

DEPARTMENT OF BIOCHEMISTRY
 ACHARYA NAGARJUNA UNIVERSITY
 SYLLABUS FOR M.Sc., (Final) BIOCHEMISTRY
 ACADEMIC YEAR AND TO THE BATCH ADMITTED DURING 2014-2015

SEMESTER-III

PAPER-I **INHERITANCE BIOLOGY**

UNIT-I

Mendelian Inheritance: Law of Dominance, Law of Segregation and Law of Independence assortment and deviations of Mendelian inheritance. **Extra chromosomal inheritance-** inheritance of Mitochondrial and Chloroplast. Sex-linked inheritance. Polygenic inheritance. Identification of Nucleic acids as genetic material.

Genome Organization: in Viroids, Viruses, Prokaryotic and Eukaryotic chromosomes. Histones and non-Histones type DNA binding proteins. C-value paradox. Plasmids, Transposons

UNIT-II

Concepts of Cistrons, Recons and Mutons. Single copy genes, unique sequences, repetitive sequences and tandem genecluster-Histone genes, Immunoglobuline genes. Mutations- Different types of mutations and nature of mutagens. Detection and isolation of mutants. Mechanism of mutation. Benger's fine structure of rII locus. Ames test. Site directed mutagenesis. Eugenics and Euphonics.

UNIT-III

Cell growth and Cell division: Mitosis and Meiosis. Cells cycle parameters, specific events in the cell cycle, control of cell cycle, Internal and external mitotic inducers. Cell death – Apoptosis, Protooncogenes and Oncogenes.

UNIT-IV

Gene transfer mechanisms: Transformation, Conjugation, and Transduction - Generalized, abortive and specialized transduction. Mechanism of general recombination, cross over, Site specific recombination

UNIT-V

Elements of gene mapping: Gene linkage. Mapping by recombination analysis. Multiple crossover and interference. The circular chromosome and mapping by conjugation. Tetrad analysis and complementation analysis. Mapping by transformation and transduction. Map units and cytological maps of eukaryotic chromosomes. Somatic cell genetics.

Books Recommended:

1. Genetics - Gardener
2. Molecular Genetics of Bacteria 2nd edition 1995, Jeremy W.Dale.-John Wiley and sons.
3. Cell biology (1993)-David E.Sadva (Jones and Barrette)
4. Modern genetics (2nd edition,1984)-A.J.Ayala and W.Castra(Goom Helns,London)
5. Genetics by P.K Gupta.
6. Genetics by Verma and Agarwal
7. Text Book of Molecular Biology –K.Sivaramasastry, *etal*, Macmillan India Ltd., 1994.
8. Genetics by m.W.Strickberger.
9. Genetics by Weaver.

SEMESTER-III

PAPER –II

ENDOCRINOLOGY

UNIT-I

Introduction to endocrinology: General characters, Classification hormones. Hormone Action- Signal transduction, Receptors-Types, Structure (Insulin, Thyroid, steroid and Adrenergic receptors) Concept of second messengers (cAMP, IP₃ calcium, and NO). Protein phosphorylation and dephosphorylation. Assay of Hormones.

UNIT-II

Role of Calcium: Control of cellular calcium levels, transport and regulation. Interaction between cAMP and calcium. Calcium dependent proteins.

Hypothalamic Hormones-Synthesis, secretion, transport and biological actions of hypothalamic, adeno-hypophysial and neurohypophysial hormones. Hypothalamic and pituitary disorders. Pituitary hormones-melatonin and serotonin.

UNIT-III

Thyroidal Hormones: Chemistry, function and metabolism, hypo and hyper thyroidism.

Parathyroid Hormones-Parathormone and calcitonin, their role in calcium and phosphate metabolism, abnormalities of parathyroid functions. Role of vitamin D in calcium and phosphate metabolism.

UNIT-IV

Pancreatic Hormones-Biosynthesis of insulin and glucagon. Regulation of insulin and glucagon secretions. Role in carbohydrate, lipid and protein metabolism. Endocrine disorders of pancreas- Diabetes mellitus, melliturias, hypoglycemia, Glucose tolerance test.

Adrenal Medulla- Chemistry, biosynthesis and function of adrenal medullary hormones. Disorders of Medullary hormones.

UNIT-V

Adrenal Cortex-Chemistry, biosynthesis and function of adrenal cortical hormones. Disorders of cortical hormones.

Gonadal Hormones- Chemistry, biosynthesis and functions of androgens, estrogens and progesterone. hormonal regulation of menstrual cycle and Pregnancy.

Hormones of Gastrointestinal tract- Secretin, Gastrin and cholecystikinin.

Books Recommended:

1. General Endocrinology –Turner C.D,
2. Text book of Endocrinology –R.H.Williams
3. Harper's review of Biochemistry,
4. Lehningers Principles of Biochemistry –Nilson and cox.
5. Text book of Biochemistry with clinical correlations –Ed.Thomas, M.Devlin (John Wiley)
6. Biochemistry –Lubert Stryer,
7. Mammalian Biochemistry –White, handler and smith.
8. Endocrinology (4th edition) M.E.Hadley (Prentie Hall)

PAPER III
SEMESTER-III
IMMUNOTECHNOLOGY

UNIT-I

Biological aspects of immunity: Innate and adaptive immunity, cell mediated and humoral immunity. Primary and secondary lymphoid organs. Specificity, self and non-self recognition.
Antigen-Antibody: Haptens and determinants epitopes and paratopes. Nature of Ag and Ab, heterogeneity, isolation and purification. Structure and enzymatic fragmentation of immunoglobulin. Classification of immunoglobulins, types and biological activities of immunoglobulins. Generation of antibody diversity. Theories of immune response.

UNIT-II

Immune Response: Primary and secondary immune response. T&B cells and accessory cell. Subsets of T&B Cells, T&B cell receptors, antigen processing and presentation. Cytokines and co-stimulatory molecules-Lymphokines, interleukins.

Complement: Complement components, classical pathway Nature and alternative pathway. Biological consequences of complement activation.

Hypersensitivity: Class fixation, hypersensitivity types, anaphylactic, antibody-dependent cytotoxic, immune complex mediated, cell mediated and stimulatory hypersensitive reactions.

UNIT-III

Major Histocompatibility Complex: Structure of MHC I and MHC II genes. MHC in mice and HLA in man-fine structure and functions Role of MHC in immune response. MHC in Transplantation.

Immuno Deficiencies: Introduction, primary and secondary deficiencies, T - cell and B cell combined immunodeficiencies, complement system deficiency, acquired Immuno-Deficiency syndrome.

UNIT-IV

Autoimmunity and Immuno Suppression: Introduction, autorecognition, and classes of Auto Immuno Diseases. General mechanism of immuno-suppression, immune cells specific immuno tolerance. Cytokine therapy.

Transplantation: Terminology, immunological basis of transplantation, organ transplantation, mechanism of rejection of transplants, prevention of graft rejection.

Immunological Techniques: Precipitation and agglutination-lattice hypothesis, precipitin tests one and two dimensional, single radial immunodiffusion, immunoelectrophoresis, agglutination tests-Widal test, VDRL test complement fixation test, Radioimmunoassay and ELISA-principle methods and applications, FACS.

UNIT-V

Hybridoma technique and monoclonal antibody production, myeloma cell lines. Fusion methods, selection and screening methods for positive hybrids, cloning methods. purification and characterization of monoclonal antibodies. Application of monoclonal antibodies in biochemical research, in clinical diagnosis and treatment. Production of Human monoclonal antibodies and their applications.

Vaccines-Concept of immunization, routes of vaccination. Types of vaccines-Whole organism (Attenuated and inactivated) and Component vaccines (Synthetic Peptides, DNA vaccines, Recombinant Vaccines, Subunit Vaccines).

Books Recommended:

1. Essentials of immunology – Ivan Roitt (8 th edition) – Blackwell Scientific publications
2. Fundamentals of immunology – William C. Boyd (wiley Toppan)
3. Introduction to Immunology – John W. Kinball,
4. Fundamental of Immunology - Otto. View and others.
5. Immunology – D.M.wier.
6. Immunology – Kubey.
7. U.Satyanarayana, Biotechnology

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SEMESTER-III

PAPER IV

MOLECULAR BIOLOGY-I

UNIT I

DNA Replication: DNA Superhelicity, linking number, topological properties and mechanism of action of topoisomerases. Semiconservative replication, Experimental proof for semiconservative replication, replication forks, DNA polymerases of Prokaryotic and Eukaryotic. Continuous and discontinuous synthesis, Evidence for Okazaki model, RNA primers. Enzymes in replication-Single-stranded DNA binding proteins (SSBS), Helicases, DNA primases, DNA ligase.

UNIT – II

Prokaryotic replication mechanism: Replication of E.coli, rolling circle replication, Replication of ϕ x174, Bacteriophage M13, Negative strand(VSV), positive strand(polio virus), retrovirus, DNA virus(SV-40, Adenovirus), Eukaryotic DNA replication, Autonomous replicating sequences (ARS).

UNIT – III

Mitochondrial DNA replication, Termination and fidelity of replication; Fusion of replicons and termination signals. Telomers.

Repair of DNA: Direct reversal of damage, Excision repair, Recombination repair, SOS response. Identification of carcinogens. Inhibitors of DNA replication.

UNIT-IV

Transcription: Polynucleotidephosphorylase, RNA polymerases, Structure of E.coli RNA polymerase, Interaction between RNA polymerase and template. Chain initiation, elongation and termination. Eukaryotic RNA polymerases, Promoter and enhancer sequences.

Inhibitors of transcription, Synthesis of different RNA molecules; synthesis of ribosomal RNA, 5S- r RNA and tRNA.

UNIT – V

Maturation and processing of RNA: Methylation, cutting and trimming of rRNA, capping polyadenylatin and splicing of mRNA, catalytic RNA, group I and group II intron splicing, spliceosomes, trans-splicing, RNase P.

Books Recommended:

1. Molecular biol. of the cell-B.Alberts *et al* Garland Pub., New York & London.
2. Molecular biol. a comprehensive introduction to prokaryotes and eukaryotes –D.Frefeilder, (Jones and Bartlett, USA)
3. Recombinant DNA: A Short course- J.D.Watson *et al* (Sci.Amer.Book WAPreemon)
4. Modern cloning laboratory manual –T.Maniatis *et al*, (Cold Spring Harder lab. NY)
5. Modern genetics (2nd edition,1984)-A.J.Ayala and W.Castra(Goom Helns,London)
6. Techniques in Molecular biol.(1902)-Ed.,J.Walker (Goom Helns, London).
7. Practical methods in molecular biology (1901).-R.F.Shecleif and P.C.Wensik (Springer veriang)
8. Genes V.(1994)-Benjamin Lewin.(oxford university press).
9. Lehninger's Principles of Biochemistry by Nelson and cox.

PRACTICAL-1 Microbiology

1. Preparation of liquid and solid media for growth of microorganism.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution methods. Slant and stab cultures.
3. Isolation of pure cultures from soil and water.
4. Determination of growth curve of bacteria (*E.coli* and *Pseudomonas*)
5. Bacterial population count by turbidimetry determination method.
6. Bacterial staining by Gram's, Acid fast and spores.
7. Effect of pH on bacterial growth.
8. Assay of antibiotics and demonstration of antibiotic resistance.
9. Bacterial transformation.
10. One step growth curve of coliphage.
11. Determination of biological oxygen demand (BOD) of water.

Practical 2- Molecular Biology

1. Isolation of DNA from Bacterial, Plant and animal cells.
2. Estimation of DNA by Diphenylamine and spectrophotometric method.
3. Isolation of RNA from yeast cells.
4. Estimation of RNA by orcinol and spectrophotometric method.
5. Estimation of DNA and purity determination by UV absorption method.
6. Determination of melting temperature(T_m).
7. Separation of Restriction digested DNA fragments on agarose gel electrophoresis.
8. Detection and differentiation of open circular, Linear and closed covalent circular (ccc) plasmid DNA by submarine gel electrophoresis.
9. Isolation of Plasmid PJA from *E.coli* HB.
10. Transformation of *E.coli* HB 101/JM 103 with ampicillin resistant plasmid PJA.
11. Transfection of M13 DNA into *E.coli* JM 103.
12. Isolation of phage M13; Isolation of single and double stranded M13 DNA.
13. Conjugation: Use of broad host range plasmid RF in demonstrating conjugal transfer of plasmid in Bacteria
14. Catabolite repression: Evidence of B-Galactosidase induction in presence of Lactose in *E.coli* lac strains

**SEMESTER-IV
 CLINICAL BIOCHEMISTRY**

PAPER-I

UNIT-I

Clinical Biochemistry: Introduction and maintenance of clinical laboratory, hazards in clinical biochemistry laboratory, units, normal range, reference values. Factors affecting reference values, quality control in laboratory – use of external and internal standards. Automation in clinical laboratory. Collection and preservation of specimens.

Disorders of nitrogen metabolism: Non-protein nitrogenous compounds in blood and urine, urea, creatine, creatinine, ammonia, aminoacids and their clinical significance. Aminoacidurias - overflow, renal, specific. Inborn errors of aminoacid metabolism- phenylketonuria, alkaptonuria, hartnup's disease, maple-syrup urine disease, hyperuricemia- primary and secondary gout, Lesh-Nyhan syndrome, orotic aciduria, xanthinuria.

UNIT-II

Prophyrin, haemoglobin and related compounds: Porphyrins: classification, clinical and biochemical features. Hepatic and erythropoietic porphyrias. Porphyrinuria. Tests used in investigation of porphyrias and Porphyrinuria. Occurrence of haemoglobin and related pigments in cells, plasma and urine. Identification of pigments by spectroscopy. Haemoglobinopathies, Thalassemia, sickle cell anaemia.

Disorders of gastrointestinal tract: Test of gastric function- fractional test meal. Pentagastrin test, insulin stimulation test. Hyperchlorohydrria, achlorohydrria, achylia gastrica, chloride shift, alkaline tide. Pancreatic exocrine secretion – composition. Duodenal contents – collection, examination following stimulation of pancreas; analysis; malaabsorption syndrome due to intestinal disease and pancreatic dysfunction; differential diagnosis. Disaccharidase deficiency.

UNIT - III

Biochemical aspects of liver disease: Liver function tests related to protein. Carbohydrate, lipid pigments metabolism, detoxification and excretion. Serum enzymes in liver disease. Jaundice classification and differential diagnosis. Kernicterus.

Renal function: Tests for evaluation, concentration, dilution, excretion, clearance tests; Nephritis, nephrotic syndrome.

UNIT - IV

Clinical Enzymology: Plasma enzyme in diagnosis and prognosis-aminotransferases, creatine kinase, LDH, amylase, phosphatases, choline esterase, glucose 6-phosphate dehydrogenase, gamaglutamyl transferase. Isozymes of LDH and alkaline phosphatase. Clinical application of plasma enzyme assays in myocardial infarction, liver disease, and muscle disease.

Lipid metabolism: Plasma lipids and lipoproteins and their functions. Hyperlipoproteinemias classification-primary and secondary. Investigation of lipoproteinemias and lipedemias.

UNIT-V

Disorders of carbohydrate metabolism: Diabetes mellitus-classification, aetiology, clinical and laboratory features, diagnosis of diabetes mellitus- glucose tolerance test, random, fasting and postprandial glucose levels; glycosuria; Ketone bodies' glycosylated haemoglobin, plasma insulin, metabolic complications-diabetes hyperglycemic coma and nonketotic coma; lactic acidosis; atherosclerosis; neuropathy-Hyperglycemia-fasting and provoked.

Diagnosis- stimulation tests (Intravenous glucagon and leucine test) extended G.T.T.; hypoglycemia in children- neonatal and early infancy-Investigation of glycogen storage disease, galactosemia, hereditary fructosuria, lactose intolerance.

Books Recommended:

1. Biochemical aspects of human disease –R.S.Elkeles and A.S.Tavil.
(Black well scientific Publications, 1983)
2. clinical chemistry in diagnosis and treatment –Joan F.Zilva and P.R.pannall Lloyd- Luke
medical books limited 1979.
3. Varley's Practical Clinical biochemistry –Ed.Alan W.Gowen lock (heinmann medical books
London, 1988)
4. Clinical diagnosis and management by laboratory methods (john Bernard Henry
(W.B.Salunders company, 1984)
5. Clinical Biochemistry-S.Ramakirshna and Rajiswami

SEMESTER-IV

PAPER –II MOLECULAR BIOLOGY – II & BIOINFORMATICS

UNIT-I

Protein Synthesis: General features of genetic code and its elucidation. Structural components of Prokaryotic and Eukaryotic ribosomes. in-vitro translation systems. t-RNA structure and role in protein biosynthesis. Mechanism of protein synthesis in Prokaryotic and Eukaryotic- Aminoacyl t-RNA synthetases Aminoacylation of tRNA initiation, elongation and termination. Wobble hypothesis. Mitochondrial genetic code. Nonsense suppression. Inhibitors of protein synthesis (Antibiotics and other inhibitors).

UNIT-II

Non ribosomal biosynthesis of polypeptides: Biosynthesis of Gramicidin-s. Post translational modifications.

Protein targetting: Cell organelles and proteins involved in protein sorting. The signal hypothesis, signal sequences and signal recognition particle.

Molecular chaperones. Protein degradation, Lysosomal degradation. PEST sequences. The Ubiquitin pathway. Protein stability and the N-end rule. Translational feed back-Synthesis of ribosomes and ribosomal RNA, Interferons.

UNIT-III

Regulation of Gene Expression: Regulation of gene expression at transcriptional level. The lac repressor. Fine structure of lac operon. cAMP and the catabolic activator protein. Gal operon and concept of dual promoters. Dual functions of the repressor the ara operon. Transcriptional control by attenuation. The trp operon.

UNIT-IV

Eukaryotic Gene Regulation: Positioning chromosomes for transcription. Polytene chromosomes. Gene amplification and gene rearrangements. Transcriptional control by alternative RNA processing and enhancers.

Bioinformatics: Introduction to bioinformatics, human genome project, Biological Database Principles, applications, Primary database- Genbank, EMBL, PDB, SWISSPROT. Specialized Database SCOP/CATH. Database Querying using Key word and search engines.

UNIT-V

Homeotic genes. Gene amplification. DNA binding protein motifs-Helix-turn-helix, zinc finger and leucine zipper motifs.

Sequence Analysis-I: Concepts of DNA/Protein sequence alignments and their importance. Sequence alignment method and programmes- BLAST and FASTA. Pair wise alignment versus multiple sequence alignment. **Sequence Analysis-II.** Phylogenetic analysis and tree construction, sequence analysis of nucleic acids. Computational analysis, determining transcriptional analysis, secondary structure prediction. Primer designing. Genome analysis.

Books Recommended:

1. Molecular biology of the cell-B.Alberts,D.Bray,J.Lewis M.Raff,K.Roberts and J.D.Watson Garland Publishing New York and London.
2. Molecular biology a comprehensive introduction to prokaryotes and eukaryotes – D.Freifeilder, (Jones and Bartlett,USA)
3. Recombinant DNA: A Short course- J.D.Watson, J.Tooze and D.T.Kurtz(scientific american book WA.Preemon)
4. Modern cloning laboratory manual –T.Maniatis,E.F.Fritsch and J.Sabreck.(Cold spring harbor laboratory new york).
5. Modern genetics (2nd edition, 1984)-A.J.Ayala and W.Castra(Goom Helns,London)
6. Practical methods in molecular biology (1991).-R.F.Shecleif and P.C.Wensik(Springer verlag)
7. Techniques in Molecular biology (1992)-Ed.,J.Walker and W.austra(Goom Helns, London).
8. Genes V.(1994)-Benjamin Lewin.(oxford university press).
9. Bioinformatics sequence, structure and data banks ed. By Des Higgins Willie Taylor – 2000.

SEMESTER – IV
PAPER III GENETIC ENGINEERING & APPLIED BIOCHEMISTRY

UNIT – I

Introduction tools for genetic engineering:

Enzymes: Restriction endonucleases, types, properties and applications. DNA and RNA polymerases, Polynucleotide kinase, alkaline phosphatase. DNA ligase, Topoisomerases, Terminal transferase, Reverse transcriptase and their uses in molecular cloning.

Cloning vectors – Vectors of plasmid origin types, properties and functions, Ti-plasmid, shuttle vectors, vectors of viral origin - Lambda phage, cosmids, M13 phage, phagemids, baculovirus, animal and plant viruses as vectors. Yeast plasmids, YACs, Expression vectors. Bacterial artificial chromosome.

Generation of DNA fragments-RE digestion, mechanical shearing, duplex DNA synthesis, chemical synthesis of a gene. Joining of DNA fragments to vectors, Homopolymer tailing, cohesive end ligation, blunt end ligation and linker, adopter DNA molecules and their significance in cloning.

Construction of cDNA and Genomic libraries use of cosmids, YACs in generation of Genomic libraries.

UNIT – II

Deliver/Introduction of recombinant molecules into selected host cells- Biological and Non-Biological means – transformation, transduction microinjection, liposomes, electroporation and particle bombardment.

Screening techniques for identification of transformed host cells- Genetic, immunological techniques, Insitu hybridization technique and dot blot techniques. Chromosomal walking and its significance. Principles and preparation of DNA and RNA probes and their applications. Gene probes in prenatal and antenatal detection of disease. Antisense RNA technology.

UNIT - III

Protein Engineering: Production of recombinant proteins, with examples of insulin, somatostatin, and interferon. Polymerase chain reaction and its applications. Restriction fragment length polymorphism, RAPD, AFLP and its applications. Gene probes in prenatal and antenatal detection of disease. Antisense RNA technology.

Plant and Animal Biotechnology: Outlines of plant and animal tissue culture techniques. development and use of transgenic plants and animals. Plant transformations with the Ti plasmid and *A. tumefaciens*. Ti plasmid-derived vector systems and cloning, physical methods of transferring genes to plants. Developing insect resistant, virus resistant and herbicide resistant plants. Development of transgenic mice retroviral vector method and DNA micro injection method and engineered embryonic stem cell method. Applications of transgenic mice.

UNIT-IV

Stem cells: Introduction to stem cells, Definition, Totipotency versus pluripotency, embryonic and adult stem cells, clones and cloning. Applications of stem cells.

Nanobiotechnology: Concept, scope and application-Biological applications carbon nanotubes, Bioremediation, Biosynthesis of metals and Nanomedicines

Genetherapy: Introduction and its application.

Introduction to Biostatistics: Data and its collection, classification of Data and frequency distribution, Central Tendency- mean, mode, median-Statistical evaluation of results, Probability theory, and Regression analysis.

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UNIT-V

Fermentation Technology: Design of fermentor and types of fermentation. significant fermentations-Antibiotics (penicillin, Tetracycline) Vitamins (riboflavin, biotin), organic acids (Citric acid, Gluconic acid) and Alcohol (ethanol).

Elements of downstream processing- Cell separation, disintegration, extraction –liquid-liquid, two phase liquid. Precipitation, purification, crystallization, spray drying and packing. Specific examples of fermentation product recovery (Single cell protein)

Biostatistics: Correlation and correlation coefficient (r) Correlation analysis and calculation of covariance. Distribution of student t, chi-square, F test. Non-parametric statistics. Significance of statistical methods of biological Investigations.

Books Recommended:

Molecular Biotechnology by Glick and Pasternak.

Molecular Cloning – A Laboratory Manual, Sambrook.

Gene Manipulation by Old and Primrose.

Biostatistics: A foundation for analysis in the health (7th edition) - W.W. Daniel John Wiley and Sons Inc., New York.

Genetic engineering - T.A. Brown.

Genetic Engineering by Sandhya Mitra.

Molecular biotechnology: Principles and applications of Recombinant DNA (1996) Bernard R. Glick and Jack J. Pasternak (Panama publishers corporation).

A text book on biotechnology by H.D. Kumar, New Delhi.

Molecular Biotechnology by Glick and Pasternak

Molecular Cloning –A Laboratory manual, Sambrook

Biotechnology: A text book of Industrial microbiology.

Molecular biotechnology: Principles and applications of Recombinant DNA (1996) Bernard R. Glick and Jack J. Pasternak (Panama publishers corporation).

Principles of Gene manipulation : An introduction to genetic Engineering (5th ed.) R.V. Old and S.B. Primrose (Blackwell Scientific Publi.).

Principles of biotechnology (1985) Alen Weisman (surrey university press)

Concepts in Biotechnology (1996) Ed., D. Balasubramanian, *et al* (University press).

Molecular Genetics of Bacteria 2nd edition 1995, Jeremy W. Dale. - John Wiley and sons.

Cell biology (1993) - David E. Sadava (Jones and Baret)

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SEMESTER – IV
PAPER IV PROJECT WORK / INTERNSHIP

Includes a Project work: A short training will be given in handling a project, submission of the report and Viva-voice.

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M.Sc. (Final) Practical Syllabus

Practical 1-CLINICAL BIOCHEMISTRY:

1. Estimation of blood glucose.
2. Estimation of blood urea.
3. Estimation of creatine in serum.
4. Estimation of uric acid in serum.
5. Estimation of serum total protein and albumin.
6. Estimation of serum cholesterol.
7. Estimation of serum bilirubin.
8. Estimation of serum SGOT, SGPT activity,
9. Estimation of serum alkaline phosphatase activity.
10. Estimation of serum calcium.
11. Estimation serum phosphate.
12. Agar gel electrophoresis of serum proteins and serum lipoproteins.
13. Test for abnormal constituents in urine.

PRACTICAL-2 IMMUNOLOGY

1. Total RBC and WBC count.
2. WBC differential count.
3. Erythrocyte sedimentation rate (ESR).
4. Packed cell volume (PCV)
5. Estimation of Haemoglobin (Hb).
6. Mean Cell Haemoglobin and Mean Cell RBC volume.
7. Estimation of serum antibodies by Biuret method.
8. Immunodiffusion.
9. Single radial Immuno diffusion.
10. Rocket Immuno-electrophoresis.
11. Crossover Immuno-electrophoresis.
12. Detection of HCG by Latex Agglutination inhibition test.
13. Detection of Rheumatoid arthritis (Auto immune disease) by slide agglutination tests.
14. Haem agglutination tests for identification of human blood groups.
15. Detection of viral fever by slide agglutination tests.

Recommended Books:

1. Practical Clinical Biochemistry by Verly
2. Practical Microbiology by R.C.Dubey and D.K Maheshwari
3. Microbiology a laboratory manual by Cappuccino Sherman
4. Introductory practical Biochemistry by S.K. Sawhney and Randhir Singh
5. Experimental Biochemistry a Student Companion by B.Sashidhar Rao and V.Deshpande
6. Molecular Cloning –A Laboratory manual, Volume 1, 2, & 3 Sambrook.
7. Molecular biotechnology: Principles and applications of Recombinant DNA (1996)
Bernard R.Glick and Jack J.Pasternak (Panima Publishers Corporation).
8. Principles of Gene manipulation : An introduction to genetic Engineering(5th ed.) R.V. old and S.B.Primrose (Blackwell Scientific Publi.).