# Paper code: US05CBCH21 Title of Paper: MOLECULAR BIOLOGY-I

UNIT	Description in detail	Weightage (%)
Ι	Basic concept of molecular biology	
	1. Definition and concept of gene	
	2. Concept of chromosome, Chromatin and genome	
	3. Histones, Nucleosomes and packaging of DNA into	25%
	chromosomes	
	4. Salient features of viral genome, prokaryotic and eukaryotic	
	genome.	
II	DNA Replication	
	1. Introduction and definition of replication, Replisome and	
	primosome	
	2. Set of fundamental rules for DNA replication	
	a) DNA replication is semiconservative- Meselson and	
	Stahl experiment	
	b) DNA synthesis proceeds in 5' to 3' direction and is semi	
	discontinuous	25%
	3. Prokaryotic DNA polymerases: Activities of DNA	
	Polymerase I, II and III.	
	4. Mechanism of replication: Initiation, Elongation and	
	Termination.	
	6. Differences in prokaryotic and eukaryotic replications	
111	Transcription	
	1. RNA polymerases in prokaryotic and eukaryotic organisms	
	2. Promoters in prokaryotic and eukaryotic organism	
	3. Mechanism of transcription: Initiation, Elongation and	
	1 ermination.	
	4. Post translation modification	25%
	a) Sphening mechanism of gloup $1,2,3,4$ b) Generation of 5' can in m PNA	
	c) 3' poly a tail formation	
	5 Reverse transcriptase and Reverse transcription	

IV	Translation / protein synthesis	
	1. Genetic code: Definition and properties	
	2. Role of ribosomes, m RNA and t RNA in transcription	
	a)formation of fmet tRNA	
	b) Activation of amino acid	
	c) Initiation	250/
	d) Elongation	25%
	e) Termination	
	f) Post translation modification	
	3. Inhibition of protein synthesis by antibiotics and toxins.	

Reference books:

- Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., 2008 Molecular Biology of the Gene 6th edition. Cold Spring Harbour Lab. Press, Pearson Pub.
- 2. Freifelder's Essentials of Molecular Biology by George M. Malacinski
- 3. Nelson and Cox, Lehninger's Principles of Biochemistry (2000), Worth Publish., Inc. NewYork.

Paper code: US05CBCH22

# Title of Paper: ENZYMOLOGY

UNIT	Description in detail	Weightage (%)
Ι	<b>Enzymes</b> Definition, historical perspective, general characteristics of enzymes. Nomenclature and classification based on IUB with examples. Unit of enzyme activity – definition of IU, enzyme turn over number and nature of non-enzymatic and enzymatic catalysis. Coenzymes – Structure and function, metallo-enzymes and metal activated enzymes; Enzyme specificity, the concept of active site, determination of active site. Stereo specificity of enzymes, Lock and key Model, Koshland's induced fit theory.	25%
II	<b>Isolation and purification of enzymes</b> Isozymes and their importance, Lactate dehydrogenase as an example, allozymes, Proteolytic enzymes: endopeptidase and exopeptidase; Multienzyme complex: Pyruvate dehydrogenase and fatty acid synthase	25%
III	<b>Enzyme kinetics</b> Factors affecting rates of enzyme catalyzed reactions, Effect of enzyme concentration, substrate concentration, pH and temperature. uni-substrate reactions, concept of Michaelis -Menten, Determination and significance of kinetic constants, catalytic rate constant and specificity constant, Limitations of Michaelis-Menten Kinetics. Lineweaver – Burk(L-B) plot. Determination of Vmax & Km from L-B plot and their significance Classification and kinetics of multisubstrate reactions. Reversible and irreversible inhibition, competitive, non competitive and uncompetitive inhibitions.	25%

IV	Regulation of enzyme activity	
	Reversible, Irreversible, allosteric and feedback inhibition,	
	Allosteric enzymes, Sigmoidal curve, positive and negative	
	modulators, positive and negative co-operativity examples with	
	special reference to aspartate transcarbamylase and	
	phosphofructokinase	25%
	Abzymes, Ribozymes, Industrial and biomedical applications of	
	enzymes. Mechanism of enzyme action	
	Mechanism of enzyme action.	

Reference Books:

- 1. Understanding Enzymes by Trevor Palmer
- 2. Fundamentals of Enzymologist : Nicholes C. Price and Lewis Stevens, Oxford Univ. Press.
- 3. Enzymes: M. Dixon, E. C. Webb, CJR Thorne and K. F. Tipton, Longmans, London.
- 4. L. Stryer BIOCHEMISTRY W.H. Freeman Co., San Francisco, USA

# Paper code: US05CBCH23 Title of Paper: HUMAN METABOLISM - I

UNIT	Description in detail	Weightage (%)
Ι	CARBOHYDRATE METABOLISM	
	Basic concept: Anabolism, Catabolism, Metabolic pathways	
	(liner, cyclic, metabolic sequences), Regulation of metabolic	
	pathway, Why study metabolism, Significance in medicine,	
	Types of food stuffs ,Breakdown of food stuff overview,	
	Functional anatomy of digestive system	
	• Digestion and absorption of carbohydrate (In brief)	
	• The entry of glucose into cells: Sodium-Glucose symport,	250/
	Uptake by glucose transporter	25%
	• Glycolysis: Energetics of glycolysis, Regulation of glycolysis,	
	Inhibitors of glycolysis, Conversion of pyruvate to lactate	
	Rapaport - Leubering Cycle	
	Gluconeogenesis and its regulation	
	Hexose monophosphate shunt	
	Glucose-alanine cycle and Cori cycle	
	• Krebs cycle: Energetics of Krebs cycle, Regulation of Krebs	
	cycle	
II	CARBOHYDRATE METABOLISM AND ASSOCIATED	
	DISORDERS	
	• Hormonal regulation of Carbohydrate metabolism (role of	
	Insulin & Glucagon)	
	Glycogen metabolism : Role of glycogen, Glycogenesis &	
	Glycogenolysis	25%
	• Glycogen storage diseases (Type 0, Type I – VII)	
	Glycosuria, Pentosuria, Fructosuria	
	Diabetes mellitus	
	Hunter's Syndrome or mucopolysaccharidosis	

III	LIPID METABOLISM	
	• Digestion, absorption and transport of lipid in blood,	
	• Alpha, beta and omega Oxidation of Saturated Fatty acid	25%
	• Oxidation Unsaturated, and Odd carbon chain of fatty acids	
	• Biosynthesis of Fatty acids, TG, Cholesterol	
	• Synthesis and degradation of Ketone bodies	
	Hormonal regulation of lipid metabolism	
IV	DISORDERS OF LIPID METABOLISM	

Basic Textbook & Reference book:

- Textbook of biochemistry by Rafi MD
- Nelson and Cox, LEHNINGER's Principles of Biochemistry, KalyaniPublishers, Ludhiana/Worth Publishers, Inc., New York.
- Biochemistry Satyanarayan
- Life sciences fundamentals and practice part I ,Pranav kumar and Usha mina
- Review by physiological biochemistry- Haroid Harper
- Biochemistry Lipin cott

Paper code: US05CBCH24

## Title of Paper: HUMAN PHYSIOLOGY

UNIT	Description in detail	Weightage (%)
Ι	<ul> <li>INTRODUCTION TO PHYSIOLOGY</li> <li>The cell and general physiology</li> <li>Functional organization of the human body and control of the internal environment</li> <li>Cells as the living units of the body</li> <li>Extracellular fluid unit of the internal environment</li> <li>Homeostatic mechanism of the major functional system         <ul> <li>→ Homeostasis</li> <li>→ Control system of the body</li> <li>→ 11 systems of human body</li> </ul> </li> </ul>	25%
Π	<b>RESPIRATORY SYSTEM</b> • Structure of the respiratory system• The branching of airways from the trachea, the bronchial tree• Phases of respiration• Pulmonary ventilation• External respiration• Internal respiration• Functions of respiratory system• Transport of oxygen and carbon dioxide• Oxygen-Hemoglobin dissociation curve• Factors affecting the affinity of Hb for oxygen (I) Acidity (II) PCo2 (III)Temperature (IV) BPG• Blood buffers• Acidosis -Alklosis	25%
III	<ul> <li>DIGESTIVE SYSTEM AND CIRCULATORY SYSTEM</li> <li>Overview of the digestive system: gastrointestinal tract and the accessory digestive organs</li> <li>Basic principles of gastrointestinal absorption</li> <li>Absorption in the small intestine – absorption of water, ions and nutrients</li> <li>Importance of circulatory system</li> <li>A structure of human heart</li> <li>Cardiac cycle</li> </ul>	25%

IV	MEMBRANE PHYSIOLOGY OF NERVE AND MUSCLE	
	<u>&amp; URINARY SYSTEMS</u>	
	Introduction and types of muscle	
	Composition of skeletal muscle	
	Mechanism of muscle contraction	
	• Structure and types of neuron cells	
	Organization of nervous system	
	Nerve impulse transmission	25%
	• Structure of kidney & nephron	
	• Urine formation	
	$\rightarrow$ GFR	
	$\rightarrow$ Renal threshold	
	$\rightarrow$ Tubular load	
	$\rightarrow$ Tubular maxima value (Tmax)	
	$\rightarrow$ Plasma clearance	
	$\rightarrow$ Renin angiotensin system	

### BASIC TEXT & REFERENCE BOOKS

- $\rightarrow$  Principles of Anatomy and Physiology- Gerard .J. Tortora and Bryn Derrickson
- $\rightarrow$  Textbook of Medical Physiology- Arthur. C .Guyton, John. E .Hall.
- $\rightarrow$  Medical Physiology- Vol.1 and Vol.2-C.C.chattergy

Paper Code:US05CBCH25	
Title Of Paper: Practicals	Total Credit:2

Description in detail	Weightage%
Use of analytical balance and weighting, Use of	
Colorimeter, spectrophotometer, Calibration of	
Volumetric flasks, pipettes.	
Calculation, preparation of normal, molar and	
percentage solutions.	
Chromosome staining by gimsa stain	
Determination of Cot value and GC content of DNA	
Estimation of DNA by DPA method	
Extraction of protein from plant (Green gram)	
Study of normal composition of Urine	
Study of abnormal constituents of Urine	
Estimation of haemoglobin by cyanmethemoglobin	1000/
method (Drabkin method)	100 70
Study of erythrocyte sedimentation rate (ESR)	
Estimation of total carbohydrates by anthrone method	
Estimation of starch by DNS method	
Estimation of total protein Bradford method	
Separation of amino acids by TLC	
Determination of saponification of given oil	
Separation of plant pigments by Paper Chromatography	
Effect of the Enzyme (Invertase) concentration on	
enzyme activity	
Effect of substrate concentration on Enzyme activity	
Effect of time on enzyme activity	
Effect of pH on enzyme activity	

#### **BASIC TEXT & REFERENCE BOOKS**

 $\rightarrow~$  Standard methods of biochemical analysis by S.R.THIMMAIAH

Paper code: US05CBCH26	<b>T</b> ( <b>1 1 1 1</b>
Title of Paper: ANALYTICAL BIOCHEMISTRY	Total credit: 3

UNIT	Description in detail	Weightage (%)
Ι	Centrifugation Techniques	
	Theory – definition and terminology	
	• General Principle and derivation for G and RCF	
	• Clinical, High speed and Ultra centrifuge	25%
	• analytical and preparative centrifuge;	
	• Centrifuge rotors: vertical, fixed angle, swinging bucket;	
	Subcellular fractionation by differential centrifugation	
II	<b>Chromatographic Techniques</b>	
	• Classification on the bases of phases.	
	• Types of Forces applied. definition	
	General Principle and Theoretical plates	
	• Rf, Rg and Rx and other terminology used	
	• Principles, method and applications for following method	25%
	a) Partition chromatography – types of paper chromatography and TLC.	
	b) Adsorption chromatography	
	c) Ion Exchange chromatography	
	d) Molecular sieve chromatography	
	e) Affinity chromatography	
	f) Gas Liquid chromatography and	
	g) High Performance Liquid Chromatography.	

III	Electrophoretic Techniques	
	• Starch, Agarose, Polyacrylamide, Cellulose Acetate electrophoresis	
	Difference between zone and free electrophoresis, factors affecting	
	and uses,	
	• Horizontal and vertical units. Diagrammatic explanation and	
	procedure to prepare separating unite for separation.	25%
	• General Principle, method and applications for following methods	
	• Paper electrophoresis .basic method to separate serum protein	
	• Gel electrophoresis. Types, function and composition of gels used.	
	• Starch, Agarose, Polyacrylamide, Cellulose Acetate electrophoresis	
	• Native and SDS – PAGE	
IV	Colorimetry and Spectrometry	
	Beer Lambert's law and derivation	
	• Definition for Transmittance, Absorbance, Optical density, $\lambda$ max;	
	• Types of Spectroscopy:	
	• Principle, flow diagram, working & applications of	
	a. Colorimeters	25%
	b. Visible spectrometers	
	c. UV spectrometers	
	d. IR spectrometers	
	e. fluorimeters	

#### **TEXT BOOKS:**

1.Biophysical chemistry- Principles and techniques- Upadhyay, Upadyay and Nath Himalaya Publication house Mumbai.

2.principles and techniques of biochemistry&moleculer biology. Wison and Walker. Andreas Hofmann and Samuel clokie

Paper code: US05CBCH27		
Title of Paper: BASIC MICROBIOLOGY	Total credit: 3	

UNIT	Description in detail	Weightage (%)
Ι	<b>Introduction:</b> Definition, Scope and History of Microbiology; Differences between theprokaryotic and eukaryotic microorganisms; Basic understanding of classification of Bacteria, Viruses, Algae, Fungi and Protozoa.	25%
Π	<ul> <li>Distribution of Microorganisms:</li> <li>a) In soil – distribution of bacteria, molds, yeast and protozoa.</li> <li>b) In Water – Quality of drinking water, Bacteriological examination of water</li> <li>Totalbacterial count for E. coli; Purification of water: filtration, sedimentation and addition of chemicals.</li> </ul>	25%
III	<ul> <li>a) Microorganism in air, air borne diseases.</li> <li>b) Microorganisms in milk and milk products. Preservation of milk, milk borne diseases.</li> <li>c)Principles and methods of Sterilization and disinfection</li> </ul>	25%
IV	Microbial growth, growth rate, doubling time, exponential growth phases, factors affecting growth – nutrient factors (C, O, N, P, S trace elements) and non- nutrients (temperature, hydrostatic pressure, pH, osmotic strength) for the microorganism.	25%

### **TEXT BOOKS:**

i) Microbiology – M.J. Pelzar, Jr. Et al. McGraw Hill

ii) Text book of Microbiology-Ananathanarayanan and Panikar Orient Long.

iii) Microbiology-Lansing M. Prescott IV edition, McGraw-Hill.

Paper code: US05CBCH27	Total credit: 3
Title of Paper: INDUSTRIAL BIOCHEMISTRY	

UNIT	Description in detail	Weightage (%)
Ι	extraction and purification of enzyme	
	1. Introducaton and application of purification of enzyme	
	2. Sarces of enzyme extraction	
	3. Extraction of soluble enzyme	25%
	4. Extraction of membrane bound enzyme	2070
	5. Preliminary purification procedures	
	6. Further purification procedures (brief)	
II	Application of enzymatic analysis	
	1.enzyme in in born errors of metabolism	
	2.charbohydrate metabolizing enzymes used in inusry	259/
	3.protien metabolizing enzymes used in industry	2370
III	Enzyme technology	
	1.Use micro organisam is breeing and cheese making	
	2. Use micro organisam in production of organic chemicals	
	3.use of isolated enzyme in industrial process	
	a.Alcoholic bakereges	
	b.bread making	25%
	c. cheese making	
	d.sweeteness	
	e.clasification of beers wines and fruits juices	
	f.detergents	
	g.producation of syrup from corn starch	
IV	Fermentation technology	
	1. Introduction of fermentation technology and its application	
	2. Fermentation used in farm techniques	25%
	3. Production of:	
	Alcohol from yeast	
	Lactic acid from bacteria	
	Insulin from bacteria	
	Antibiotics peniciline	

Reference

1.enzymology by palmer

- 2. microbiology by pelzar
- 3.fermantaion technology by casida