

***SCHEME OF EXAMINATION  
AND  
SYLLABUS  
(for the Academic Session 2019-2020)***

**B.Sc. (Part-III) Biochemistry**

**Bachelor of Science (B.Sc.)  
Biochemistry**

**Faculty of Science**



**UNIVERSITY OF KOTA**

**MBS Marg, KOTA (Rajasthan)-324 005**

**INDIA**

## **Bachelor of Science**

### **BIOCHEMISTRY** **(Three Year Course)**

#### **B.Sc. BIOCHEMISTRY**

1. The duration of the course will be three years.
2. There will be five theory papers in each year and each theory paper will carry 100 marks..
3. There will be practical examinations in each year & in first-four practical, 2nd year and 3<sup>rd</sup> year-3 practical. Each practical examinations will carry 100 marks each (25% marks in practical examinations will be reserved for internal assessment and viva-voce, respectively). Thus, total marks during the 3 years duration will be 1500 for theory examinations and 1000 for practical examinations.
4. The minimum pass marks for theory and practical examinations will be 45% AGGREGATE & individual 40%.
5. Practical exam duration will be 6 hrs. And Theory exams duration will be 3hrs.
6. For Theory papers of 100 marks, 3 hrs./week will be allotted.
7. For a practical paper of 100 marks, 6 periods will be allotted per week .

**Note:** The paper is divided into 5 independent units. The questions will be set from each unit. The candidates are required to attempt one question from each unit.

### **SCHEME OF EXAMINATION** **B.Sc. (Part-I) Biochemistry Examination**

Number of Paper	Code of Paper	Nomenclature of Paper	Duration of Examination	Max. Marks		
				Int.	Ext.	Total
<b>Theory Papers</b>						
Paper-I	BC-101	Physical Chemistry	3 Hours	--	100	100
Paper-II	BC-102	Organic & Inorganic Chemistry	3 Hours	--	100	100
Paper-III	BC-103	Physics	3 Hours	--	100	100
Paper-IV	BC-104	Mathematics & Statistics	3 Hours	--	100	100
Paper-V	BC-105	Introduction to Biology & Chemistry of Biologically Important Molecules	3 Hours	--	100	100
<b>Practical Papers</b>						
Paper-I	BC-106	Physical Chemistry	6 Hours	25	75	100
Paper-II	BC-107	Organic & Inorganic Chemistry	6 Hours	25	75	100
Paper-III	BC-108	Physics	6 Hours	25	75	100
Paper-IV	BC-109	Introduction to Biology & Chemistry	6 Hours	25	75	100

### SCHEME OF EXAMINATION B.Sc. (Part-II) Biochemistry Examination

Number of Paper	Code of Paper	Nomenclature of Paper	Duration of Examination	Max. Marks		
				Int.	Ext.	Total
<b>Theory Papers</b>						
Paper-I	BC-201	Biochemical and Biophysical Techniques	3 Hours	--	100	100
Paper-II	BC-202	Proteins, Enzymes and Coenzymes	3 Hours	--	100	100
Paper-III	BC-203	Human Physiology and Endocrinology	3 Hours	--	100	100
Paper-IV	BC-204	Metabolism of Carbohydrates and Lipids	3 Hours	--	100	100
Paper-V	BC-205	Metabolism of Amino Acids, Nucleotides & Phorphyrins	3 Hours	--	100	100
<b>Practical Papers</b>						
Paper-I	BC-206	Bio-Physical Techniques	6 Hours	25	75	100
Paper-II	BC-207	Bio-chemical Techniques	6 Hours	25	75	100
Paper-III	BC-208	Enzymological Techniques	6 Hours	25	75	100

### SCHEME OF EXAMINATION B.Sc. (Part-III) Biochemistry Examination

Number of Paper	Code of Paper	Nomenclature of Paper	Duration of Examination	Max. Marks		
				Int.	Ext.	Total
<b>Theory Papers</b>						
Paper-I	BC-301	Cell Biology	3 Hours	--	100	100
Paper-II	BC-302	Physiology	3 Hours	--	100	100
Paper-III	BC-303	Molecular Biology	3 Hours	--	100	100
Paper-IV	BC-304	Microbial Biochemistry & Immunology	3 Hours	--	100	100
Paper-V	BC-305	Clinical & Nutritional Biochemistry	3 Hours	--	100	100
<b>Practical Papers</b>						
Paper-I	BC-306	Clinical & Nutritional Biochemistry	6 Hours	25	75	100
Paper-II	BC-307	Physiology & Biochemistry	6 Hours	25	75	100
Paper-III	BC-308	Microbial Biochemistry, Immunology & Molecular Biology	6 Hours	25	75	100

## **Bachelor of Science**

### **BIOCHEMISTRY** (Three Year Course)

#### **Syllabus**

#### **B.Sc. (Part-III) Biochemistry**

#### ***Paper-I (BC-301): Cell Biology***

**Duration : 3 Hrs.**

**Max. Marks :100**

**Min. Marks : 36**

Note: This paper is divided into five units. Two questions will be set from each unit. The candidates are required to attempt one question from each unit.

##### **Unit-I**

Morphology of Cell, Prokaryotic and eukaryotic Cell structure, Differences in plant and animal cell, Ultra structure and Composition of plant and bacterial Cell.

##### **Unit-II**

Structure and Composition of plasma membrane, Various models of plasma membrane. Transport of metabolites across plasma membrane.  
Membrane Transport–Laws of diffusion across membranes, Simple diffusion, facilitated diffusion and active transport –glucose transporter Na<sup>+</sup> K<sup>+</sup> ATPase

##### **Unit-III**

Structure and function of nucleus, mitochondria and chloroplast.

##### **Unit-IV**

Structure and functions of ribosomes, endoplasmic reticulum, golgi apparatus , peroxisomes and lysosomes.

##### **Unit -V**

Cell Cycle – Phases of the cycle, regulation by cyclins and CDKs \$ Meiosis.

#### ***Paper-II (BC-302): Physiology***

**Duration : 3 Hrs.**

**Max. Marks :100**

**Min. Marks : 36**

Note: This paper is divided into five units. Two questions will be set from each unit. The candidates are required to attempt one question from each unit.

##### **Unit-I**

Blood components and their functions, Blood groups: the ABO system, the rhesus system, Blood clotting factors, intrinsic and extrinsic pathways for blood clotting.

##### **Unit-II**

Components of respiratory system (nasal cavity, trachea, pharynx, larynx, lungs, bronchi, bronchioles and alveoli) and their functions. Diffusion of oxygen and CO<sub>2</sub>, transport of

oxygen, role of hemoglobin, dissociation curve of oxyhaemoglobin and its significance, Bohr's effect, transport of CO<sub>2</sub> and chloride shift. Various buffer system of the blood: Acid – base balance, factors affecting acid – base balance, acidosis and alkalosis, role of lung and kidney in regulation of acid – base balance.

### **Unit-III**

Kidney: Structure and its organization. Functions of globular membrane, characteristics of tubules, selective re-absorption and secretion, active and passive transport of various substances (sugars, amino acids, urea and creatinine), mechanism of urine formation.

### **Unit -IV**

Muscles tissue: Structure of myofilaments. Molecular organization of actin, myosin, troponin and tropomyosin. Biochemistry of muscle contraction.

### **Unit-V**

Nerve cells, nerve fibers, and nerve impulses and neurotransmission, synapses: chemical and electrical synapses, functional properties of nerve fiber, action potential, the reflex action and reflex arc.

## ***Paper-III (BC-303): Molecular Biology***

**Duration : 3 Hrs.**

**Max. Marks :100**

**Min. Marks : 36**

Note: This paper is divided into five units. Two questions will be set from each unit. The candidates are required to attempt one question from each unit.

### **Unit-I**

DNA replication in prokaryotes—conservative semi-conservative and dispersive types, experimental evidence for semi-conservative replication. Mechanism of replication. Inhibitors of replication.

### **Unit-II**

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.

Genetic code—Basic features, biological significance of degeneracy, Wobble hypothesis, gene with genes and overlapping genes.

### **Unit-III**

Mechanism of translation—Ribosome structure, A and P sites, charged RNA, f-met-tRNA, initiator codon, Shine–Dalgarno consensus sequence, formation of 70s initiation complex, role of EF-Tu, EF-Ts, EF-G and GTP, nonsense codons and release factors, RF1 and RF2. Regulation of gene expression in prokaryotes—enzyme induction and repression, Operon concept, Lac operon, Trp operon.

### **Unit-IV**

Mutation—Molecular basis of mutation, Types of mutation. Eg. Transition, transversion, frame shift, insertion, Deletion, Suppressor sensitive, Germinal and somatic. backward and forward, true reversion and suppression, dominant and recessive mutation, spontaneous and induced mutations. DNA repair- UV repair system in *E.coli*, significance of thymine in DNA.

#### **Unit-V**

Recombinant DNA technology–Restriction endonucleases, brief description of steps in DNA cloning, Applications of recombinant DNA technology.

### ***Paper-IV (BC-304): Microbial Biochemistry & Immunology***

**Duration : 3 Hrs.**

**Max. Marks :100**

**Min. Marks : 36**

Note: This paper is divided into five units. Two questions will be set from each unit. The candidates are required to attempt one question from each unit.

#### **Unit-I**

Isolation of bacteria and pure culture techniques, culture media, Types of bacteria, Bacterial growth curve. Aerobic and Anaerobic respiration, Bacterial photosynthesis.

#### **Unit-II**

Bacterial fermentation & types, Food spoilage and preservation, Food borne infections, Production of citric acid, Ethanol, Wine and vinegar.

#### **Unit-III**

Structures and classification of viruses, Replication of RNA and DNA viruses, Virus host interaction, Types and life cycle of Bacteriophages.

#### **Unit-IV**

Types of immunity, Innate, Acquired, Passive and Active immunity, Humeral and cellular immunity, Antigens, Haptens, Adjuvants, Structures and functions immunoglobulins.

#### **Unit-V**

Antigen–antibody reaction, Agglutination and precipitation, Immuno-diffusion, Immuno-fluorescence, RIA and ELISA, Monoclonal antibodies.

### ***Paper-V (BC-305): Clinical & Nutritional Biochemistry***

**Duration : 3 Hrs.**

**Max. Marks :100**

**Min. Marks : 36**

Note: This paper is divided into five units. Two questions will be set from each unit. The candidates are required to attempt one question from each unit.

#### **Unit-I**

Collection and preservation of biological fluids, blood serum, Plasma urine and CSF, Normal values of important constituents in blood, CSF and Urine. Hypo- and Hyper-glycaemia, Hyperlipidaemia, lipid malabsorption, Steatorrhoea, sphingolipidosis, role of lipoproteins in health and diseases. Gout and hyperuricemia

#### **Unit-II**

Definition of functional and non functional plasma enzymes, Isozymes, enzyme pattern in health and diseases for the enzymes alkaline and acid phosphatase, SGOT and SGPT, LDH and CPK.

#### **Unit-III**

Liver function test & kidney function test, Function test of pancreas and stomach.

**Unit-IV**

Nutritional aspects of carbohydrates, fats and proteins, Essential fatty acids and amino acids  
Protein calorie malnutrition (kwashiorkor and marasmus). Body water and its importance.  
Respiratory quotient. Basal metabolic rate (BMR) & factor affecting BMR. Specific dynamic  
action of foods. Energy requirement of various groups.

**Unit-V**

Outline of nutritional aspects of some vitamins (A,B1,B2,B12,C,d,E) and minerals (Ca, P, Fe  
and I<sub>2</sub>). RDA and composition balanced diet for average Indian adult With different habits.

## ***Chemistry Practical Courses***

**Paper-I (BC-306): Clinical & Nutritional Biochemistry (Max Marks 100)**

**Paper-II (BC-307): Physiology & Biochemistry (Max Marks 100)**

**Paper-III (BC-308): Microbial Biochemistry, Immunology & Molecular Biology  
(Max Marks 100)**

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