Rotifera

b. Entoprocta

c. Phoronida

d. Ectoprocta

Suggested Reading Materials:

1. Hyman, L.H. The invertebrates, Vol. I. protozoa through Ctenophora, McGraw Hill Co., New York

2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.

3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London. M. Sc. Zoology 2011-2012 Onwards

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4. Hyman, L.H. The Invertebrates. Vol. 2. McGraw Hill Co., New York.

5. Hyman, L.H. The Invertebrates. Vol. 8. McGraw Hill Co., New York and London.

6. Barnes, R.D. Invertebrates Zoology, III edition. W.B. Saunders Co. Philadelphia.

7. Russel-Hunter, W.D. A biology of higher invertebrates, the Macmillan Co. Ltd., London.

8. Hyman, L.H. The Invertebrates smaller coelomate groups, Vol. V. McGraw Hill Co., New York.

9. Read, C.P. Animal Parasitism. Parasitism. prentice Hall Inc., New Jersey.

10. Sedgwick, A.A. Student text book of Zoology. Vol. I, II and III. Central Book Depot, Allahabad.

11. Parker, T.J., Haswell W.A. Text book of Zoology, Macmillan Co., London.

Principles of Biosystematics and Taxonomy

Unit I

- . Definition and basic concepts of biosystematics taxonomy and classification.
- History of Classification
- Trends in biosystematics : Chemotaxonomy cytotaxonomy and molecular taxonomy
- Dimensions of speciation and taxonomic characters.
- Species concepts : species category, different species concepts, subspecies
- and other infra-specific categories.
- Theories of biological classification: hierarchy of categories.

Unit II

- Taxonomic Characters . Different kinds.
- Origin of reproductive isolation, biological mechanism of genetic incompatibility.
- Taxonomic procedures: Taxonomic collections , preservation , curation, process of identification.
- Taxonomic keys, different types of keys, their merits and demerits.
- International code of Zoological Nomenclature (ICZN):
- Operative principles, interpretation and application of important rules: Formation of Scientific names of various Taxa.

Unit III

- Taxonomic categories.
- Evaluation of biodiversity indices.
- Evaluation of Shannon . Weiner Index.
- Evaluation of Dominance Index.
- Similarity and Dissimilarity Index.

Unit IV

Concepts of evolution and theories of organic evolution.

Neo Darwinism and population genetics:

A- Hardy-Weinberg law of genetic equilibrium.

B . A detailed account of destabilizing forces:

i- Natural selection

ii- Mutation

iii- Genetic Drift

iv- Migration

v- Meiotic Drive.

Trends in Evolution

Molecular Evolution

- a) Gene evolution
- b) Evolution of gene families
- c) Assessment of molecular variation

Unit V

- Origin of higher categories
- Phylogenetic . gradualism and punctuated equilibrium.
- Major trends in the origin of higher categories
- Micro and macro evolution.
- Molecular population genetics
- Pattern of changes in nucleotide and amino acid sequence.
- Ecological significance of molecular variations (genetic polymorphism)
- Genetic & Speciation
- Phylogenetic and biological concept of species.
- Patterns and mechanism of reproductive isolation.
- Modes of speciation (allopatry & sympatry)
- Origin and Evolution & Economically important microbes and animals.

Suggested Reading Materials:

1. M. Koto-The. Biology of biodiversity-Springer
2. E.O. Wilson-Biodiversity-Academic Press Washington.
3. G.G.-Simpson-Principle of animal taxonomy Oxford IBH Publication company.
4. E-Mayer-Elements of Taxonomy
5. Bastchelet-F-Introduction to mathematics for life scientists Springer Verlag, Berling.
6. Skoal R.R. and F.J.Rohiff Biometry-Freeman, San-Francisco.
7. Snecdor, G.W. and W.G. Cochran Statisical Methods of affiliated-East-West Press, New Delhi.
8. Murry J.D. Mathematical Biology-Springer, Verlag, Berlin.

DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

POST GRADUATE PROGRAM

MASTER OF ZOOLOGY

SECOND SEMESTER

COURSE TITLE : MASTER OF ZOOLOGY
DURATION : 2 YEARS
MODE : SEMESTER
TOTAL MARKS : 700

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL MARKS
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Introduction to Quantitative Biology & Population Genetics	MSCZ/S/210	40	60	NA	NA	100
Principle of Biochemistry	MSCZ/S/220	40	60	NA	NA	100
Animal Physiology	MSCZ/S/230	NA	NA	40	60	100

Paper –1

Paper Code- MSCZ/S/210

INTRODUCTION TO QUANTITATIVE BIOLOGY & POPULATION GENETICS

Unit – I :

Biostatistics: Introduction – Scope and application of statistics in Biology, Sampling – Essentials, advantages and methods of sampling and sampling errors, Frequency distribution : Preparation of ordered, discrete and continuous tables, Diagrammatic presentation of data : Data presentation by diagrams, graphs and curves, Skewness and Kurtosis
 Measures of central tendency : Mean, median and mode
 Measures of dispersion : Standard deviation, variance and coefficient of variance
 Correlation and regression

Unit – II :

Probability : Measurement, terminology, laws
 Probability distributions : Binomial, Poisson and normal distributions
 Tests of significance : Chi-square test, t-test
 Analysis of variance
 Fundamentals of computers – Hardware and Software
 Computer-aided techniques for data presentation, data analysis and statistical techniques – Excel

Mathematical modeling – Types of models, building of a model, Examples of models from Biology : Growth of snail shell, Morphogenesis

Unit – III :

Concepts of evolution and theories of organic evolution with emphasis on Darwinism

Neo-Darwinism : Hardy Weinberg law of genetic equilibrium, A detailed account of destabilizing forces - (i) natural Selection (ii) Mutation (iii) Migration (iv) Genetic drift

Quantifying genetic variability : Genetic structure of natural populations, Phenotypic variation, Factors affecting human diseases frequency

Genetics of quantitative traits in populations : Analysis of quantitative traits, Quantitative traits and natural selection, Estimation of heritability, Genotype – environment interactions, Inbreeding, depression and Heterosis

Unit – IV :

Genetics of speciation : Phylogenetic and biological concept of species, Patterns and mechanisms of reproductive isolation, Models of speciation (Allopatric, Sympatric, Parapatric)

Molecular evolution : Gene evolution, Evolution of gene families, Molecular drive
Origin of higher categories : Phylogenetic gradualism and punctuated equilibrium , Micro- and macro-evolution

Molecular Phylogenetics : How to construct Phylogenetic trees?, Immunological techniques, Restriction Enzyme sites, Amino acid phylogeny-DNA-DNA hybridizations, Nucleotide, sequence comparisons and homologies

Suggested Reading Material :

1. Batschelet, E., Introduction to Mathematics for Life Scientists. Springer- Verlag, Berlin.
2. Jorgensen, S.E., Fundamentals of Ecological Modelling, Elsevier, New York.
3. Swaritzman, G.L. and S.P.O. Kaluzny. Ecological Simulation Primer Macmillan, New York.
4. Lendren, D. Modeling in Behavioural Ecology. Chapman & Hal. London,UK
5. Sokal, R.R. & F.J. Rohlf. Biometry. Freeman, San Francisco.
6. Jha, A.P. Genes and Evolution, John Publication, New Delhi
7. King, M. Species Evolution – the role of chromosomal change. The Cambridge University Press, Cambridge.
8. Merrel, D.J. Evolution and genetics. Oxford University Press, New York
9. Strikberger, M.W. Evolution. Jones and Bartett Publishers, Boston, London

Principles of Biochemistry

UNIT I :

1. Biomolecules, characteristic features.
2. Water, structure of liquid water, water as ideal biological solvent.
3. Thermodynamics- free energy, entropy, high energy bonds

UNIT II :

1. Mitochondria: Electron transport, proton translocation, oxidation phosphorylation.
2. Chloroplast: Photosynthesis and other processes involving light.

UNIT III :

1. Amino acids, peptides and polypeptides
2. The three dimensional structures of proteins, the Ramchandran plot, α helix, β sheet.
3. Structure of collagen, domain - basic unit of tertiary structure, Quaternary structure. Functional diversity of proteins.

UNIT IV :

1. Carbohydrates: Monosaccharides, Disaccharides and polysaccharides, structure and function.
2. Lipids: Chemistry of triglycerides sterols, quinones and prostaglandins.

UNIT V :

1. Nucleic Acids: structure and function, properties and types of nucleic acids.
2. The RNA world.

UNIT VI :

1. Enzymology: Concepts of enzyme Units, Specific Activity, Coenzymes.
2. Kinetics of Enzyme catalyzed reactions, Effect of pH, Temp, Inhibitor, activator.
3. Regulation of enzyme activities.
4. Isoenzyme: structure and function.

Reference Books:

- Biochemistry, 3rd Ed. (2005), Voet Donald and Voet Judith G. John, Publisher: Wiley & sons, New York.
- Biochemistry 6th Ed, (2007) Berg Jeremy, Tymoczko John, Stryer Lubert, Publisher: W. H. Freeman, New York.
- Lehninger's Principles of Biochemistry, 4th edition, (2005) Nelson D. L. and Cox M. M. W. H. Freeman & Co. NY.
- Biochemical Calculations, 2nd Ed., (1997) Segel Irvin H., Publisher: John Wiley and Sons, New York.
- Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001) Palmer Trevor , Publisher: Horwood Pub. Co., England.

Animal Physiology

UNIT I :

01 Digestion: Physiology of digestion and absorption.

02 Blood pigments: Role in oxygen transport, Oxygen dissociation curves and their physiological significances, Transport of CO₂.

UNIT II:

03 Circulation: Cardiac cycle, Neurogenic and myogenic hearts, Blood volume, cardiac out-put.

04 Muscle contraction: Structure of the skeletal muscle, proteins of the myofilaments, actin-myosin interaction; sarcoplasmic reticulum and role of calcium in contraction.

UNIT III:

05 Osmotic regulation: Osmolarity and toxicity, ionic regulation, hyper and hyposmotic regulators, ureosmotic animals.

06 Excretion: Basic processes in urine formation, Renal function in animals “mammalian kidney”, Renal portal system.

UNIT IV:

07 Chemical communication: Neuro-hemal and endocrine organs, chemistry of vertebrate hormones, Mechanism of hormone action.

08 Sense organs: Classification of sense organs and their principles. Detailed mechanism of photoreaction, Types of reflexes and their functions, Principles of neural integration.

Reference Books:

- Principles of Animal Physiology (2006), C. D. Moyes and P. M. Schulte. Publisher - Pearson Education Inc. and Dorling Kindersley Publishing Inc.
- Text book of Medical Physiology 10th edition (2001),. A. C. Guyton and J. E. Hall. Publisher - W. B. Saunders Company, Philadelphia. -
- Principles of Anatomy and Physiology, 11th edition (2006), G. J. Tortora and B. Derrickson. Publisher-John Wiley and Sons Inc.
- Endocrinology, 5th edition (2008), Mac. E. Hadley. Publisher-Pearson Education Inc. and Dorling Kindersley Publishing Inc.
- Comparative Vertebrate Endocrinology 3rd edition (1998), P. J. Bentley. PublisherCambridge University Press.
- Vertebrate Endocrinology 3rd edition (1997), D. O. Norris. Publisher- Academic Press: An imprint of Elsevier.
- The World of the Cell, 7th edition, (2005), Wayne M. Becker, Lewis J. Kleinsmith, Jeff Hardin., Publisher - Benjamin Cummings.

DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

POST GRADUATE PROGRAM

MASTER OF ZOOLOGY

THIRD SEMESTER

COURSE TITLE : MASTER OF ZOOLOGY
DURATION : 2 YEARS
MODE : SEMESTER
TOTAL MARKS : 700

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL MARKS
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
CELL AND MOLECULAR BIOLOGY	MSCZ/S/310	40	60	NA	NA	100
GENRAL MICROBIOLOGY AND BIOCHEMISTRY	MSCZ/S/320	40	60	NA	NA	100
BIOTECHNOLOGY	MSCZ/S/330	40	60	NA	NA	100
PRACTICALS – I	MSCZ/S/340	NA	NA	40	60	100

Paper – 1

Paper Code- MSCZ/S/310

CELL AND MOLECULAR BIOLOGY

UNIT – I

Cell concept – Size and form – ultra structure and functions of plasmic membranes. Endoplasmic reticulum, Ribosomes, mitochondria, lysosomes, centrioles, and golgi complex in the light of recent researches.

UNIT – II

Ultra structure of chromosomes – Giant chromosomes – structure and functions – supernumerary (or) B. Chromosomes.

UNIT – III

Interphase nucleus – Dynamics of cell division, a molecular approach, cell centre and mitotic apparatus, synaptonemal complex and movement of chromosomes.

UNIT – IV

Chemistry and structure of DNA, DNA replication, Nucleic acids, amounts and c-value Paradox, satellite DNA, functions, of repeated DNA sequence, mitochondrial DNA, A, B, and Z-DNA, Types chemistry and functions of RNA, Processing of rRNA and tRNA. Gene action and Protein synthesis, genetic code – Processing and translation of mRNA.

UNIT – V

Radiation and radioactivity Isotopes and their uses in biological investigation – Biological effects of radiation – Geiger – Muller counter – scintillation counter.

GENERAL MICROBIOLOGY AND BIOCHEMISTRY

GENERAL MICROBIOLOGY

UNIT – I

History and scope of microbiology – prokaryotic and eukaryotic micro organisms. Morphological types – cell wall of gram Positive and Gram negative bacteria. A brief outline of structure of pictorial, plant and animal viruses, Bacteriophages. Brief account of HIV.

UNIT – II

Industrial microbiology – Fermentation Process – Primary and secondary metabolites – industrial uses of Bacteria – Lactic acid vinegar and industrial uses of yeasts

– Amino acid pollution, alcohol and Baker's yeast and food yeast – Industrial uses of molds – Penicillin. Production – citric acid – Enzyme Production.

UNIT – III

Dairy microbiology – Pasteurization – milk products – curd, butter, ghee, cheese and yogurt. Food microbiology – Fermented food and food spoilage – food poisoning – factors influencing spoilage – Physico – chemical methods in food preservation.

UNIT – IV

MEDICAL MICROBIOLOGY : Study of common bacterial and viral diseases of man – causative organisms – symptoms and preventive measures (Gastro intestinal, respiratory and nervous systems).

UNIT – V

Human cancer : DNA Tumour viruses – Papilloma viruses – Epstein – Barr virus – SV 40 virus RNA tumour viruses – Retro viruses. – (Structure, replication, assembly and release) – Tumourigenic retroviruses, cellular viral oncogenes, relationship between viral and animal oncogenes – oncogene families – oncoproteins – Tumour suppressors.

BIOCHEMISTRY

UNIT – I

Atoms, molecular, Polymerization of organic molecular – nature of living matter, major organic components – chemistry of water – dissolved gases - P^H – buffers – membrane permeability. Structure, properties and functions of proteins, carbohydrates and lipids and Nucleic acids. Derivatives of carbohydrates and lipids.

UNIT – II

Enzymes – nature, classification and functions – co-enzymes – Isoenzymes, Antienzymes, mechanism of enzyme action – enzyme inhibitors – enzyme kinetics. Energy – flow of energy of biological world concept of free energy, redox potential, coupling of chemical reactions in transfer of energy. High energy rich compounds – Thermodynamics.

UNIT – III

Metabolism – Protein metabolism – Amino acid metabolism oxidative decarboxylation – transamination – decarboxylation, demethylation reactions. Carbohydrate metabolism – Glycogenesis, glycolysis – energetics of kreb's cycle, Gluconeogenesis, cori's cycle, glycosuria – Diabetics – Lipid metabolism – metabolism of fatty acids, glycerol's cholesterol – Inborn errors of metabolism, BMR

UNIT – IV

Vitamins – Structure, sources, requirements, functions and deficiency manifestations of fat and water soluble vitamins. Minerals – sources, functions, requirements, absorption and metabolism with reference to iron, calcium, phosphorous, magnesium, sodium, potassium and other trace elements as iodine, copper, Zinc and fluorine.

UNIT – V

Hormones – chemical nature, properties and biochemical mode of functions of hormones. Hormonal control of carbohydrates, protein and lipid metabolism, cyclic AMP.

Paper 3

BIOTECHNOLOGY

UNIT – I

Genetic Engineering : Techniques – Concepts of gene cloning – cDNA & Genomic Libraries and rDNA technology – Strategies of genetic engineering – formation of DNA fragments – various methods – Introduction of recombinant vector into host cell – selection of clones – blotting techniques.

UNIT – II

Food Biotechnology : Microbial production of food – Single cell Protein (Algal, Bacterial and Actinomycetes, yeast and Fungi) – Microbial production of flavours and other products and generalising food biotechnology.

UNIT – III

Enzyme Engineering : Properties – Preparation methods – immobilisations – Ribozyme – Abzymes. Hybridomas and Monoclonal antibodies – production and application. Animal cell and tissue culture – production - Animal viral vector, Transgenesis – transgenic animals – methods- gene targeting. Embryo technology – Manipulation – Embryo splitting – invitro fertilization.

UNIT – IV

Biotechnology and Human Welfare : Production and hormones and vaccines . Biomass and Bioenergy – conversion methods – types of bio fuels – fuels for further use.

UNIT – V

Values of Biotechnology : Ethical values in animal and Human Cloning – Social and Environmental problems due to cloning – DNA finger printing – Bio chips, Bio sensors – Gene therapy

PRACTICALS – I

1. Handling microscopes, Camera lucid, stage and ocular micrometers.
2. Blood smear preparation, RBC, WBC count by Haemocytometer – differential count of WBC.
3. Study cell division stages – Onion root tip squash technique for mitosis and grasses hopper testis for meiosis.
4. Mounting of the salivary gland chromosomes of chromosomes larva.
5. Human blood grouping.
6. Washing and sterilization of glassware.
7. Media preparation – Liquid and solid media.
8. Staining of bacteria – Simple & gram staining.
9. Estimation of reducing sugars by Benedict's method.
10. Preparation of starch from potato and determination of its purity.
11. Separation of amino acids by paper chromatography.
12. Agarose gel electrophoresis – Paper electrophoresis.

DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

POST GRADUATE PROGRAM

MASTER OF ZOOLOGY

FOURTH SEMESTER

COURSE TITLE : MASTER OF ZOOLOGY
DURATION : 2 YEARS
MODE : SEMESTER
TOTAL MARKS : 700

COURSE TITLE	Paper Code	MARKS				TOTAL MARKS
		THEORY		PRACTICAL		
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
ANIMAL PHYSIOLOGY AND EMBRYOLOGY	MSCZ/S/410	40	60	NA	NA	100
ANIMAL FORMS – ECOBIOLOGY & ANIMAL BEHAVIOUR	MSCZ/S/420	40	60	NA	NA	100
PRACTICALS – II	MSCZ/S/430	NA	NA	40	60	100

Paper –1

Paper Code- MSCZ/S/410

ANIMAL PHYSIOLOGY AND EMBRYOLOGY

UNIT – I

Concept of balanced diet – role of enzymes in the digestion and absorption – Physical and chemical aspects of bioluminescence – Functional significance of bioluminescence. Movements – critical review of amoeboid, flagellar, ciliary movements in animal in the light of recent researches.

UNIT – II

Respiration – Types of respiration mechanisms – factors affecting respiration – structures, properties and composition and function in O₂ and CO₂ transport in animals.
 Circulation – Types of Hearts, ECG, Cardiac rhythm – control of heart beat. Factors controlling coagulation of blood. Excretion – nature and mode of formation of excretory products – Excretory mechanisms in vertebrates and invertebrates.

UNIT – III

Nervous integration – Types of neurons – Transmission of impulses – autonomous nervous system – origin and function, Reflex actions. Chemical coordination – Neurosecretion and its importance in physiology. Hormones of vertebrates and their specific role in chemical coordination. Muscle physiology – Molecular structure –

chemical composition of muscles – Regulation and energetics of contraction. Sensory Physiology – Classification of receptors in vertebrates and invertebrates.

UNIT – IV

Ger, cells origin, structure and differentiation ultra structural organization of the egg with reference to egg membrane, egg cytoplasm, structure of spermatozoan Polarity, symmetry – gradient cortex – activation of egg – interaction and fusion.

Cleavage :- Chemodifferentiation – cleavage Patterns – factors determining cleavage patterns. Theories of cleavage. Gastrulation :- Morphogenetic movements – Nucleocytoplasmic interactions in morphogenesis – formation of germ layers. Fate maps – gastrulation in characters – exogastrulation.

UNIT – V

Embryonic nutrition:- Yolk utilization – amniotic and allontonic fluids. Embryonic fields. Differentiation – Nuclear factors – chemical basis gene action development. Mechanism of information transfer, molecular and embryonic development – inductors and organizers – genes and organizers. Regeneration – Experimental data – Regeneration as developmental Phenomena.

Paper –2

Paper Code- MSCZ/S/420

ANIMAL FORMS – ECOBIOLOGY & ANIMAL BEHAVIOUR

UNIT – I

Nature of international code of zoological nomenclature principles relating to nomenclature, Taxonomic keys, objectives and uses in zoological studies.

Adaptation and evolution – coloration of animals. Non adaptive characters. Animal distribution – evolutionary significances.

UNIT – II

Biochemical origin of life. Theories and concept of evolution Neotamarkism, Neo-Darwinism –modern synthetic theory of evolution Natural selection.

What is ecosystems – Biological pyramids. Edaphic Nutrient cycle. Evolution of ecosystem.

UNIT – III

Forest resources – cause of deforestation – Demand and supply of wood, forest management – conservation and protection forestry. Introduction – conventional and non-conventional resources. Biogas programme in India. Solar photo voltaic technology.

Solar thermal (ST) Programme in India.

UNIT – IV

Environmental Pollution.

Paper Code- MSCZ/S/430

PRACTICALS – II

1. Study of digestive enzymes in cockroach.
2. Study of human salivary activity in relation to temperature.
3. Study of hemoglobin concentration.
4. Study of blood pressure.
5. Detection of nitrogenous waste products in fish and, bird etc and mammalian urine.
6. Sections of testes and many showing the maturation stages of gametes.
7. Slides of mammalian sperm and ovum.
8. Slides of cleavage stages in Frog and Chick.
9. Slides of developmental stages of chick embryos.
10. Slides of blastula and gastrula of frog and chick.
11. Slides of developmental stages of brain, heart and eye in chick embryo.
12. Measurement of environmental parameters.
13. Terrestrial environment using the instruments for measuring environmental parameters – Rain gauge – maximum and minimum thermo meters – wet and dry Hygrometer.
14. Adaptation of terrestrial animals based on a study of museum specimens.
15. Study of a natural ecosystem such as scrub jungle, forest and pond.