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**MASTER OF ZOOLOGY**

**SYLLABUS**

**FIRST YEAR**

**Paper – 1**
**CELL AND MOLECULAR BIOLOGY**

**UNIT – I**

Cell concept – Size and form – ultra structure and functions of plosmo membranes. Endoplasmic retieulum, Ribosomes, mitochondria, lysosomes, contriosomes, and golgicompled in the light of recent researches.

**UNIT – II**

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

**UNIT – III**

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

**UNIT – IV**

Chemistry and structure of DNA, DNA replication, Nucleus DNA, 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.

**Reference:**

1. Beifelder.D (1985). Essentials of molecular Biology, James and Bortlet Publishers Inc., U.S.A.
2. De Robertis, E.D.P. and De Robertis Sr. E.M. Fr, Lea and Febiger (1987) 8th Ed. Cell and molecular Biology, Saundor's college, Philadelphia.
3. Dnyansaga, V.R. (1986) Cytology and Genetics Tata McGraw Hill, Publishing Co., New Delhi.
4. Wolfe S.L. (1981). Biology of cell, wordsworth Publishing Co.,
5. Alberts, B.et.al., (1986) The molecular Biology of the cell, garl and Publishing, Inc., New York

6. Watson., J.D. et.al., (1987). Molecular Biology of the gene, Col.I, II and III Benjamin – cumming Publishing Co., California.
7. Kelinsmith, L.J. and Kish., V.M. (1989). Principles ofcell Biology, Harper and Row, New York.

**Paper – 2**
**GENRAL 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 metabolies – industrial uses of Bacteria – Lactic acid vinegar and industrial uses of yeasts

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

**UNIT – III**

Diary 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 MICRBIOLOGY : 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 – Bair virus – Sc 40 virus RNA tumour viruses – Retro viruses. – (Structure, replication, assembly and release) – Tumourgenic retroviruses, cellular viral oncogenes, relationship between viral and animal oncogenes – oncognene families – oncoprotiens – Tumour suppressors.

**BIOCHEMISTRY**

**UNIT – I**

Atoms, molecular, Polymerization of organic molecular – nature of living matter, major organic components – chemistry of water – dissolved gasses - $P^H$ – 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 biolofical world concept of free energy, redoxpotential, coupling of chemical reactions in transfer of energy. High energy rich compounds – Thermodynamics.

**UNIT – III**

Metabolism – Protein metabolism – Amino acid metabolism oxidative dermination – transmination – decorboxylation, demethylation reactions. Carbohydrate metabolism – Glycogenesis, glycolysis – energetics ofkreb's cycle, Gluconeogenesis, cori's cycle, glycosuria – Diabetics – Lipidmetabolism – metabolism of fatty acids, glyeero'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**

Harmon's – chemical nature, properties and biochemical mode of functions of hormones.Hormonal control of carbhyodrates, protein and lipidmetalbolism, cyclic AMP.

**Reference:**


1. Micheal pelczer J. Pelczas, E.C.S. chan, Noel R. Krieg 5th Ed. 1993.
2. Presscott L.M. Hartey. P. Klein J. 1990. Microbiology U.M.C. Brown Publishers.
3. Ananthanarayanan. C.K. Jayaraman Panicker. C.K. Text book of microbiology.
4. Presscott & Dunn's Industrial microbiology. CBS Publishers & Distributors, New Delhi.
5. A text book microbiology R.C. Dubey & D.K. Maheswari 1999. S. Chand & Co., Ltd, New Delhi – 110 005.
6. Lehninger A.L. 1970 Biochemistry worth publishing company N.Y.
7. Harper's Biochemistry 27th Ed. Tata McGraw Hill Publishing.

**Paper 3**
**BIOTECHNOLOGY**

**UNIT – I**

Genetic Engineering : Techniques – Concepts of gene clonning – CDNA & Geonomic 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 Fugi) – Microbial production of flavours and other products and generalising food biotechnology.

**UNIT – III**

Enzyme Engineering : Properties – Preparation methods – immobiliations – Ribozyme – Abzymes. Hybridomas and Minoclonal antibodies – production and application. Animal cell and tissue culture – production - Animal viral vector, Transgenesis – transgenic animals – methods-gene targetting. 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.

**Reference :**


1. T.C. Brown – Genecloning : D. Nichol : D.S.T. An introduction to genetic engineering.
2. R.C. Dubey and D.K. Maheswari – A Textbook of Microbiology, S. Chand and Company Ltd.
3. R.C. Dubey - A Textbook of Biotechnology, S. Chand and Company Ltd.
4. Gupta PK., Elements of Biotechnology, Rastogi and Company Lted, Meerut.

**Paper – 4**
**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 vertibrates and invertibrates.

**UNIT – III**

Nervous integration – Types of neurons – Transmission of impules – 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 vertibrates and invertibrates.

**UNIT – IV**

Ger, cells origin, structure and differentiation ultra structural organization of the egg with reference to egg membrane, egg eytoplasm, structure of spermatozoan Polarity, symmetry – gradient cortex – activation of egg – interaction and fusion.
Cleavage :- Chemodifferentiation – cleavage Patterns – factors determining cleavage patterns. Theories of cleavage.
Gastrulotion :- 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. Embroyanic 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.

**Reference:**


1. Raven. Ch. P. 1958 Morphogenes
2. Zalinsky B.L. 1970. An introduction to embryology, Saunders, TOPAN.
3. Batch, L.A. 1949, Embryology. The Dryden. N.Y.

**Paper – 5**

**ANIMAL FORMS – ECOBIOLOGY & ANIMAL BEHAVIOUR**

**UNIT – I**

Nature of international code of zoological nomen cloture principles relating to nomenculature , Taxanomic 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 f wood, forest management – conservation and protection forestry. Introduction – conventional and non-conventional resources. Biogas programme in India. Solar photo voltic technology.

Solar thermal (ST) Programme in India.

**UNIT – IV**

Environmental Pollution.

## PRACTICALS

### 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 Benedit's method.
10. Preparation of starch from potato and determination of its purity.
11. Separation of amino acids by paper chromotagraphy.
12. Agarose gel electrophoresis – Paper electrophoresis.

### 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 tests 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 any 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.