

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM & MARKING SCHEME

B.Sc. PART – II & III BIOCHEMISTRY

SESSION : 2022-23



ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

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**Syllabus and Marking Scheme for Second Year
2022-23**

Paper No.	Title of the Paper	Marks Allotted in Theory
		Max
I	ENZYMOLGY	50
II	INTERMEDIARY METABOLISM	50
III	Practical	50
	Total	150

Lab Course		
Duration: 5 Hrs	TWO EXPERIMENTS	30
Total Marks: 50	VIVA/PROJECT	10
	SESSIONAL	10

02	Theory papers	-	100
01	Practical	-	50
	Total Marks	-	150

Note: The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

NAME AND SIGNATURE:

Chairperson /H.O.D <i>Ashi</i>	Departmental members:
Subject Expert <i>M. S.</i>	<i>[Signature]</i> <i>[Signature]</i>
(University Nominee)	
Subject Expert..... <i>S. D. Tilly</i>	<i>[Signature]</i> <i>[Signature]</i>
Representative.....	<i>[Signature]</i> <i>[Signature]</i>
(Industry)	
Representative..... <i>Dr. Bhavana Jai</i>	<i>[Signature]</i> <i>[Signature]</i>
(Alumni)	
Representative <i>[Signature]</i>	<i>[Signature]</i> <i>[Signature]</i>
(Professor Science Faculty Other Dept.)	

B. Sc. Part - II (BIOCHEMISTRY)
2022-23
PAPER- I
ENZYMOLGY

Course Outcome (CO):

After completion of the course, the students would be able:

- CO1. To acquire fundamental knowledge on enzymes and their importance in biological reactions.
- CO2. To understand ability to difference between a chemical catalyst and biocatalyst.
- CO3. To understand the concept of activation energy and its importance in biological reactions.
- CO4. To understand the nature of non-protein enzymes such as ribozymes.
- CO5. To understand the role of enzymesin clinical diagnosis and industries. Biochemistry Core .

NAME AND SIGNATURE:

		Departmental members	
Chairperson /H.O.D	<i>Abhi</i>		
Subject Expert (University Nominee)	<i>M</i>	1.....	8.....
Subject Expert.....	<i>S2</i>	2.....	9.....
Representative (Industry)		3.....	10.....
Representative (Alumni)	<i>Dr. Bhawani Jai</i> <i>B Jai</i>	4.....	11.....
Representative (Professor Science Faculty Other Dept.)	<i>Schull</i>	5.....	12.....
		6.....	13.....
		7.....	14.....

B. Sc. Part - II (BIOCHEMISTRY)

2022-23

PAPER- I

ENZYMOLOGY

Max. Marks – 50

UNIT-I

Introduction

History general characteristics, nomenclature, IUB enzyme classification (rational, overview and specific examples), significance of numbering system. Definitions with examples of holoenzyme, apoenzyme, coenzymes, cofactors, activators, inhibitors, active site (identification of groups excluded), metallo-enzymes, units of enzyme activity, specific enzymes, isoenzymes, monomeric, enzymes, oligomeric enzymes and multi-enzyme complexes. Enzyme specificity.

Historical perspective, nature of non-enzymatic and enzymatic catalysis. Measurement and expression of enzyme activity-enzyme assays. Definition of IU, Katal enzyme turn over number and specific activity. Role of non-protein organic molecules and inorganic ions-coenzyme, prosthetic groups. Role of Vitamins as coenzymes precursors (general treatment).

UNIT-II

Enzyme Catalysis

Role of cofactors in enzyme catalysis : NAD/NADP⁺, FMN/FAD, coenzyme A, biocytin, cobamide, lipoamide, TPP, pyridoxal phosphate, tetrahydrofolate and metal ions with special emphasis on coenzyme functions. Acid-base catalysis, covalent catalysis, proximity and orientation effects, strain and distortion theory. Mechanism of action of chymotrypsin, carboxypeptidase, ribonuclease and lysozyme.

UNIT-III

Enzyme Purification

Method for isolation, purification and characterization of enzymes.

UNIT-IV

Enzyme Kinetics

Factors affecting enzyme activity, enzyme concentration, substrate concentration, pH and temperature. Derivation of Michaelis- Menten equation for uni-substrate reactions. K_m and its significance. Line Weaver - Burk plot and its limitations. Importance of K_{cat}/K_m . Bi-substrate reactions - brief introduction to sequential and ping-pong mechanisms with examples.

Kinetics of zero and first order reactions. Significance and evaluation of energy of activation and free energy.

Reversible and irreversible inhibition, competitive, non competitive and uncompetitive inhibitions. Determination of K_m & V_{max} in presence and absence of inhibitor. Allosteric enzymes.

UNIT-V

Industrial and Clinical Application of Enzymes

Immobilization of enzyme and their industrial applications. Production of glucose from starch, cellulose and dextran, use of lactose in dairy industry, production of glucose fructose syrup from sucrose, use of proteases in food. Detergent and leather industry, medical application of enzymes use of glucose oxidase in enzyme electrodes.

List of Reference Books:

1. Fundamental of Enzymology Nicholas C Price and Lewis Stevens , Oxford university Press.
2. Principles of Enzymology for food Science by JR Whitkar , M Dekker Publishers.
3. Biochemistry by Lubert Stryer , WH Freeman and Co., San Francisco .
4. Enzyme Dixon Mand Webb , EC, Longmans, London .
5. The chemical kinetics of enzymes action by KJ Laidler and PS Buntinf , Oxford Univercity Press, London.
6. Enzyme stucture and function by S Blackburn , Marcel Dekker , Inc., NY.

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper will be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions, No 'Fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 50 (Marks X No. of Q.)
A (Very short Ans.)	1X10 = 10
B (Short Ans.)	3X5 = 15
C (Long Ans.)	5X5 = 25

NAME AND SIGNATURE:

Chairperson /H.O.D <i>Abhi</i>	Departmental members: <i>[Signatures]</i>
Subject Expert <i>M</i> (University Nominee)	
Subject Expert..... <i>[Signatures]</i>	
Representative..... (Industry)	
Representative..... <i>Dr. Bhawana Jai</i> (Alumni)	
Representative <i>[Signature]</i> (Professor Science Faculty Other Dept.)	

B. Sc. Part - II (BIOCHEMISTRY)
2022-23
PAPER- II
INTERMEDIARY METABOLISM

Course Outcome (CO):

After completion of the course, the students would be able:

- CO1. To understand the importance of lipids as storage molecules and as structural component of bio membranes
- .CO2. To understand the importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.
- CO3. To acquire knowledge related to the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance.
- CO4. To understand perturbations in the carbon metabolism can lead to various disorders such as diabetes and cancer.
- CO5. To understand differences in the properties of metabolic enzymes of the host and pathogens can be exploited for the development of new drugs.
- CO6. To understand metabolic engineering for the production of useful biomolecules.

NAME AND SIGNATURE:

		Departmental members	
Chairperson /H.O.D			
Subject Expert		1.....	8.....
(University Nominee)		2.....	9.....
Subject Expert.....		3.....	10.....
		4.....	11.....
Representative		5.....	12.....
(Industry)		6.....	13.....
Representative		7.....	14.....
(Alumni)			
Representative			
(Professor Science Faculty Other Dept.)			

B. Sc. Part - II (BIOCHEMISTRY)
2022-23
PAPER- II
INTERMEDIARY METABOLISM

Max. Marks – 50

UNIT-I

Introduction to Metabolism

General features of metabolism, experimental approaches to study metabolism: use of intact organism. Bacterial mutants, tissue slices, stable and radioactive isotopes.

Carbohydrate Metabolism

Reactions and energetics of glycolysis. Alcoholic and lactic acid fermentations. Entry of fructose, galactose, mannose etc. Reactions and energetics of TCA cycle. Gluconeogenesis, glycogenesis and glycogenolysis. Reactions and physiological significance of pentose phosphate pathway. Regulation of glycolysis and TCA cycle. Photosynthesis. A brief review.

UNIT-II

Electron Transport Chain and Oxidative Phosphorylation

Structure of mitochondria, sequence of electron carriers, sites of ATP production, inhibitors of electron transport chain, Hypothesis of mitochondrial oxidative phosphorylation (basic concepts). Inhibitors and uncouplers of oxidative phosphorylation. Transport of reducing potentials into mitochondria.

UNIT-III

Lipid Metabolism

Introduction, hydrolysis of triacylglycerols, transport of fatty acids into mitochondria β oxidation of saturated fatty acids. ATP yield from fatty acid oxidation, Biosynthesis of saturated and unsaturated fatty acids, Metabolism of ketone bodies, oxidation of unsaturated and odd chain fatty acids, Biosynthesis of triglycerides and important phospholipids, glycolipids, sphingolipids and cholesterol. Regulation of cholesterol metabolism.

UNIT-IV

Amino Acid Metabolism

General reactions of amino acid metabolism: Transamination, oxidative deamination and decarboxylation. Urea cycle. Degradation and biosynthesis of amino acids. Glycogenic and ketogenic amino acids.

UNIT-V

Nucleotide Metabolism

Sources of the atoms in the purine and pyrimidine molecules. Biosynthesis and degradation of purines and pyrimidines. Regulation of purine and pyrimidine biosynthesis.

Porphyrim Metabolism

Biosynthesis and degradation of porphyrins production of bile pigments.

List of Reference Books:

1. Fundamental of biochemistry by Donald Voet , JG Voet and CW Pratt , John Willey & Sons, NY.
2. Biochemistry by Geoffrey L Zubay , Mc Graw Hill.
3. Biochemistry Lubert Stryer , WH Freeman and Co., San Francisco.

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper will be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions, No 'Fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows:

Question Type	MM 50 (Marks X No. of Q.)
A (Very short Ans.)	1X10 = 10
B (Short Ans.)	3X5 = 15
C (Long Ans.)	5X5 = 25

NAME AND SIGNATURE:

Chairperson /H.O.D	Departmental members:
Subject Expert (University Nominee)	
Subject Expert.....	
Representative..... (Industry)	
Representative..... (Alumni)	
Representative..... (Professor Science Faculty Other Dept.)	

B.Sc. Part – II

BIOCHEMISTRY PRACTICAL

Max. Marks – 50

Min. Marks - 17

1. Separation of Blood Plasma and Serum.
 - a. Estimation of protein from serum by biuret and Lowry methods.
 - b. Determination of albumin and A/G ratio in serum.
2. Estimation of bilirubin (conjugated and unconjugated) in serum.
3.
 - i. Estimation of total lipids in serum by vanillin method.
 - ii. Estimation of cholesterol in serum.
4. Estimation of lipoprotein in plasma.
5. Estimation of lactic acid in blood before and after exercise.
6. Estimation of blood urea nitrogen from plasma.
7. Separation and identification of amino acid by (a) paper chromatography and (b) thin layer chromatography
8. Separation of polar and non polar lipids by thin layer chromatography.
9. Estimation of SGPT and SGOT in serum.
10.
 - a) Assay of serum alkaline phosphatase activity.
 - b) Inhibition of alkaline phosphatase activity by EDTA.
 - c) Effect of substrate concentration on alkaline phosphatase activity and determination of its Km value.
11.
 - a) Effect of temperature on enzyme activity and determination of activation energy.
 - b) Effect of pH on enzyme activity and determination of optimum pH.
 - c) Effect of enzyme concentration on enzyme activity.
12.
 - a) Preparation of starch from potato and its hydrolysis by salivary amylase.
 - b) Determination of achromatic point in salivary amylase.
 - c) Effect of sodium chloride on amylases.

NAME AND SIGNATURE:

Chairperson /H.O.D <i>ABW</i>	Departmental members: <i>[Signatures]</i>
Subject Expert <i>M.A.</i>	
(University Nominee)	
Subject Expert..... <i>S.L. S.L.</i>	
Representative.....	
(Industry)	
Representative..... <i>D. Bhowari Jain</i>	
(Alumni)	
Representative..... <i>B. Jan</i>	
(Professor Science Faculty Other Dept.)	

**Syllabus and Marking Scheme for Third Year
2022-23**

Paper No.	Title of the Paper	Marks Allotted in Theory
		Max
I	MOLECULAR BIOLOGY	50
II	NUTRITIONAL , CLINICAL & ENVIRONMENTAL BIOCHEMISTRY	50
III	Practical	50
	Total	150

Lab Course		
Duration: 5 Hrs	TWO EXPERIMENTS	30
Total Marks: 50	VIVA/PROJECT	10
	SESSIONAL	10

02	Theory papers	-	100
01	Practical	-	50
	Total Marks	-	150

NAME AND SIGNATURE:

Chairperson /H.O.D <i>AKM</i>	Departmental members: <i>[Signatures]</i> <i>Disaster</i> <i>[Signature]</i>
Subject Expert <i>MA</i>	
(University Nominee)	
Subject Expert..... <i>SJ</i>	
Representative.....	
(Industry)	
Representative..... <i>Dr. Bhavna Ji</i>	
(Alumni) <i>B Ji</i>	
Representative <i>[Signature]</i>	
(Professor Science Faculty Other Dept.)	

B.Sc. Part - III (BIOCHEMISTRY)
2022-23
PAPER- I
MOLECULAR BIOLOGY

Course Outcome (CO):

After completion of the course, the students would be able:

- CO1. To understand DNA as genetic material, primary, secondary and tertiary structure of DNA and RNA.
- CO2. Replication, Transcription, and Translation and their mechanisms.
- CO3. To understand coding and non-coding regions of eukaryotic genome and their importance.
- CO4. To understand importance of E. coli lac operon, PCR, expression vectors and their importance in Biotechnology.
- CO5. To acquire knowledge about recombinant DNA technology.
- CO5. To explain different types of mutations their causes and types.

NAME AND SIGNATURE:

	Departmental members	
	1.....	8.....
Chairperson /H.O.D <i>Adhi</i>	<i>[Signature]</i>	<i>[Signature]</i>
Subject Expert <i>MA</i> (University Nominee)	2..... <i>[Signature]</i>	9.....
Subject Expert..... <i>mans S.R. gu</i>	3..... <i>[Signature]</i>	10..... <i>[Signature]</i>
Representative (Industry)	4..... <i>[Signature]</i>	11..... <i>[Signature]</i>
Representative <i>Dr. Bhawan Ja</i> (Alumni) <i>B.J</i>	5.....	12..... <i>[Signature]</i>
Representative <i>[Signature]</i> (Professor Science Faculty Other Dept.)	6..... <i>[Signature]</i>	13.....
	7.....	14..... <i>[Signature]</i>

B.Sc. Part - III (BIOCHEMISTRY)

2022-23

PAPER- I

MOLECULAR BIOLOGY

Max.Marks – 50

UNIT – I **Basic Concepts of Genetic Information**

- Nucleic acids as genetic information carriers, experimental evidence e.g. bacterial genetic transformation, Hershey–Chase Experiment, TMV reconstitution experiment.
- Central dogma of molecular genetics –current version, reverse transcription and retroviruses.
- Primary structure of nucleic acids and their properties, salient features of eukaryotic, prokaryotic and viral genomes; highly repetitive, moderately repetitive and unique DNA sequences.
- Basic concepts about the secondary structures of nucleic acids, 5'→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.

UNIT-II **Structural Levels of Nucleic Acids and Sequencing**

- Secondary and Tertiary structure of DNA: Watson and Crick model, A, B and Z type of DNA major and minor grooves, chirality of DNA, tertiary structure of DNA.
- Structures and properties of RNA: Classes of RNA secondary and tertiary structures.
- Nucleic acid hybridization : Cot value and satellite DNA.
- Sequencing: Restriction and modification system; sequencing of DNA and RNA

UNIT-III **DNA Replication**

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

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.

UNIT-IV **Translation and Regulation of Gene Expression**

- Genetic code: Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes.
- Mechanism of translation: Ribosome structure, A and P sites, charged tRNA, f-mat-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 condons and release factors RF 1 and RF 2.
- Regulation of gene Expression in prokaryotes: Enzyme induction and repression, operon concept, Lac operon, Trp operon.

UNIT-V

Mutation and Repair

- a. Mutation: Molecular basis of mutation, type 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.

Recombinant DNA Technology

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

List of Reference Books:

- 1. Biochemistry J David Rawn , Neil Patterson Publisher, North Carolina.
- 2. Molecular biology of the gene JD Watson , NH Hopkins , JW Robert , JP Stertz , AM Weiner , Freeman , San Francisco.
- 3. Fundamental of biochemistry by D Voet and CW Pratt, John Wiley & Sons ., NY
- 4. Text book of biochemistry Thomas M Devin , John Wiley & Sons , NY .

NAME AND SIGNATURE:

Chairperson /H.O.D	Departmental members:
Subject Expert (University Nominee)	
Subject Expert.....	
Representative..... (Industry)	
Representative..... (Alumni)	
Representative (Professor Science Faculty Other Dept.)	

B. Sc. Part - III (BIOCHEMISTRY)

2022-23

PAPER- II

NUTRITIONAL, CLINICAL & ENVIRONMENTAL BIOCHEMISTRY

Course Outcome (CO):

After completion of the course, the students would be able:

- CO1. To understand normal constituents of urine, blood and their significance in maintaining good health
- CO2. To understand the mechanisms of causation of diseases of liver and kidney.
- CO3. To understand the current concepts related to mechanism of Cancer.
- CO4. To understand the variations in the levels of triglycerides and lipoproteins and their relationship with various diseases. To get acquainted with the role of enzymes in diagnosis of various diseases.

NAME AND SIGNATURE:

		Departmental members	
Chairperson /H.O.D	<i>Abhi</i>		
Subject Expert (University Nominee)	<i>MA</i>	1..... <i>[Signature]</i>	8..... <i>[Signature]</i>
Subject Expert.....	<i>S.L.</i> <i>[Signature]</i>	2..... <i>[Signature]</i>	9.....
Representative (Industry)	<i>[Signature]</i>	3..... <i>[Signature]</i>	10..... <i>[Signature]</i>
Representative (Alumni)	<i>Dr. Bhavana Jai</i> <i>B. Jai</i>	4..... <i>[Signature]</i>	11..... <i>[Signature]</i>
Representative (Professor Science Faculty Other Dept.)	<i>[Signature]</i>	5.....	12..... <i>[Signature]</i>
		6..... <i>[Signature]</i>	13.....
		7.....	14..... <i>[Signature]</i>

B. Sc. Part - III (BIOCHEMISTRY)

2022-23

PAPER- II

NUTRITIONAL, CLINICAL & ENVIRONMENTAL BIOCHEMISTRY

Max. Marks – 50

UNIT –I

Nutritional Biochemistry

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 Iodine and their biological functions. Basic food groups: energy giving foods, 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 diets, emphasis on nutritional adequacy.

UNIT II

Nutritive and Calorific Value of Foods

- a. Basic concepts of energy expenditure, units of energy, measurement of energy expenditure by direct or indirect calorimetry, calculation of non protein RQ with respect to carbohydrates and lipids. Determination of heat production of the diet. The basal metabolism and methods of measuring basal metabolic rate (BMR); energy requirements during growth, pregnancy, lactation and various physiological activities. Calculation of energy expenditure of average man and woman.
- b. Specific dynamic action (SDA) of foods, nutritive value of 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-calories 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.

UNIT - III Clinical Biochemistry

Basic concept of clinical biochemistry

- a. Definition and scope of clinical biochemistry in diagnosis, a brief review of units and abbreviations used in expressing concentration 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 analysis of blood, urine and CSF. Normal values for important constituents (in SI units) in blood (plasma /serum), CSF and urine, clearance test for urea.

UNIT – IV (i) Clinical Enzymology

- a. Definition of functional and non functional plasma enzymes, isoenzyme and diagnostic tests. Enzyme patter in health and diseases with special mention of plasma lipase, amylase, cholinesterase, alkaline and acid phosphate, SGOT, SGPT, LDH and CPK.
- b. Functional test of kidney, liver and gastric fluids.

(ii) Disease Related to Metabolism

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

UNIT – V Environmental Biochemistry

- a. **Air pollution**
Particulate matter, compounds of carbon, sulphur, nitrogen and their interactions, methods of their estimation, their effect on atmosphere.
- b. **Water pollution**
Types of water bodies and their general characteristics, major pollutants in domestic, agricultural and industrial wastes, methods of their estimation, effects of pollutants on plants and animals, treatment of domestic and industrial wastes, solid wastes and their treatment.

List of Reference Books:

- 1. Modern nutrition in health and diseases by Whol and Goodhart.
- 2. Human nutrition and Dietetics by S Davidson and Passmore: ELBS Zurich.
- 3. Tietz fundamental of clinical Chemistry by Cart A Burtis & ER Ashwood Saunders WB Co.
- 4. Lecture Notes on Clinical Biochemistry – LG Whitby, AF Smith , GJ Beckett, SM Walker, Blackwell Sci Inc.

NAME AND SIGNATURE:

Chairperson /H.O.D <i>Aswini</i>	Departmental members:
Subject Expert <i>M.A.</i>	<i>[Signature]</i>
(University Nominee)	<i>[Signature]</i>
Subject Expert <i>[Signature]</i> , <i>S.E.</i> , <i>[Signature]</i>	<i>[Signature]</i>
Representative.....	<i>[Signature]</i>
(Industry)	<i>[Signature]</i>
Representative..... <i>Dr. Bhawana Jai</i>	<i>[Signature]</i>
(Alumni) <i>B. Jai</i>	<i>[Signature]</i>
Representative	<i>[Signature]</i>
(Professor Science Faculty Other Dept.) <i>[Signature]</i>	<i>[Signature]</i>

B. Sc. Part – III

BIOCHEMISTRY PRACTICAL

Max. Marks – 50

Min. Marks - 17

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 ammonium sulphate.
8. Denaturation of enzyme, studies on DNA.
9. (a) Separation of proteins by column chromatography.
(b) Determination of proteins by dye binding assay.
10. Separation of proteins by SDS- polyacrylamide gel electrophoresis.

NAME AND SIGNATURE:

	Departmental members	
	1.....	8.....
Chairperson /H.O.D		
Subject Expert (University Nominee)	1..... 	8.....
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	7.....	14.....