EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination B.Sc I Year

/For batch admitted in Academic Session 2020-21/

Subject wise distribution of marks and corresponding credits

S. No.	Subject Name	Subject Code	Paper Name	Maximum Marks Allotted											Total Marks	Contact Periods Per week			Total Credits
				Theory Slot									Practical Slot						
				Final Yearly				Half Yearly				Quiz/ Assignment/ Attendence	End Sem	Lab Work/ Sessional		L	T	P	
				P1	P2	P3	P4	P1	P2	P3	P4								
1	Common	BAECC20Y101	Environmental and Disaster Management (University Core Under Ability Enhancement Course (AEC-1)	60				30				10			100	2	0	0	2
		BAECC20Y102	Communication Theory (University Core under Ability Enhancement Course (AEC-2)	60				30				10			100	4	0	0	4
		BYOGA20Y101	Yoga- 1 (University Core)	–	–	–		–	–	–		–	60	40	100	2	0	0	2
2	Biochemistry	BBIOC20Y101	Introduction to Biology and Chemistry of Biologically Important Molecules - I (Core Course - 6A)	30				15				5			50	3	1	0	4
		BBIOC20Y102	Biochemical and Biophysical Techniques - II (Core Course - 6B)		30				15			5			50	3	1	0	4
		BBIOC20Y103	Paper- I and Paper- II, Practical (Practical 6 A & 6 B, Core Course 6C)										30	20	50	0	0	2	2
		BBIOC20Y104	Microbial Biochemistry & Immunology - III (Core Course - 6D, for Honors)			30				15		5			50	3	1	0	4
		BBIOC20Y105	Paper- III, Practical (Practical 6 D for Honours, core coure 6E)										30	20	50	0	0	1	1
3	Common	BASPR20Y101	Assingment Presentation for 3 Core Courses											50	50	0	3	0	3

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiencey Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

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Estd. by Madhya Pradesh Niji Vishwavidyalaya (Sthapna Avam Sanchalanal Adhyadesh, 2020

School of Basic and Applied Sciences

Class				**B.Sc. Biochemistry**
Semester/Year				**I Year**
Subject & Paper Code				**Biochemistry - BBIOC20Y101**
Paper				**Introduction to Biology and Chemistry of Biologically Important Molecules - I**
Max. Marks				30 (ETE) + 20(IA) = 50
Credit			**Total Credits**	
L	**T**	**P**	4	
3	1	0		

Course Objectives:
From this course the students will know
1. The cells of living organisms contain thousands of biomolecules.
2. The structure-function relationship of these molecules, and their importance with regard to maintenance and perpetuation of the living systems.

Course Outcome:
At the end of the course, learners will be able to:
1. Explain the structure and properties of carbohydrates.
2 .Describe the reducing action of sugars.
3. Classify lipids with examples. Combine the structure and functions of lipids.
4. Define saponification number, acid number and iodine number of fats.
5. Identify the structure of aminoacids.
6. Classify proteins with functions.
7. Illustrate the structure of proteins.
8. Describe the denaturation of proteins.

Student Learning Outcomes (SLO):
Students will learn-
1. The relationship between the properties of macromolecules and cellular activities,
2. The relationship between cellular activities and biological responses,
3. Cell metabolism, chemical composition, physiochemical and functional organization of organelles,
4. Contemporary approaches and techniques used in modern cell and molecular biology.
5. Biomolecular Sciences majors will be able to evaluate, summarize and critique papers from the scientific literature.

Unit	Syllabus	Periods
UNIT - I	Definition and characteristics of life, General account of various classes of living organisms such as viruses, bacteria, algae, fungi higher eukaryotes and plants, Cell theory, cell cycle, mitosis, meiosis and their significance.	15

Unit	Syllabus	Periods
UNIT - II	**Carbohydrates:** Monosaccharides and their inter relationship, structure of sugars, Stereoisomerism and optical isomerism of sugars, Reactions of aldehyde and ketone groups, Ring structure and tautomeric forms, mutarotation, Reaction of sugars due to OH groups, Important derivatives of Monosaccharides, Disaccharides and Trisaccharides (glucose, fructose, maltose, lactose, cellobiose, gentiobiose, melibiose, turanose, sucrose, trehalose, mannotriose, rabinose, rhamnose, raffinose, gentionose, melizitose.) Identification and analysis of mono and oligosaccharides, structure and importance. Structure, occurrence and biological importance of structural polysaccharides e.g. Cellulose, chitin, agar, algenic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, bacterial cell wall polysaccharides etc.	15
UNIT - III	**Lipids:** Building block of lipids - fatty acids, glycerol, sphingosine Definition and classification of lipids. Classification of fatty acids, physiochemical properties of fatty acids, separation of fatty acids, distribution of fatty acids in nature and characterization of fatty acids, saponification and iodine number, properties of glycerol, fats and oils. Systematic nomenclature and classes of glycerides-MAG, DAG, TG, phospholipids- A, PG, PE, PS, LPC, PI and plasmalogens, sphingolipids-sphingosine, ceramide, sphingomyelin, glycolipids- cerebrosides, gangliosides and sialic acids. Properties and function of phospholipids, Prostaglandins. Classes, structure and synthesis. Isoprenoids-types and structures, Chemistry of sterols, Bile acids, steroid hormones, plant sterol, ergosterol, stigma sterol, cholesterol, glucocorticoid, mineralocorticoids. Lipoproteins-classification, composition and their importance, Role of Lipids in cellular architecture and functions.	15
UNIT - IV	**Amino acids:** Classification and formulae, Proteinaceous and nonproteinaceous, essential and non-essential amino acids. Physical, chemical and optical properties of amino acids. Introduction to biologically active peptide e.g. Insulin, Functional diversity of proteins with examples.	15
UNIT - V	**Nucleic acids:** Importance of nucleic acids in living system, general composition of nucleic acids, the purine and pyrimidine bases, Tautomeric forms of bases. Reactions of purines and pyrimidines, structure of nucleosides and nucleotide, deoxynucleotides, cyclic nucleotides and polynucleotides. Watson and crick model for DNA. Different types of DNA and RNA. **Vitamins:** Discovery and role in body functions. Chemistry of fat soluble vitamins A, D, E & K. Water soluble vitamins such riboflavin, pantothenic acid, niacin, pyridoxine, biotin, cobalamine, folic acid and ascorbic acid.	15

References:

1 Principles of Biochemistry by Lehninger.

2 Principles of Biochemistry by Lehninger,Nelson and Cox.

3 Harper's Illustrated Biochemistry by Harper.

4 Molecular biology of the Cell by Alberts Johnson, Lewis, Morgan, Raff,Roberts and Walter

5 Biochemistry by Berg,John,Tymoczko and Stryer.

6 Fundamentals of biochemistry by A.C.Dev.

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School of Basic and Applied Sciences

Class	**B.Sc. Biochemistry**
Semester/Year	**I Year**
Subject & Paper Code	**Biochemistry - BBIOC20Y102**
Paper	**Biochemical and Biophysical Techniques - II**
Max. Marks	**30 (ETE) + 20(IA) = 50**

Credit			**Total Credits**
L	**T**	**P**	**4**
3	1	0	

Course Objectives:
The course will help students to acquaint with
1. Basic instrumentation, principle and procedure of various sophisticated instruments .
2. The use of these techniques in biological research and in discovering new products/compounds.

Course Outcomes:
At the end of the course, learners will be able to:
1. Prepare chemical solution and reagents to the precision appropriate to the task.
2. Demonstrate knowledge of the current state of research in particular areas of the biomolecular sciences.
3. Attain technical competence in the specific discipline of Biochemistry like Chromatography techniques
4. Prepare chemical solution and reagents to the precision appropriate to the task .
5. Demonstrate knowledge of the current state of research in particular areas of the biomolecular sciences.
6. Attain technical competence in the specific discipline of Biochemistry like Chromatography techniques
7. Familiarize with the theory of chromatographic separation process and they will be able to apply theoretical knowledge in optimization of chromatographic separation.

Student Learning Outcomes (SLO):
Students will be able to
1. To illustrate the working principles underlying protein and nucleic acid electrophoresis techniques and their application in biochemistry.
2. Learn concepts, fundamentals and types of centrifugation technique.
3. Learn about how to measure radioactivity, instrument used for detecting and measuring ionizing radiations and use of autoradiography.
4. Understand the concept of spectrophotometer, relevant terms of uv-visible spectroscopy and outline of uv spectroscopy device.

Sharma

Unit	Syllabus	Periods
UNIT - I	**Chromatography:** 1. Partition chromatography 2. Adsorption chromatography 3. Ion exchange chromatography 4. Thin layer chromatography 5. Molecular sieve (Gel chromatography) 6. Hydrophobic chromatography 7. Gas liquid chromatography 8. Affinity chromatography 9. High pressure liquid chromatography	15
UNIT - II	1. Salt and organic solvent fractionation. 2. Dialysis, reverse dialysis, ultra filtration 3. Electrophoresis – free flow, zone (disc, slab-SDS PAGE) and paper electrophoresis. 4. Isoelectric focusing 5. Centrifugation–centrifuge of various types, rotors, boundary, differential, density gradient.	15
UNIT - III	**Instrumental methods:** 1. Spectrophotometry - UV, visible 2. Fluorometry 3. Radioactive counters, GM, liquid scintillation	15
UNIT - IV	Radioisotopes in Biology, applications and precautions.	15
UNIT - V	**Microbiology:** Types of media, selective and enrichment media, sterilization, cell counting, cell number, viable & non-viable, Growth, maintenance of cultures, staining procedures, plating, microtomy. Microscopy: Compound, electron, phase contrast, confocal and Preparation of samples.	15

References Books :

1 Fundamentals of biochemistry by N.Arumugum.

2 Principles and Techniques of Biochemistry and Molecular Biology by Wilson and Walkers

3 Biochemistry and Biotechniques by N. Arumugum.

4 Practical Clinical Biochemistry by Mohanty and Varma.

5 Biochemistry by Lehninger.

6 Fundamentals of Biochemistry by J.L.Jain,Sanjay Jain and Nitin Jain.

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School of Basic and Applied Sciences

Class	**B.Sc. Biochemistry**
Semester/Year	**I Year**
Subject & Paper Code	**Practical Biochemistry - BBIOC20Y103**
Paper	**Paper- I and Paper- II, Practical**
Max. Marks	**50= (30+20)** (ETE + IA)

L	T	P	
0	0	2	2

PRACTICALS

1 Identification tests for Carbohydrates, proteins and lipids. Carbohydrates :

Carbohydrates: 1 Molisch test
2 Benedicts
3 Barfoed's
4 Fehling's test
5 Iodine test

Proteins : 1 Biuret
2 Xantho protein
3 Ninhydrin
4 Hopkin cole

Lipids : 1 Salkowski
2 LieBermann Burchard

2 Preparation of solutions of different molarities and normalities.

3 Adjusting the pH of solution and preparation of buffer

4 Isoelectric point of casein.

5 Measurement - Criteria of reliability, precision, accuracy, sensitivity, specificity

6 Laboratory rules and safety regulation - First Aid.

7 Principles of Colorimetry

i Verification of Beer's law, estimation of protein and phosphate.

ii Finding out Xmax. Relation between O.D. and % transmission. pH, pK, Henderson's equation.

8 Determination of - pH optimum, Temperature optimum, Km value, Vmax value, Effect of inhibitor (Inorganic phosphate) and measurement of K.

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School of Basic and Applied Sciences

Class	**B.Sc. Biochemistry (Honours)**
Semester/Year	**I Year**
Subject & Paper Code	**Biochemistry Honours - BBIOC20Y104**
Paper	**Microbial Biochemistry & Immunology - III**
Max. Marks	**30 (ETE) + 20 (IA) = 50**

Credit			Total Credits
L	T	P	4
3	1	0	

Course Objectives:

The course aims to provide
1. An advanced understanding of the core principles and topics of Biochemistry and their experimental basis,
2. To acquire a specialised knowledge and understanding of selected aspects by means of a stem/branch lecture series and a research project.

Course Outcome:

At the end of the course, learners will be able to:
1.Understand the immunological basis of immune response and demonstrate key concepts in microbiology and immunology.
2.Identify the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses.
3. Understand microbial diversity; physiology and nutrition.The student will be able to identify microbes using modern techniques.
4. Understand basic instrumentation, principle and procedure of various sophisticated instruments like phase contrast, fluorescence, electron microscopy, confocal microscopy, fluorescent activated cell sorting, and Freeze drying.

Student Learning Outcomes (SLO):

Students will:
1.Understanding of the overview of immune system including cells, organs and receptors.
2.Understand the structure and functions of different classes of immunoglobulins, the genetic.
3.Understand basis of antibody diversity and the importance of humoral, cell-mediated and innate immune responses in combating pathogens.
4. Get acquainted with the importance of antigen-antibody interaction in disease diagnosis.
5. Get acquainted with the discovery of antibiotics and their targets, drug/antibiotic resistance, preventive and therapeutic approaches of infectious diseases, hospital acquired infections.

Sharma

Unit	Syllabus	Periods
UNIT - I	Isolation of bacteria and pure culture techniques, culture media, Types of bacteria, Bacterial growth curve. Aerobic and Anaerobic respiration, Bacterial photosynthesis.	15
UNIT - II	Bacterial fermentation & types, Food spoilage and preservation, Food borne infections, Production of citric acid, Ethanol, Wine and vinegar.	15
UNIT - III	Structures and classification of viruses, Replication of RNA and DNA viruses, Virus host interaction, Types and life cycle of Bacteriophages.	15
UNIT - IV	Types of immunity, Innate, Acquired, Passive and Active immunity, Humeral and cellular immunity, Antigens, Haptens, Adjuvents, Structures and functions immunoglobulins.	15
UNIT - V	Antigen–antibody reaction, Agglutination and precipitation, Immuno-diffusion, Immuno-fluorescence, RIA and ELISA, Monoclonal antibodies.	15

References:

1 Microbiology by Pelczar,Chan and Krieg.

2 Brock Bilology of Microorganism by Madigan,Martinko,Bender,Buckley and Stahl.

3 Prescott's Microbiology by Willey, Sherwood and Woolberton.

4 Freifelder's Essentials of Molicular Biology by Malacinski.

5 Industrial Microbiology by Casida.

6 Cell Biology Gerald Karp.

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School of Basic and Applied Sciences

Class				**B.Sc. Biochemistry (Honours)**
Semester/Year				**I Year**
Subject & Paper Code				**Practical Biochemistry Honours - BBIOC20Y105**
Paper				**Paper- III, Practical**
Max. Marks				**50= (30+20)** (ETE + IA)
L	**T**	**P**	**1**	
0	0	1		

PRACTICALS

1 Safety measure in Laboratory.

2 Study of compound microscope construction,working,principle,care to be taken while using the microscope . use of oil immersion objective.

3 Study of instruments Autoclave, hot air oven. Laminar air flow, colony counter, inoculation, incubater, centrifuge, pH meter, seitz filter, membrane filter and colorimeter/spectrometer.

4 Study of compound microscope.

5 Cleaning and sterilization of glassware's.

6 Basic media prepation staining of bacteria.

7 Pure culture techniques- Pour, Steak and Spread.

8 Staining of Bacteria.

9 Simple staining methylene blue staining.

10 Gram Staining.