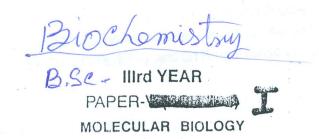
Alexandracion Dip



i) Basic Concepts of Genetic Information

- a. Nucleic acids as genetic information carriers, experimental evidence e.g. bacterial genetic transformation, Hershey-Chase Experiment, TMV reconstitution experiment.
- b. Central dogma of molecular genetics current version, reverse transcription and retroviruses.
- c. Primary structure of nucleic acids and their properties, salient features of eukaryotic, prokaryotic and viral genomes; highly repetitive, moderately repetitive and unique DNA sequences.
- d. Basic concepts about the secondary structures of nucleic acids, $5' \longrightarrow 3'$ direction antiparallel strands, base composition, base equivalence, base pairing and base-stacking in DNA molecule. T_m and buoyant density and their relationship with G-C content in DNA.
- ii) Structural Levels of Nucleic Acids and Sequencing
- a. Secondary and Tertiary structure of DNA: Watson and Crick model, A. B and Z types of DNA, major and minor grooves, chirality of DNA, tertiary structure of DNA.
- b. Structures and properties of RNA: Classes of RNA, secondary and tertiary structures.
- c. Nucleic acid hybridization: Cot value and satellite DNA.
- d. Sequencing: Restriction and modification system; sequencing of DNA and RNA.

iii) DNA Replication

DNA replication in prokaryotes-conservative, semiconservative and dispersive types, experimental evidence for semiconservative replication. DNA polymerases, other enzymes and protein factors involved in replication. Mechanism of replication. Inhibitors of DNA replication.

iv) Transcription

Transcription in prokaryotes. RNA polymerase, promoters, initiation, elongation and termination of RNA synthesis, inhibitors of transcription. Reverse transcriptase, post-transcriptional processing of RNA in eukaryotes.

v) Translation and Regulation of Gene Expression

a. Genetic code: Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes.

- b. Mechanisms of translation: Ribosome structure, A and P sites, charged tRNA, f-met-tRNA, initiator codon, Shine-Dalgarno consensus sequence (AGGA), formation of 70S initiation complex, role of EF-Tu, EF-Ts, EF-G and GTP, non-sense codons and release factors, RF1 and RF2.
- c. Regulation of Gene Expression in prokaryotes: Enzyme induction and repression, operon concept, Lac operon, Trp operon.

vi) Mutation and Repair

- a. Mutation: Molecular basis of mutation, types of mutation, e.g. transition, transversion, frame shift, insertion, deletion, suppresser sensitive, germinal and somatic, backward and forward mutations, true reversion and suppression, dominant and recessive mutations, spontaneous and induced mutations Lederberg's replica plating experiment.
- b. Mutagenecity testing: Correlation of mutagenecity and carcinogenecity: Ames testing, Random and site-directed mutagenesis.
- c. DNA Repair: UV repair systems in E. coli, significance of thymine in DNA.

vii) Recombinant DNA Technology

Restriction endonucleases, brief discussion of steps in DNA cloning. Applications of recombinant DNA technology.

A. Nutritional Blochemistry

- i) Nutrition and dietary habits
- a. *Introduction and definition of foods and nutrition. Factors determining food acceptance, physiological, energy, body building (growth and development). Regulation of body temperature. Physiology and nutrition of carbohydrates, fats, proteins and water. Vitamins A, D, E, K, Vit. B-complex and Vit. C and minerals like Ca, Fe and lodine and their biological functions. Basic food groups: energy giving foc Js, body building foods and protective foods.
- b. Composition of balanced diet, recommended dietary allowances (RDA) for average Indian, Locally available foods, inexpensive quality foods and food stuffs rich in more than one nutrients. Balanced vegetarian and non-vegetar an diets, emphasis on nutritional adequacy.
- ii) Nutritive and calorific value of foods
- a. Basic concepts of energy expenditure, units of energy, neasurement of energy expenditure by direct or indirect calorimetry, calculation of no --protein RQ with respect to carbohydrate and lipids. Determination of heat production of the diet. The basal metabolism and methods of measuring basal metabolic rate (EMR); energy requirements during growth, pregnancy, lactation and various physical activities. Calculation of energy expenditure of average man and woman.
- b. Specific dynamic action (SDA) of foods, nutritive value if various kinds of foods generally used by Indian population. Planning of dietary regimes for infants, during pregnancy and old age. Malnutrition, its implications and relationship with dietary habits and prevention of malnutrition specially protein calorie malnutrition (Kwashiorkor and Marasmus) by improvement of diets. Human milk and its virtues, breast vs formulated milk feeding. Food preservation standards, food adulterations and precautions, government regulations on preservation and quality of food.

B. Clinical Biochemistry

- i) Basic concepts of clinical blochemistry
- a. Definition and scope of clinical biochemistry in diagnosis, a brief review of units and abbreviations used in expressing concentrations and standard solutions. Quality control. Manual vs automation in clinical laboratory.
- b. Collection and preservation of biological fluids (blood, serum, plasma, urine and CSF). Chemical enalysis of blood, urine and CSF. Normal values for important constituents (in SI units) in blood (plasma/serum), CSF and urine, clearance test for urea.

- ii) Clinical enzymology
- a. Definition of functional and non-functional plasma enzymes. Isozymes and diagnostic tests. Enzyme pattern in health and diseases with special mention of plasma lipase, amylase, cholinesterase, alkaline and acid phosphatase, SGOT, SGPT, LDH and CPK.
- b. Functional tests of kidney, liver and gastric fluids.
- iii) Disease related to metabolism

Hypo- and hyper-glycemia, glycogen storage diseases; lipid mal-absorption and steatorrhea, sphingolipidosis; role of lipoproteins. Inborn errors of amino acid metabolism – alkaptonuria, phenyl-ketonuria, albinism, gout and hyper-uricemia.



A. Microbiology

i) Classification of microorganisms

Types of microorganisms, general characteristics of main groups of microorganisms, criteria used in the classification of bacteria.

- ii) Morphology, nutrition and physiology of bacteria
- a. General organization of bacterial cells Gram-positive and Gram-negative organisms; structure and function of different polymeric components in Gram-positive and Gram-negative organisms.
- b. Physiology and growth of bacterial cells and use of selective media in bacterial cultivation.
- iii) Metabolisin and genetics of Microorganisms
- a. Microbial metabolism -Special features of bacterial metabolism, Glyoxalate cycle and its role in conversion of fats into carbohydrates (compare with plants). Role of microorganisms in food spoilage, fermentation, food-borne infections and sewage (domestic and industrial) disposal.
- Microbial genetics and differentiation Adaptation and mutation: types of mutation and induction of mutation; transformation, conjugation, sex types, transduction, transfection, protoplast fusion, genetic recombination, plasmids and transposons.

B. Virology

i) Morphology and replication of viruses

Definition, virus structure, viral proteins, virus classification emphasizing importance of bacteriophage and virus as tool in modern biological research. Replication of RNA viruses negative strand (VSV), positive strand (polic), retroviruses (infection cycle), replication of DNA (Adenovirus or SV40).

ii) Virus-host infection

Acute virus infections – influenza, persistent virus infection, Herpes/Hepatitis A & B and AIDS; transformation and Cancer – RNA & DNA tumor viruses; Vaccine in prevention of viral infections – smallpox, pollo and AIDS.

Environmental Biochemistry Air poliution Air poliution

Air pollution

Particulate matter, compounds of carbon, sulphur, nitrogen and their interactions, methods of their estimation, their effect on atmosphere.

ii) Water pollution

.ypes of water bodies and their general characteristics, major pollutants in domestic, agricultural and industrial wastes, methods of their estimation, effects of pollutants and animals, treatment of domestic and industrial wastes, solid-wastes and intreatment.



Immunology

- 1. Concept of immunity, classification
- 2. Humoral and cellular immunity
- 3. Immunoglobulins
 - a. Structure and function
 - b. Types of antibodies
- 4. Antigens
 - a. Nature of antigens
 - b. Immunogens
 - c. Haptens
- 5. Formation of antibodies in the body:
 - a. cells involved in antibody formation
 - b. Differentiation of lymphocyte
 - c. Clonal selection theory
 - d. Cooperation of T-cell with B-cell
 - e. Secretion of antibody
 - f. Genetic basis of antibody diversity
- 6. Antigen-antibody reactions in vivo and in vitro
- 7. Components of complement, complement fixation reaction
- 8. Immunological tolerance and immunosuppression
- 9. Hypersensitivity and allergy
- 10. Histocompatible antigens elementary knowledge
- 11. Autoimmune diseases
- 12. Monoclonal antibody-preparation and application in biology
- 13. Transplantation immunology.

PRACTICAL for IIIrd YEAR LABORATORY-III

- 1. Estimation of DNA by diphenylamine method.
- 2. Effect of temperature on the viscosity of DNA using Ostwald's viscometer.
- 3. Extraction of RNA and its estimation by Orcinol method.
- 4. Estimation of hemoglobin by measuring total iron in blood.
- 5. Estimation of calcium and phosphorus in serum & urine.
- 6. Estimation of creatine and creatinine in urine.
- 7. Estimation of immunoglobulins by precipitation with saturated an monium sulphate.
- 8. Denaturation of enzyme, studies on DNA.
- 9. a. Separation of proteins by column enromatography.
 - b. Determination of proteins by dye binding assay.
- 10. Separation of proteins by SDS-polyacrylamide gel electrophorε is.