SARDAR PATEL UNIVERSITY

Programme & Subject : B.sc (Biochemistry)

Semester : VI

Syllabus with Effective from : June 2020

Paper code: US06CBCH21	**Total credit: 3**
Title of Paper: GENETIC ENGINEERING	

UNIT	Description in detail	Weightage (%)
I	**Regulatuion of gene expression** 1. Principle of gene regulation 2 .Definition, constitutive enzyme, induced enzyme .inducible and induction, repressible and repression, activators and repressors 3. Lac operon hypothesis A. Negative control mechanism B. Positive control mechanism 4. Tryptophan operon A. Repressor mechanism B. Attenuation mechanism 5. Regulation of gene expression in eukaryotes A. Euchromatin and heterochromatin B. Many eukaryotic promoters are positively regulated C. DNA binding activators and co activators	**25%**
II	**Gene mutation and repair** Definition : mutation and repair Mutation hotspot ,mutagens Mutagenic agents A. Base analogues B. Agents modifying nitrogen base C. Agents producing distortion in DNA 3. The primary mutagenic effect of UV light 4. DNA Repair mechanism A. Mismatch Repair B. Base expression repair C. Nucleotide excision repair D. Direct repair	**25%**

III	**Recombinant DNA technology and genetic engineering** Purification of DNA A. Preparation of total cell DNA B. Preparation of plasmid DNA Gene cloning vectors (brief) Plasmid Lambda phase Cosmid Ti plasmid PBR322 Restriction endonuclease its types and function	**25%**
IV	**Applied genetics** 1. Detection of recombinant clone A. Southern blotting B. Northern blotting C. Western blotting 2. Principle, method and application of A.PCR B.RFLP C. DNA finger printing D. gene library 3. Gene sequencing A. Sanger's method B. Maxam and Gilbert's method	**25%**

Reference Books:

1. Freifelder's Essentials of Molecular Biology by George M. Malacinski
2. Molecular Biology of the Gene 6th edition. By Watson J D, Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R.,2008 Cold Spring Harbour Lab. Press, Pearson Pub.
3. Gene Cloning & DNA Analysis: An introduction by T A Brown WILEY Blackwell 7th Edition
4. Lewin's Gene XII by Elliot S Goldstein, Jocelyn E. Krebbs, and Stephen T. Kilpatrick

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Paper code: US06CBCH22	**Total credit: 3**
Title of Paper: BASIC IMMUNOLOGY	

UNIT	Description in detail	Weightage (%)
I	**Overview and historical perspective of Immunology:** Immunity, Types: innate and acquired - active, passive, natural and artificial immunity. Overview of immune system, Cells of the immune system and functions, Organs of the immune systems and functions - primary and secondary lymphoid organs.	**25%**
II	**Antigens:** Nature and types of antigens, specificity, epitope, haptens, adjuvants, immunogenicity, factors affecting immunogenicity. **Antibodies:** Immunoglobulins-Structure, Classes and functions; Antigens-antibody reactions - Agglutination, precipitation, complement fixation, neutralization; Immunofluorescence.	**25%**
III	**Immunodiagnostic technique**: Single radial Immunodiffusion, Double Immunodiffusion, Immunoelectrophoresis, Rocket electrophoresis, Haemaggulitination, bacterial agglutination, ELISA, RIA.	**25%**
IV	**Hypersensitivity reactions:** Type I, II, III and IV, Allergy and inflammation; Fundamentals of autoimmune disorders, Immunodeficiency and Immune suppression disease. Transplantation Immunology: graft acceptance and rejection.	**25%**

TEXT BOOKS:

1. Textbook of Immunology- Chakkaravarthy, Tata McGraw Hill publishing Company, Ltd (2004)
2. Essentials of Immunology- I. Roitt, Blackwell Science
3. Immunology Textbook by Janis Kuby
4. Textbook of Microbiology by R. Ananthanarayan

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Syllabus with Effective from : June 2020

Paper code: US06CBCH23	**Total credit: 3**
Title of Paper: HUMAN METABOLISM-II	

UNIT	Description in detail	Weightage (%)
I	**RESPIRATORY CHAIN AND OXIDATIVE PHOSPHORYLATION** • Functional stages of Respiratory chain • Components of respiratory chain 1. Nicotinamide nucleotides 4. Coenzyme Q 2. Flavin nucleotides 5. Cytochromes 3. Iron-Sulphur proteins • Organisation of Electron Transport Chain → Inhibitors of electron transport chain • Oxidative phosphorylation → Mechanism of oxidative phosphorylation (Hypothesis) → P:O Ratio → ATP synthase → Inhibitors of oxidative phosphorylation → Uncouplers → Brown adipose tissue	**25%**
II	**PROTEIN METABOLISM** • Digestion and absorption of protein • Cellular uptake of Amino acid → Metabolic uses of Amino acid → Protein turnover → Amino acid pool • Transamination & Deamination → Ammonia transport and metabolism → Ammonia toxicity → Removal of ammonia • Metabolism of individual amino acid (In brief) • Urea cycle • Metabolic disorder of protein • Phenylketonuria • Albinism	**25%**

III	**NUCLEIC ACID METABOLISM** • Biosynthesis of Purine Nucleotides • De Novo synthesis → Synthesis of AMP and GMP from IMP → Formation of Purine Nucleotide Diphosphates and Triphosphates → Inhibitors of Purine synthesis → Regulation of Purine Nucleotide biosynthesis → Salvage pathways → Synthesis of Doexyribonucleotides • Degradation of Purine Nucleotides → Uric acid metabolism • Gout • Pyrimidine metabolism → De Novo synthesis , Regulation , Degradation of pyrimidine nucleotides	**25%**
IV	**<u>INTEGRATION OF METABOLISM</u>** • Energy demand and supply • Integration of major metabolic pathways • Regulation of metabolic pathways • Organ specialization metabolic integration in → Liver → Adipose tissue → Skeletal muscle → Brain • Fast – feed cycle → The Fed state → The Fasting state → The Fe-fed state • Metabolism in starvation	**25%**

Basic Textbook & Reference book:

- Textbook of biochemistry by Rafi MD
- Principle of biochemistry – Lehninger
- Biochemistry – Satyanarayan
- Life sciences fundamentals and practice part – I ,Pranav kumar and Usha mina
- Review by physiological biochemistry- Haroid Harper
- Biochemistry – Lipin cott
- Human metabolism by Michael Palmer

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Syllabus with Effective from : June 2020

Paper code: US06CBCH24	**Total credit: 3**
Title of Paper: CLINICAL BIOCHEMISTRY	

UNIT	Description in detail	Weightage (%)
I	**BLOOD AND BODY FLUIDS** • Clinical biochemistry: definition • Water and electrolytes : distribution of water In body , water balance in human body, electrolytes distribution and balance in body fluid , regulation of water and electrolytes balance • Blood: Normal constituents of blood and their variation in pathological conditions - urea, uric acid, creatinine, glucose, bilirubin, total protein, albumin/globulin ratio. Lipid profile – cholesterol, triglycerides, lipoproteins - HDL and LDL. • functions , physical characteristics , composition , functions of blood cells (RBC , WBC , PLATELETS) • Body fluids: major body fluids , normal composition and functions of CSF , Lymph , saliva , urine	**25%**
II	**PLASMA PROTEINS** • Plasma protein : types and major functions of plasma proteins • Separation of plasma protein • Chemistry , functions and clinical significance of 1. Albumin 2. Alpha-1-antitripsin 3. Lipoproteins 4. Haptoglobin 5. Ceruloplasmin 6. Transferrin • Prothrombin • Fibrinogen • Lipid profile	**25%**

III	**ORGAN FUNCTION TEST AND DISEASE** • Liver function test : functions of liver, classification of liver function test • Renal function test : functions of kidney , classification of renal function test • Jaundice : types of jaundice • Fatty liver • Diabetes mellitus : WHO classification , clinical symptoms , biochemical symptoms , life threatening complications (CHD , Retinopathy , nephropathy ,neuropathy • Nephritis • Cancer	**25%**
IV	**HEMOGLOBIN, ANEMIA AND BLOOD COAGULATION** • Chemistry functions and structure of haemoglobin • Normal types of haemoglobin • Properties of haemoglobin • Derivatives of haemoglobin • Types of anemia • Blood coagulation → Basic reaction (some properties and functions of the principal of clotting factors) • Role of blood platelets • Biochemical reactions in the clotting process • Anticoagulants • Fibrinolytic system	**25%**

BASIC TEXT & REFERENCE BOOKS

→ Principles of Anatomy and Physiology- Gerard .J. Tortora and Bryn Derrickson
→ Textbook of Medical Physiology- Arthur. C .Guyton, John. E .Hall.
→ Medical Physiology- Vol.1 and Vol.2-C.C.chattergy
→ Human biochemistry by James M. Orten & Otto W. Neuhaus
→ Textbook of biochemistry for medical students :Rafi MD

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Programme & Subject : B.sc (Biochemistry)

Semester : VI

Syllabus with Effective from : June 2020

Paper Code:US06CBCH25	**Total Credit:2**
Title Of Paper: Practicals	

	Description in detail	Weightage%
	Estimation of Creatinine by Jaffe method	**100%**
	Estimation of protein by Lowery method	
	Estimation of SGOT and its clinical importance	
	Estimation of SGPT and its clinical importance	
	Estimation of A/G ratio	
	Estimation of Urea	
	Estimation of serum bilirubin	
	Estimation of serum cholesterol	
	Lowry protein assay	
	Determination of human blood group	
	Determination of Rh factor	
	RA test	
	Widal test	
	Estimation of DNA by UV spectroscopy	
	Demonstration of Polyacrylamide gel electrophoresis of serum proteins	
	Study of abnormal constituents of Urine	

BASIC TEXT & REFERENCE BOOKS

→ Standard methods of biochemical analysis by S.R.THIMMAIAH

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Semester : VI

Syllabus with Effective from : June 2020

Paper code: US06CBCH26	**Total credit: 3**
Title of Paper: CLINICAL ENDOCRINOLOGY	

UNIT	Description in detail	Weightage (%)
I	**CLASSIFICATION OF HORMONES** • Definition • General importance • Mechanism of action of Group- I Hormone • Mechanism of action of Group- II Hormone • Hypothalamic hormone • Regulatory feedback loops between hypothalamus pituitary glands	**25%**
II	**EFFECT OF HORMONES ON METABOLISM AND DISORDERS** • Growth hormone • Thyroid hormone • Insulin • Glucagon • Cortisol • Biochemical and physiological function of Catecholamine	**25%**
III	**DISORDERS OF HORMONES** • Goitre • Hyperthyroidism • Hypothyroidism • Thyroid function test • Diabetes mellitus • Hypoglycaemia • Acromegaly • Gigantism	**25%**

IV	**HORMONES OF ENDOCRINE GLANDS WITH THEIR PHYSIOLOGICAL FUNCTIONS** • Endocrine and Exocrine glands • Hormones of pituitary gland • Hormones of Thyroid gland • Hormones of Pancreas • Hormones of Adrenal gland	**25%**

Basic Textbook & Reference book:

→ Textbook of biochemistry by Rafi MD

→ Biochemistry – Satyanarayan

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Programme & Subject : B.sc (Biochemistry)

Semester : VI

Syllabus with Effective from : June 2020

Paper code: US06CBCH27	**Total credit: 3**
Title of Paper:PLANT BIOCHEMISTRY	

UNIT	Description in detail	Weightage (%)
I	**Plant cell Structure** Biochemistry of Specialized Plant cell Organelles , Primary and Secondary cell wall, Plasmodesmata (structure and Function), Water relations of plants: Role of water, Absorption, Adsorption, Conduction and Transpiration, Guttation, Water Balance and Stress.	**25%**
II	**Secondary Metabolism** Secondary Metabolites-Phenols, Tannins, Lignin, Flavonoids, Waxes, Cutin and Suberin-structures and functions.	**25%**
III	**Photosynthesis** Hill's Reaction, Light Reaction, Dark Reaction C_3 and C_4 cycles, Photo Respiration, Factors affecting rate of Photosynthesis.	**25%**
IV	**Plant Hormones** Auxins, Cytokinins, Gibberalic acids, Absisic acid, Brassinosteroids, Salicylic acid, Jasmonic acid.	**25%**

Basic Text & Reference Books:

- Plant Physiology by Salis burry and Ross
- Plant Biochemistry by Hans - Walter Heldt