

**MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI**

PG - COURSES – AFFILIATED COLLEGES

Course Structure for M.Sc. Biochemistry

(Choice Based Credit System)

(with effect from the academic year 2016- 2017 onwards)

(44th SCAA meeting held on 30.05.2016)

Sem	Sub 'Pr. No.	Subject status	Subject Title	Hrs/ week	Cre - dits	Marks				
						Maximum			Passing minimum	
						Int.	Ext	Tot.	Ext.	Tot
III	13	Core – 7	Research methodology	5	5	25	75	100	38	50
	14	Core – 8	Immunology and Immunotechniques	5	5	25	75	100	38	50
	15	Core - 9	Nutritional Biochemistry	5	5	25	75	100	38	50
	16	Elective – III (Choose any one)	Genomics (or) Biotechnology	5	5	25	75	100	38	50
	17	Practical - III	Physiology, Immunology and Nutritional Biochemistry Techniques	5	-	50	50	100	25	50
	18	Practical - IV	Molecular Techniques and Clinical analysis	5	-	50	50	100	25	50
IV	19	Core – 10	Molecular Endocrinology	5	4	25	75	100	38	50
	20	Core – 11	Clinical Biochemistry	5	4	25	75	100	38	50
	21	Core - 12	Molecular Biology	5	4	25	75	100	38	50
	22	Practical – III	Physiology, Immunology and Nutritional Biochemistry Techniques	--	4	50	50	100	25	50
	23	Practical -- IV	Molecular Techniques and Clinical analysis	--	4	50	50	100	25	50
	24	Project		5	5	50	50	100	25	50

Research Methodology

Unit -1

Spectroscopic Techniques:

Laws of absorption and absorption spectrum. Principle, instrumentation and applications of UV and visible spectrophotometry and spectrofluorimetry, Basic principles of turbidimetry and nephelometry. Principle, instrumentation and applications of luminometry, atomic absorption spectroscopy and flame photometry. Use of lasers in spectroscopy.

Unit -2

Radioisotope Techniques:

Nature and units of radioactivity. Detection and measurement of radioactivity-Geiger-Muller Counter, Solid and liquid Scintillation counting, Quenching and quench correction, scintillation cocktails and sample preparation. Serenkov counting. Autoradiography. Applications of Radisotopes in biology. Radiation Hazards.

Unit -3

Electrophoresis and Electrochemical Techniques:

Electrophoresis – General principles. Electrophoresis of proteins – native PAGE, SDS-PAGE, gradient gels, isoelectric focusing, 2-D page. Cellulose acetate electrophoresis. Electrophoresis of nucleic acids-agarose gel electrophoresis, DNA sequencing gels,pulsed field electrophoresis. Blotting-western, Northern, Southern.

Electrochemical techniques – Basic Principles and instrumentation of the pH electrode. Elementary details of biosensors.

Unit – 4

Chromatography Techniques:

General principles of partition and adsorption chromatography. paper, TLC, GLC, Column chromatography, Ion exchange chromatography, Molecular exclusion chromatography, Affinity Chromatography, Special Forms of affinity chromatography – immuno affinity, metal chelate, dye-ligand and covalent chromatography, HPLC.

Unit – 5

Centrifugation Techniques:

Basic principles of sedimentation. Ultracentrifuges – Analytical Ultracentrifuge – preparative ultracentrifuge .Basic principles and techniques of sub cellular fractionation by differential centrifugation. Centrifugal Elutration. Density-Gradient centrifugation-rate zonal and isopycnic. Formation and choice of gradients, Sample application, recovery and monitoring.

Text Book Recommended

- 1.Wilson and walker.A biologist guide to principles and techniques of practical biochemistry 5th ed.Cambridge University Press 2000
- 2.Boyer,R.Modern Experimental Biochemistry.3rd ed.Addison Weslery Longman,2000.
- 3.Upadhyay,Upadhyay and Nath.Biophysical Chemistry Principles and Techniques,Himalaya Publ .1997
- 4.Simpson CFA & Whittacker,M.,Electrophoretic Techniques.
- 5.Sambrook,Molecular Cloning.cold Spring Harbor Laboratory,2001.
- 6.Friefelder and Friefelder,Physical Biochemistry-applications to Biochemistry and Molecular Biology.WH Freeman & Co.1994
- 7.Pavia et al.Introduction to Spectroscopy.3rd ed .Books/Cole Pub Co.`2000

Immunology and Immunotechniques

Unit-1

Elements of immunology. Types of immunity-innate and acquired. Humoral and cell mediated immunity. Central and peripheral lymphoid organs-Thymus, bone marrow, spleen, lymph nodes and other peripheral lymphoid tissues-GALT.Cells of the immune system-Lymphocytes, mononuclear phagocytes-dendritic cells,granulocyte, NK cells and mast cells, cytokines.

Antigens vs immunogens, haptens. Factors influencing immunogenicity. Immunoglobulins - structure, classification and functions. Isotypes, allotypes and idiotypes.

Unit-2

Complement activation and its biological consequences. Clonal selection theory. Organization and expression of immunoglobulin genes generation of antibody diversity. Class switching.

T-cell, B-cell receptors, Antigen recognition-processing and presentation to T-cells, Interaction of T and B cells. Immunological memory. Effector mechanisms-macrophage activation. Cell mediated cytotoxicity, immunotolerance, immunosuppression.

Unit-3

MHC genes and products.Polymorphism of MHC genes,role of MHC antigens in immune response,MHC antigens in transplantation.

Immune response to infectious diseases-viral bacterial and protozoal.Cancer and immune system.

Unit-4

Immunization practices-active and passive immunization. Vaccines-killed, attenuated-toxoids. Recombinant vector vaccines-DNA vaccines,synthetic peptide vaccines-antiidiotypic vaccines production of polyclonal and monoclonal antibodies. Principles, techniques and application. Genetically engineered antibodies.

Fractionation of leucocytes by density gradient centrifugation. Identification of lymphocytes and their subsets in blood. Leukocyte migration inhibition technique. Delayed type hypersensitivity technique.

Unit-5

Agglutination and precipitation techniques, Immuno electrophoresis, RIA, immunoblotting, avidin-biotin mediated immuno assay. Immuno histochemistry- immunofluorescence, immunoferritin technique. Fluorescent immunoassay.

Cytokines assay:-ELISA and ELISPOT. Production of cytokines invitro. Interferon production. Abzymes.

Text Books Recommended

- 1.Roitt et al.Roitt's Essential Immunology.10th ed.Blackwell Sci.2001
- 2.Richard A Goldsby et al.Kuby Immunology.4th ed.WH Freeman & Co.2003
- 3.Abbas et al.Cellular and Molecular Immunology.W.B Saunders Company,2000
- 4.Janeway,C.(Ed), Paul Travers. Immunobiology 5th ed.Garland Publ.2001
- 5.Eli Benjamini AU et al. Immunobiology 5th ed. Garland Publ.2001
- 6.NMS Series in immunology.3rd ed.Lippincott willams and Wilkins
- 7.Bier et al.Fundamentals of Immunology, Springer Verlag,1986

Nutritional Biochemistry

Unit-1

Introduction and definition of food and nutrition, Function of foods and its relation to nutrition and clinical health, essential nutrients, analysis of food composition, food groups, food habits. Nutritional challenges in future – Food production, food storages, functional foods, new protein foods, new fat foods and changing food habits. Food adulteration and hygiene.

Unit-2

Measurement of food stuffs by Bomb calorimeter. Calorific values of proteins, carbohydrates and fats. Energy considerations in nutrition, respiratory quotient, BMR and SDA. Measurement of BMR, factors affecting BMR, regulation of body temperature, energy needs, total energy requirement, estimation of energy requirement and energy value of foods. Requirements of carbohydrates and lipids. Essential fatty acids.

Unit-3

Essential amino acids and biological value of proteins, improvement of protein quality by supplementation and fortification. Nitrogen balance-positive and negative nitrogen balance. Protein energy malnutrition-Marasmus and Kwashiorkor. Special aspects of nutrition during pregnancy and lactation.

Unit-4

Minerals-Sources, daily allowances, absorption, metabolism, biological roles and clinical significance of calcium, phosphorus, sodium, potassium. Trace element-metabolism of iron-absorption, storage, transport and excretion-iron deficiency and overload. copper, zinc, selenium, cobalt.

Unit -5

Water soluble vitamins-ascorbic acid, thiamin, riboflavin, niacin, pantothenic acid, lipoic acid, biotin, folic acid and vitamin B12, structures, sources, recommended daily allowances. Biological actions. Coenzyme functions, clinical significance, deficiency symptoms. Fat soluble vitamins- structures, sources, recommended daily allowances, biological action, clinical significance, deficiency symptoms. Hypervitaminosis.

Text Books recommended

1. Biochemistry and Physiological aspects of human nutrition. Stipanuk, Saunders, 2000
2. Human Nutrition and Dietetics-Davidson and Passmore, ELBS
3. Principles of Nutrition and Dietetics-Swaminathan, Bangalore printing and publ.co.Ltd
4. Human Nutrition and Diabetics. Garrow and James Churchill Livingstone
5. Normal and therapeutic nutrition-Corine Robinson
6. Food nutrition and diet therapy-Krause and Hunscher
7. Advanced text book on food and nutrition-M. Swaminathan (Vol. 1&2)

Genomics

Unit – 1

Dataware housing, data capture, data analysis, sequence data banks, introduction to sequence data banks-protein sequence data banks NBRF-PIR, SWISSPROT, signal peptide data bank. Nucleic acid sequence data bank, Genbank, EMBL, Nucleotide sequence data bank. AIDS virus sequence data bank, tRNA data bank.

Unit – 2

Genome sequencing; chain termination and automated DNA sequencing; shotgun and gene cloning strategies; library construction, sequence assembly and gap closure; genome resources-NCBI map viewer, ORF finder, locuslink. Analysis tools for sequence data banks. Pair wise alignment smith Waterman. Multiple alignment-CLUSTAL, PRAS. DNA microarray, Transcription analysis.

Unit – 3

BLAST & FASTA types and their algorithms, structural data banks, protein Data bank (PDB), The Cambridge Structural Data base (CSD), Genome data bank, metabolic path way data, Composite protein sequence data bases. Biochemical pathway databases-WIT and KEGG.

Unit – 4

Protein classification, secondary and tertiary structure prediction, GOR Method, Chou-Fasman Method, HMMs, Neural networks, Blocks and profile analysis. Phylogenetic analysis-Maximum parsimony, Maximum Likelihood UPGMA methods. Proteome analysis, 2D gel electrophoresis, MALDI Tof, protein microarray.

Unit – 5

Microbial and cellular data banks, Introduction to MSDN (Microbial Strain Data Network), Numerical coding systems of microbes, Hybridoma data bank structure, Virus information system, cell line information system, Other important data banks in the area of Biotechnology/Life sciences/biodiversity.

Text Books Recommended

1. Bioinformatics sequence and genome analysis. Mount, David W.Cold Spring Harbor Laboratories press, CSH New York, 2001.
2. Introduction to proteomics. Tools for the new biology Liebler, Humana press 1st Ed. December, 2001
3. Proteomics: From protein sequence to function S.Pennington, M.J.Dunn Bios Scientific Publications Ltd. 2nd Ed. (Jan 15, 2001)
4. Genomes – T.A.Brown, Willey – Liss Publications, 2002

Biotechnology

Unit – 1

Recombinant DNA technology – Basic Principles. Uses of restriction enzymes for production of DNA fragments. Cloning vectors-Plasmids (pBR 322, pUC 18), phages(and M13) and cosmids. YACs, BACs, PACs, HAECs and HACs.

Splicing of DNA, cohesive end method, blunt end ligation.

Gene transfer methods – calcium phosphate coprecipitation, electroporation, lipofection, microinjection. Cloning strategies-genomic and cDNA libraries. Chromosome walking.

Unit – 2

In vitro fertilization and embryo transfer. Animal vaccines-production of vaccine for foot and mouth disease of cattle.

Techniques in Human genome mapping-FISH, PCR, RFLP, DNA fingerprinting. Gene therapy-ex vivo and in vivo. Antisense RNA technology and applications.

Hazards and safety aspects of genetic engineering.

Unit – 3

Plant cell and tissue culture-culture media and cell culture. Tissue culture, micropropagation and somaclonal variation. Protoplast culture-isolation and purification of protoplasts, protoplast fusion, genetic modification of protoplasts.

Methods of gene transfer in plants-Agrobacterium mediated transformation, viral vectors and particle gun method.

Transgenic plant technology-genetic engineering of plants for pest resistance, virus resistance, herbicide tolerance, stress tolerance and delay of fruit ripening. Use of plants of produce commercially important proteins, antibodies, viral antigens and peptide hormones.

Unit - 4

Bioprocess-Basic principles of microbial growth. Types, design and operation of fermenters. Fermentation culture medium-carbon, nitrogen and vitamin sources. Anti foaming devices. Downstream processing-separation, concentration, purification, modification and drying. Production of vitamin B12, penicillin, streptomycin.

Unit – 5

Waste treatment – aerobic and anaerobic. Composting, Utilization of cellulose, Bioremediation, Microbial degradation of xenobiotics. Biodegradable plastics. Single cell protein.

Immobilized enzymes, methods and applications. Industrial applications of enzymes in food, dairy and leather industry.

Text Books recommended

1. Fermentation Biotechnology O.P. Ward. 1989 Prentice Hall
2. Biotechnology J.E.Smith Cambridge University Press 1996
3. Introduction to Biotechnology Brown, Campbell and Priest Blackwell Science 1987
4. A Textbook on Biotechnology H.D.Kumar 2nd edition East West Press 1998
5. Molecular Biotechnology Glick and Pasternak, Panima Publ.
6. From Genes to clones Winnaecker VCH Publication
7. Elements of Biotechnology P.K.Gupta, Rastogi Publication, 1998
8. Molecular Biology and Biotechnology. Walker and Gingold 3rd ed. Panima Publ. 1999
9. Plant Biotechnology. Lgnacimuthu, Oxford, IBH
10. Recombinant DNA Technology, Watson, Scientific American Publ.
11. Principles of Genome analysis, Primrose, Oxford University Press, 1998.

Physiology, Immunology and Nutritional Biochemistry Techniques

1. Qualitative analysis of Normal and abnormal constituents in urine.
2. Enumeration of RBC
3. Enumeration of WBC
4. Estimation of Hemoglobin levels by Drabkin's method
5. Determination of Bleeding time and Clotting time
6. Immunodiffusion-Ouchterlony
7. Immunoelectrophoresis
8. dot ELISA
9. Determination of Iodine value
10. Determination of Saponification number
11. Determination of Acid number
12. Determination of total carbohydrate content in cereals
13. Determination of protein content in pulses
14. Estimation of calcium in milk
15. Determination of total iron content from plant source

Molecular Techniques and Clinical Analysis

Molecular Techniques

1. Isolation of plasmid DNA
2. Isolation of DNA from animal tissue
3. Separation of proteins by SDS-PAGE
4. Western Blotting of protein
5. Separation of DNA by Agarose gel electrophoresis

Clinical analysis

Estimation of the following blood constituents

1. Blood sugar
2. Blood urea
3. serum uric acid
4. Serum creatinine
5. Serum cholesterol
6. Serum Total protein

I. Assay of the following serum enzymes

1. GOT
2. GPT
3. Acid phosphatase
4. Alkaline phosphatase
5. Amylase

Molecular Endocrinology

Unit – 1

Hormones-definition, classification, biosynthesis, circulation in blood, modification and degradation. Target tissue-feedback control. Hormone receptors-external features and structure, regulation of receptor levels. Mechanisms of hormone action.

Signal transduction. Plasma membrane receptors adenylate cyclase, Role of G proteins, protein kinases, tyrosine kinase, inositol phosphates, calcium, calmodulin. Steroid hormone receptors-mechanism of steroid hormone action.

Unit – 2

Hypothalamus and pituitary hormones. Hypothalamic releasing factors. Anterior pituitary hormones-actions and feedback regulation of synthesis. Growth promoting, lactogenic hormones. Glycoprotein hormones of the POMC family. Endorphins. MSH. Hypo and hyperactivity of pituitary, hormones-gigantism, acromegaly, dwarfism. Vasopressin and oxytocin. Diabetes insipidus, syndrome of inappropriate ADH secretion.

Unit – 3

Thyroid hormones-synthesis and secretion, transport, metabolic fate. Biological actions. Antithyroid agents. Thyroid diseases-thyrotoxicosis, goiter, hypothyroidism, Graves's disease. Hashimoto's thyroiditis. Thyroid function tests.

Parathyroid Hormone-Biological action and regulation of calcium and phosphorous metabolism, calcitonin. Pathophysiology.

Calcitriol-Biosynthesis, transport, functions, mechanism of action. Rickets and osteomalacia.

Unit -4

Pancreatic hormones-cell types of the islets of Langerhans. Insulin-Biosynthesis regulation of secretion. Biological actions, Mechanism of action. Insulin receptorintracellular mediators. Insulin signaling pathways, Glucagon, somatostatin and pancreatic polypeptide. Insulin like growth factors.

Gastrointestinal hormones-location of peptide producing cells, synthesis, structure and functions. Mechanism of action of secretin, GIP, VIP, gastrin, CCK, other peptides.

Unit – 5

Adrenal hormones – Glucocorticoids, Minerlocorticoids synthesis, secretion, transport, metabolism and excretion. Biological effects. Mechanism of action. Adrenal androgens-metabolic effects and functions Adrenal medulla-catecholamines, biosynthesis, storage, metabolism, regulation of synthesis.

Abnormal secretion of adrenal hormones-Addisons disease, cushings syndrome, congenital adrenal hyperplasia, pheochromocytoma.

Gonadal hormones-Androgens, estrogens. Biological actions. Ovarian cycle, Pregnancy biochemical changes in pregnancy.

Text Books recommended

1. Williams Text book of Endocrinology-Wilson and Foster 8th ed.
2. Mechanisms of hormone action-Autin and Short
3. Harpers Biochemistry-Murray et al 25th ed. Mc Graw Hill, 2000
4. Principles of Biochemistry-Mammalian Biochemistry-Smith et al.Mc Graw Hill 7th ed.

Clinical Biochemistry

Unit – 1

Patterns of inheritance-autosomal and sex-linked disorders, disorders of amino acid metabolism-amino aciduria, phenylketonuria, Hartnup disease, alkaptonuria, albinism, cystinuria, cystinosis, homocystinuria and maple syrup urine disease.

Disorders of carbohydrate metabolism-glycogen storage diseases, galactosemia, fructose intolerance and fructosuria.

Disorders of Purine and pyrimidine metabolism; Hyperuricemia and gout. Hypouricemia. Orotic aciduria.

Unit – 2

Blood sugar homeostasis: Role of tissues and hormones in the maintenance of blood sugar. Hypoglycemia, hyperglycemia, glycosuria. Diabetes mellitus-classification, metabolic abnormalities, diagnosis and management. Acute complications-diabetic ketoacidosis hyperosmolal non-ketotic coma, long term complications retinopathy, neuropathy and nephropathy, glycosylation.

Unit – 3

Bilirubin metabolism – Jaundice, Dubin Johnson syndrome, Rotor syndrome, Crigglers and Najjar syndrome, Differential diagnosis of Jaundice, consequences and biochemical findings in hepatitis and cirrhosis. Liver function tests, Gall stones and steatorrhea.

Disorders of lipid metabolism-lioproteinemia. Lipid storage diseases-Gauchers, Tayssach's Niemann Pick and Sandhoff's disease. Fatty liver, Atherosclerosis.

Unit – 4

Plasma protein disorders. Non-protein nitrogenous constituents in blood with reference to urea, uric acid, aminoacid, abnormalities including uremia, plasma protein abnormalities hemoglobinopathy, porphyria, acute phase proteins, proteinuria.

Qualitative analysis of urine & Sediments, renal function test, Osmolality & free water clearance, acute & chronic renal failure, glomerulonephrities, Nephrotic syndrome, Renal hypertension, Urinary Calculi, analysis of stones, peritoneal & hemodialysis.

Unit – 5

Clinical enzymology in diagnosis, test for the evaluation of endocrine dysfunction pituitary, thyroid, parathyroid, adrenal cortex & medulla. General concepts of metabolism & detection of inborn error in foetus & heterozygous carriers by enzymes assay in amniotic fluid. Plasma & cell biopsy specimen. Clinical significance of aspartate & alanine transaminase, Creatine kinase, lactate dehydrogenase, aldolase, Enzyme test in determination of myocardial infarction, muscle dystrophy & bone disorders.

Text Books recommended

1. Text book of Medical Biochemistry- M.N.Chaterjee and Rane Shinde
2. Biochemistry with clinical correlation – Devlin
3. Clinical Biochemistry – William – Hoffman
4. Practical Clinical Biochemistry – Harold Varley
5. Text book of Medical Biochemistry – S.Ramakrishnan, K.G.Prassanan, R.Rajan.

Reference Books

1. Harpers Biochemistry 24th edition
2. Clinical chemistry – Teity and Co

**MSU / 2016-17 / PG –Colleges / M.Sc. (Biochemistry) / Semester -IV / Ppr. no.21 / Core -12
Molecular Biology**

Unit – 1

Prokaryotic transcription and regulation

Basic principles of transcription – E.Coli RNA polymerase submit structure. Promoter sequence in E coli; Steps in transcription-initiation, elongation and termination. Rho dependent and Rho independent termination. Inhibitors of transcription, Post transcriptional processing of rRNA and tRNA. Regulation of transcription in prokaryotes – the lac operon and trp operon.

Unit – 2

Eukaryotic transcription and regulation

Eukaryotic RNA polymerases-structure and functions. RNA pol I, II and III, promoters, transcription factors, transcription complex assembly and mechanism of transcription, Transcriptional regulation in eukaryotes-hormonal (steroidal hormone receptors), phosphorylation (STAT proteins), Activation of transcriptional elongation by HIV Tat protein, cell determination, homeodomain proteins.

Post transcriptional processing of mRNA, rRNA and tRNA. Alternative splicing. Catalytic RNA (ribozymes), RNA editing, Antisense RNA. The genetic code-general features. Mitochondrial genetic code. Mutations-point mutations and frameshift mutations. Suppressor mutations-nonsense and missense suppression.

Unit – 3

TranslationComponents of protein synthesis-m RNA, ribosomes and tRNA. Mechanism of protein synthesis in bacteria and eukaryotes-amino acid activation, initiation, elongation and termination translation control in bacteria and eukaryotes.

Regulation of protein synthesis-constitutive, and narrow domain regulation, Inhibition of protein synthesis. Co and post translation modification.

Protein degradation: the Ubiquitine pathway. Protein folding models, molecular chaperones.

Unit – 4

Gene expression and regulation

Levels of gene expression. Principles of gene regulation, cis acting elements and trans acting factors. Upregulation, down regulation, induction, repression, global and narrow domain mechanisms.

Comparison of gene regulation strategies in prokaryotes and eukaryotes.

Genetic and epigenetic gene regulation by DNA methylation. DNA methylation in prokaryotes-modification systems, Dam methylation. Dcm methylation. DNA methylation in eukaryotes-cytosine methylation, CpG islands. Methylation and gene regulation in mammals and plants.

Epigenetic gene regulation by DNA methylation in mammals-role of imprinting and X-chromosome inactivation.

Unit – 5

Molecular oncology:

Differences between benign and malignant tumors. Growth characteristics of malignant tumours. Morphological, ultrastructural and metabolic alterations in tumour cells. Mechanism of radiation, viral and chemical carcinogenesis. Multistage carcinogenesis-initiation, promotion, progression- oncogenes and proto-oncogenes-mechanism of protooncogene activation. Tumour suppressor genes-mechanism of action with examples.

Text Books Recommended

1. Lewin.Genes VII. Oxford University Press 2000.
2. Twyman. Advanced Molecular Biology Viva publ. 2nd ed 1998.
3. Alberts. Molecular Biology of the cell. 4th ed. Garland sci 2002
4. Lodish et al, Molecular cell biology, 4th ed. Freeman 2000
5. Pitot HC., Fundamental of Oncology, Marcel Dekker, 2002
6. Stansfield etal., Molecular Cell Biology, Schaum’s Outlines. Mc Graw Hill, 1996

Physiology, Immunology and Nutritional Biochemistry Techniques

16. Qualitative analysis of Normal and abnormal constituents in urine.
17. Enumeration of RBC
18. Enumeration of WBC
19. Estimation of Hemoglobin levels by Drabkin's method
20. Determination of Bleeding time and Clotting time
21. Immunodiffusion-Ouchterlony
22. Immunoelectrophoresis
23. dot ELISA
24. Determination of Iodine value
25. Determination of Saponification number
26. Determination of Acid number
27. Determination of total carbohydrate content in cereals
28. Determination of protein content in pulses
29. Estimation of calcium in milk
30. Determination of total iron content from plant source

Molecular Techniques and Clinical Analysis

Molecular Techniques

6. Isolation of plasmid DNA
7. Isolation of DNA from animal tissue
8. Separation of proteins by SDS-PAGE
9. Western Blotting of protein
10. Separation of DNA by Agarose gel electrophoresis

Clinical analysis

Estimation of the following blood constituents

7. Blood sugar
8. Blood urea
9. serum uric acid
10. Serum creatinine
11. Serum cholesterol
12. Serum Total protein

II. Assay of the following serum enzymes

6. GOT
7. GPT
8. Acid phosphatase
9. Alkaline phosphatase
10. Amylase

BCPR-Project

- i) Students should carry out individual project only.
- ii) Project report will be evaluated by Central valuation and Viva – Voce will be conducted by both the external examiner and the guide at the end of the Third semester itself.