

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8
(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Biochemistry

Course Title: Biomolecules

No. of Hrs:60

LTP:400

Semester: I

Course Code:21BCCCBM14

Credits:4

Course Objectives

- To acquire knowledge of the biological importance of water, pH, and buffers found in living cells.
- To impart basic knowledge of biomolecules and their importance in biological systems.
- To prepare solutions, buffers, and dilutions.

Course Outcomes

CO1: Schematize the structures of biomolecules.

CO2: Classify the carbohydrates, lipids, proteins, and, amino acids with examples

CO3: Summarize the Physical-chemical properties of biomolecules.

CO4: Analyze the types of biochemical reactions undergone by biomolecules.

CO5: Understand the importance of these biomolecules in living organisms.

Unit - I:

1. Water and Buffers (10 hrs.)

1.1 Water as a biological solvent, Introduction to Different types of waters such as Potable water, Purified Water, Distilled Water, Deionized Water, RO Water, Water for Injection, water for Vaccines Total dissolved salts (TDS), BOD, COD, Different Types of Waters used in the pharmaceutical industry,

1.2 Buffers, biologically important buffers, measurement of pH, the biological relevance of pH, pKa value,

Unit - II: Carbohydrates (12 hrs.)

2.1 Carbohydrates: Classification, monosaccharides, D and L designation, open-chain and cyclic structures, epimers and anomers, mutarotation, reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde, and ketone. Glycosides, Structure and biological importance of disaccharides (sucrose, lactose, maltose),

2.2 Structural polysaccharides (cellulose, chitin, pectin), storage polysaccharides (starch, glycogen). Glycosaminoglycans, and Blood group substances. Galactomannans and their applications in modern foods.

Unit – III: Lipids (12 hrs.)

3.1 Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids.

3.2 Prostaglandins- structure, types, and biological role. Lipoproteins- types and functions, Biomembranes- Membrane composition and organization - Fluid mosaic model. Formation of micelles, bilayers, vesicles, liposomes.

Unit-IV: Amino Acids and Proteins (12 hrs.)

4.1 Amino Acids: Classification, structure, stereochemistry, chemical reactions of amino acids due to carboxyl and amino groups. Essential and nonessential amino acids, non-protein amino acids. Peptide bond - nature and conformation. Naturally occurring peptides - glutathione, enkephalin.

4.2 Proteins: Classification based on solubility, shape, and function. Determination of the amino acid composition of proteins. General properties of proteins, denaturation, and renaturation of proteins. Structural organization of proteins- primary, secondary, tertiary, and quaternary structures (e.g., Hemoglobin and Myoglobin).

Unit-V: Nucleic acids and porphyrins (12 hrs.)

5.1 General Structure of nucleosides, nucleotides, purines, and pyrimidines, Nucleic acids - Structure and types of RNA. Watson-Crick DNA double helix structure, biological importance, Hydrolysis of nucleic acids. formation of phosphodiester bonds, Introduction to circular DNA, supercoiling, Denaturation, and renaturation of nucleic acids, T_m -values, and cot value and their significance.

5.2 Porphyrins: Structure and Classification of porphyrins, protoporphyrin, porphobilinogen Properties, of Porphyrins, Metalloporphyrins—heme, cyanocobalamin, and chlorophylls

Skill / Hands-on (1hrs)

- Calculation of Molarity, Normality.
- Making Dilutions

- Preparation of Reagents and Solutions

Structure practicing sessions

Co-curricular Activities

(1hrs)

- Schematize the structures
- Class Tests
- Quiz
- Assignment

Prescribed Textbooks

1. Biochemistry 3rd Edition 2006 by Satyanarayana, Chakrapani 3rd revised
2. Outlines of Biochemistry, 5th Edition by E E Conn, PK Stumpf 693. John Wiley and Sons, New York. 1987
3. Leininger Principles of Biochemistry SEVENTH EDITION David L. Nelson Madison Michael M. Cox

Reference Text Books

1. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer,
2. Proteins: Structure, function, and evolution. Dickerson & Geis, 2nd Edn, Benjamin/Cummings.
3. Biochemistry, A problem Approach, 2nd Edn. Wood, W.B. Addison Wesley 1981.
4. Principles of Biochemistry White-A, Handler, Pand Smith E.L. Mc Grew Hill.
5. Fundamentals of Biochemistry by Donald Voet (1999).

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SEMESTER END MODEL QUESTION PAPER

Subject: Biochemistry
Course Title: Biomolecules
Time: 3 Hrs.

Semester: I
Course Code:21BCCCBM14
Max. Marks: 100 M

SECTION-A

Answer **ALL** questions

20 X 1 = 20 M

1. Common nitrogenous bases present in both nucleic acids are
 - A. Adenine, Guanine. Uracil
 - B. Adenine, Guanine. Thymine
 - C. Adenine, Guanine. Cytosine
 - D. Adenine, Guanine. Dehydrouracil
2. The two types of nucleic acids found in the cell are _____.
 - A. DNA
 - B. RNA
 - C. DNA & RNA
 - D. Tasteless
3. Elements present in Biomolecules are
 - A. C, H, O, N, P, S
 - B. CH, ON, PS, SS
 - C. Ni, Ca, Zn, Sn
 - D. H, Y, V, K
4. The function of Buffers is to resist change in
 - A. pH
 - B. Temperature
 - C. Pressure
 - D. Physical state
5. Glycerol and fatty acids are the constituents of
 - A. Acids
 - B. Glucose
 - C. Cholesterol

- D. Triacylglycerol
6. Diabetes is characterized by
- A. Increased blood sugar levels
 - B. Decreased blood sugar levels
 - C. Increased fat levels
 - D. Decreased protein levels
7. Osazones are formed by reaction of _____phenylhydrazine
- A. Soaps
 - B. Lipids
 - C. Proteins
 - D. Sugars
8. Irrespective of the length DNA sequence is read from
- A. 5'-3'
 - B. 3'-5'
 - C. 2'-3'
 - D. 2'-6'
9. Based on the number of carbohydrates xylose is a
- A. Hexose
 - B. Pentose
 - C. Tetrose
 - D. Triose
10. Lipids are formed major components of membrane, outline their role
- A. Protective
 - B. Defense
 - C. Nutritive
 - D. Immune
11. Majority of naturally occurring nucleic acid(s) are _____ in number.
- A. 3
 - B. 1
 - C. 2

D. 5

12. The word saccharides refer to
- A. Carbohydrates
 - B. Amino acids
 - C. Fats
 - D. Proteins
13. The biomolecules that play a protective role in membranes are
- A. Minerals
 - B. Carbohydrates
 - C. Proteins
 - D. Fats
14. Human body is composed of _____ water.
- A. 90%
 - B. 70%
 - C. 50%
 - D. 10%
15. Triacylglycerol consists of
- A. Fatty acids and glycerol
 - B. Glucose and Glycerol
 - C. Amino acids and Proteins
 - D. Glycerol and Glyceraldehyde
16. An example of the Quaternary Structure of protein is
- A. α - helix, β - sheet
 - B. Insulin molecule
 - C. Hemoglobin and myoglobin
 - D. Collagen
17. Amino acids atoms containing sulfur atoms are
- A. Cysteine, Methionine
 - B. Tyrosine, Tryptophan
 - C. Cysteine, Threonine

D. Methionine, Tyrosine,

18. Iodine number *gives* - a measure of the_____of Fat/Oil.

- A. Unsaturation
- B. Saturation
- C. Quantity
- D. Quality

19. Polynucleotide chains of DNA are

- A. Parallel and antiparallel
- B. Parallel
- C. Antiparallel
- D. Angular

20. The pH at which a molecule or surface carries no net electrical charge.

- A. Isoelectric point
- B. Acidic pH
- C. Basic pH
- D. Neutral pH

SECTION-B

Answer any **FOUR** questions

4 X 8 = 32M

- 21. What is a chiral center? Draw structures of an amino acid(s) without a chiral center.
- 22. Illustrate aldoses and ketoses with examples and give their structures.
- 23. List the Chemical properties of amino acids.
- 24. What is mutarotation? Draw structures of mutarotation glucose.
- 25. Summarize the differences in the structure of starch and glycogen polysaccharides.
- 26. What are the different types of biomolecules existing in nature? Mention the important elements present in them.

SECTION-C

Answer any **FOUR** questions

4 X12 = 48M

- 27. Write the reaction for Triacylglycerol with acid or alkali.

28. Differentiate between the glucose and fructose molecule with the help of the Haworth projection structure.
29. What is the biological significance of water?
30. Give in detail the primary, secondary, and Tertiary structure of proteins and give examples.
31. Describe the different types of carbohydrates based on the number of carbon atoms? Mention the important elements present in carbohydrates.
32. Explain the structural organization of the Fluid Mosaic Model of the membrane.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8
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Blueprint

Subject: Biochemistry
Course Title: Biomolecules
Maximum Marks: 100

Semester: I
Course Code: 21BCCCBM14
Maximum Time: 3Hrs.

SECTION – A

Answer **ALL** questions

20 x 1 = 20 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 10 RBT2 – 10
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions

4 x 8 = 32 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 3; RBT2 – 3
22	II	8	
23	III	8	
24	IV	8	
25	V	8	

26	I / II / III / IV / V	8	
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SECTION – C

Answer any **FOUR** questions

4 x 12 = 48 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 3; RBT2 – 3
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8
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PRACTICAL SYLLABUS

Subject: Biochemistry

Course Title: Qualitative Analysis-Practical

No. of Hrs:30

LTP: 002

Semester: I

Course Code: 21BCP1QA11

Credits:1

Course objectives

- To explain the importance of Biosafety and good laboratory practices (GLP) to work in the laboratory,
- To impart the knowledge on the principles, procedure, and calculations
- To identify biomolecules by qualitative Tests
- To Understand Handling of pH meter. Weighing machine.
- To learn techniques for the isolation of genetic material.

Course outcomes

CO1: Gain of knowledge for preparing all the reagents, buffer, and solutions by themselves

CO2: Analysis of biological or non-biological sample identification of its chemical composition of biomolecules

CO3: Identification of its chemical composition of Biomolecules

CO4: Calibration of pH meter. Weighing machine.

CO5: Use genetic material isolation techniques for research.

List of Experiments:

1. Preparation of standard solutions by calculation of Normality, Molarity, making dilutions. Preparation of buffers (acidic, neutral, and alkaline), and determination of pH.
2. Qualitative identification of carbohydrates- glucose, fructose, galactose ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
3. Estimation of total sugars by Anthrone method.
4. Preparation of Osazones and their identification.
5. Qualitative identification of amino acids-histidine, tyrosine, tryptophan, cysteine, arginine.

6. Qualitative Identification of lipids- solubility, saponification, Acrolein, Bromine test (Unsaturation), Salkowski test.
7. Isolation of RNA /DNA from tissue/culture.
8. Estimation of RNA by Orcinol Method.

Prescribed Textbooks

1. Experimental Biochemistry: A Student Companion by Beige Sashidhar Rao, Vijay Deshpande.
2. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill. Practical Biochemistry – J. Jayaraman, 2nd Edition.
3. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley & Sons Inc., 1983.

Reference Textbooks

1. Principles and Techniques of Practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press.
5. Analytical Biochemistry, Holmes, and Hazel peck, Longman, 1983.
6. Biophysical chemistry, Edsall & Wyman, Academic press Vol. II & I.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
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Scheme of Valuation and Model for Semester End Practical examination

Subject: Biochemistry
Course Title: Biomolecules
Maximum Marks: 50

Semester: I
Course Code: 21BCP1QA11
Time: 3Hrs.

- | | |
|---|-------------|
| 1. Major | 7 + 5 = 12M |
| Estimation of Carbohydrates using Anthrone Method | |
| 2. Minor | 4 + 4 = 8M |
| Qualitative Analysis of Amino acids. | |
| 3. Principles/Identification | 2 X 5 = 10M |
| Write Principles for Osazone formation of | |
| | A. Lactose |
| | B. Glucose |
| 4. Viva | 10M |
| 5. Record | 10M |

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
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SYLLABUS

Subject: Biochemistry

Semester: II

**Course Title: Biophysical Techniques &
Microbiological Methods**

Course Code: 21BCCCBT24

No. of Hrs:60

LTP:400

Credits:4

Course objectives

- To Impart knowledge about the principles of biophysical instrumentation and microbial methods.
- To Incorporate theoretical and practical knowledge of principles and working of biophysical instrumentation.
- To know the usage of Instrumentation for analyzing/Separation of biochemically active compounds.

Course outcomes

At the end of the course, the student will be able to

CO1: apply different homogenization techniques

CO2: Understand the importance of different biophysical techniques.

CO3: learn the principles of different Biophysical Instruments and their use for research purposes

CO4: acquire Knowledge about isolation and microbiological methods

CO5: use isolation and microbiological methods for research purposes

Unit-I: Cell homogenization and centrifugation (12 hrs.)

1.1 Introduction to types of Cells & Cell Lysis, methods of tissue homogenization:(Potter-Elvehjem, mechanical blender, sonicator and enzymatic).

1.2 Centrifugation techniques, principles, and applications- differential, density gradient. Ultra-centrifugation- preparative and analytical.

Unit-II: Chromatographic techniques (12 hrs.)

- 2.1** Types of chromatographic techniques, Principle and applications - Paper chromatography- solvents, R_f value, applications; Thin layer chromatography- principle, choice of adsorbent and solvent, R_f value, applications
- 2.2** Gel filtration, Ion- exchange- principle, resins, the action of resins, experimental techniques, applications, separation of metal ions; Affinity chromatography. Introduction to HPLC

Unit-III Spectroscopy (12 hrs.)

- 3.1** Electromagnetic radiation, Introduction to Absorption & Emission spectroscopy Beer-Lambert's law.
- 3.2** Colorimetry, Spectrophotometry, spectrofluorimetry, and flame photometry.

Unit-IV: Electrophoresis and tracer techniques (12hrs.)

- 4.1** Electrophoresis- types of Electrophoresis principles and applications of paper, polyacrylamide (native and SDS), and agarose gel electrophoresis. Isoelectric focusing, immune-electrophoresis-types, and applications.
- 4.2** Tracer techniques: Radioisotopes, units of radioactivity, half-life, β , and γ - emitters, use of radioactive isotopes in biology.

Unit-V: Microbiological methods (12 hrs.)

- 5.1** Microscopy: Basic principles of light microscopy, phase contrast, fluorescent microscope and electron microscope their applications, isolation and culturing and preservation of microbes, Gram's staining (Gram-positive and Gram-negative bacteria), spore staining (Endospore staining), Hanging drop method (motility).
- 5.2** Sterilization Techniques-Physical methods, chemical methods, Applications of Sterilization in the Food & Pharmaceutical Industry.

Prescribed Textbooks

1. Textbook of Biophysical Chemistry – Nath & Upadhyaya., Himalaya publications
2. Outlines of Biochemistry, 5th Edition by E E Conn, PK Stumpf 693. John Wiley and Sons, New York. 1987
3. Biochemistry Prof. U. Satyanarayana, 3rd revised Edition:2006, Arunabha Sen, books and allied (P)Ltd, 8/1Chintamani Das lane, Kolkata 700009.

Reference text Books

1. Biochemistry by L. Steyer (1995) W.H. Freeman Press, San Francisco, USA. 4.
2. Biochemistry, by Voet. D. and Voet, J.G. (2004). 3rd Edition, John Wiley & Sons, Inc. USA.
3. Leininger Principles of Biochemistry SEVENTH EDITION David L. Nelson Madison Michael M. Cox.

Skill / Hands-on

(2hrs)

- Schematize the structures of Nucleic acids
- Isolations of biologically relevant compounds.
- Different separation techniques for analyzing and separating biologically active compounds
- Basic microbial Techniques -Sterilization techniques.

Co-curricular Activities:

(2hrs)

- Structure practicing sessions
- Class Tests
- Quiz
- Assignment

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8
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Subject: Biochemistry
Course Title: Biophysical Techniques
& Microbial Methods
Time: 3 Hrs
Date

Semester: II
Course Code: 21BCCCBT24
Max. Marks:100 .
Reg. No.

SECTION-A

Answer **ALL** questions

20 X 1 = 20 M

1. The sonication process makes use _____ rays/waves to disrupt cell walls.
 - A. Sound
 - B. Light
 - C. Infrared
 - D. Ultraviolet

2. Cell lysis is the method of breakdown of _____ membrane to release inter-cellular materials
 - A. Cell
 - B. Nuclear
 - C. Vascular
 - D. Cambium

- 3 The sedimentation coefficient has units of time, expressed in
 - A. Svedbergs.
 - B. Gravitational Constant
 - C. Gravity
 - D. Density

4. In the electrophoresis process DNA migrates towards the positive anode in the presence of an electric field due to the presence of _____ charge on it.
 - A. Positive
 - B. Negative
 - C. Amphoteric
 - D. Neutral

4. The substance to be separated in a chromatographic procedure is called _____.
- A. Solute
 - B. Solvent
 - C. Solution
 - D. Sublimate
5. The primary difference between ribose sugar and deoxyribose sugar is the presence of hydroxyl group on the _____ of ribose.
- A. 2' carbon
 - B. 4' carbon
 - C. 6' carbon
 - D. 5' carbon
6. Electrophoresis is process in which _____ are separated under the influence of electric charge.
- A. Nucleic acids
 - B. Proteins
 - C. Carbohydrates
 - D. Pentoses
8. The term *radioactivity* was actually coined by
- A. Marie Curie
 - B. Rosalind
 - C. Watson
 - D. Becquerel
9. Sodium dodecyl sulphate (SDS) in SDS-PAGE is a _____ detergent.
- A. Anionic
 - B. Cationic
 - C. Non-anionic
 - D. Anionic exchanger
10. In which type of chromatography, the stationary phase held in a narrow tube, and the mobile phase is forced through it under pressure?
- A. Column chromatography
 - B. Planar chromatography

C. Liquid chromatography

D. Gas chromatography

11. IR spectrum is a plot of:

A. % Transmittance versus time

B. % Transmittance versus wavenumber

C. Peak area versus time

D. Peak area versus wavenumber

12. Which of the following spectroscopy techniques is associated with molecular emission?

A. UV-Visible spectroscopy

B. IR spectroscopy

C. Fluorescence spectroscopy

D. X-ray diffraction

13. A compound containing some amount of radioisotope is _____

A. tracer

B. radioactive compound

C. non-radioactive

D. linear active compound

14. Nuclei bombarded with protons, neutron or alpha particles are changed to

A. Isotopes

B. Radioisotopes

C. An element having an atomic number less than 82

D. None of above

15. The half-life of a radioisotope is the time taken for _____

A. complete decay

B. half the half decay

C. half of the complete decay

D. start of the decay process

16. What do you mean by sterilization?

A. Purification of products

- B. Recovery of products
 - C. Elimination of contamination
 - D. Formulation of media
17. The highest feasible temperature for batch sterilization using autoclave is _____.
- A. 124°C
 - B. 120°C
 - C. 122°C
 - D. 121°C
18. Laminar Air Flow (LAF) prevents the contamination of _____ samples.
- A. Chemical
 - B. biological
 - C. Dry powder
 - D. Medium
19. Which of the following refers to a disinfecting chemical dissolved in alcohol?
- A. Iodophor
 - B. Tincture
 - C. Phenol
 - D. Per oxygen
20. Which of the following peroxygenase is widely used as a household disinfectant, is inexpensive, and breaks down into water and oxygen gas?
- A. hydrogen peroxide
 - B. peracetic acid
 - C. benzoyl peroxide
 - D. ozone

SECTION-B

Answer any **FOUR** questions

4 X 8 =32M

21. What are nucleic acids? Mention the different elements present Draw structures of nucleic acids.

22. Illustrate the formation of phosphodiester bonds with their structures.
23. Write a short note on the density gradient centrifugation technique.
24. Explain the process of Gel Filtration Chromatography/ and write the principle.
25. Describe the physical and chemical methods of sterilization.
26. Enlist the uses of radioactive isotopes in biology.

SECTION-C

Answer any **FOUR** questions

4 X12=48M

27. What are the different types of Chromatography Techniques that are used for the separation of biological compounds.
28. What is a microscope Write a brief note on different types of microscopes.
29. Give the principle and working of the spectrophotometer?
30. Show with the help of a diagram and discuss base-pairing present in the Watson and Crick double-helical structure of DNA.
31. Explain the different types of Electrophoresis techniques?
32. Define the Beer lamberts Law. Write the concept of Molecular extinction Coefficient.

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Blueprint

Subject: Biochemistry
Course Title: Biophysical Techniques
& Microbial Methods
Maximum Marks: 100
Date

Semester: II

CourseCode:21BCCCBT24

Time: 3Hrs.

Reg No.

SECTION – A

Answer **ALL** questions

20 x 1 = 20 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 10 RBT2 – 10
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions

4 x 8 = 32 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 3; RBT2 – 3
22	II	8	
23	III	8	

24	IV	8	
25	V	8	
26	I / II / III / IV / V	8	

SECTION – C

Answer any **FOUR** questions

4 x 12 = 48

M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 3; RBT2 – 3
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

Subject: Biochemistry
Course Title: Biophysical Techniques-Practical

Semester: II
Course Code: 21BCP2BT21
Max.Marks:50

Time: 30 Hrs.

002

Reg. No.

Course objectives

- To explain to the student about the Biosafety and good laboratory practices (GLP) to handle instrumentation.
- To impart the knowledge on the principles, procedure, and calculations
- To identify a mixture of components
- To understand the principles and Handling of instrumentation.

Course outcomes

CO1: Gain of knowledge for preparing all the reagents, buffer, and solutions by themselves

CO2: Analysis of biological or non-biological sample identification of its chemical composition of biomolecules

CO3: Identification of its chemical composition of Biomolecules

CO4: Calibration of pH meter. Weighing machine.

List of Experiments:

1. Separation of amino acids by circular paper chromatography.
2. Separation of plant pigments by TLC
3. Separation of serum proteins by paper electrophoresis.
4. Isolation of casein from milk.
5. To verify Lambert – beer 's law for Potassium Dichromate by colorimetry.
6. Absorption spectra of nucleic acids- DNA using spectrophotometer
7. Gram Staining Procedure
8. Hanging Drop

Prescribed Textbooks

7. Experimental Biochemistry: A Student Companion by Beige Sashidhar Rao, Vijay Deshpande.

8. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.
Practical Biochemistry – J. Jayaraman, 2nd Edition.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley & Sons Inc., 1983.

Reference Textbooks

1. Principles and Techniques of Practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press.
5. Analytical Biochemistry, Holmes, and Hazel peck, Longman, 1983.
6. Biophysical chemistry, Edsall & Wyman, Academic press Vol. II & I.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
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Scheme of Valuation and Model for Semester End Practical examination

Subject: Biochemistry

Course Title: Biophysical Techniques-Practical

Maximum Marks: 50

Semester: II

Course Code: 21BCP2BT21

Time: 3Hrs.

- | | |
|---|-------------|
| 1. Major Isolation | 7 + 5 = 12M |
| a. Isolation of Casein from Milk | |
| 2. Minor Separation Technique | 4 + 4 = 8M |
| a. Paper Chromatography of Amino acids. | |
| 3. Principles/Identification | 2 X 5 = 10M |
| 4. Viva | 10M |
| 5. Record | 10M |

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Biochemistry

**Course Title: Enzymology, Bioenergetics
& Intermediary Metabolism**

Semester: III

Course Code:20BCCCIM34

No. of Hrs:60

LTP:400

Credits:4

Course objectives

- To understand the concepts of enzymes and enzyme-substrate reactions.
- To acquire basic knowledge about the energy transformations of living organisms.
- To impart knowledge of bioenergetic reactions
- To provide information on metabolic processes undergone by the biomolecules
- To emphasize the importance of the metabolism of biological systems.

Course outcomes:

At the end of the course, the student can

CO1: Gain knowledge about the physiological importance of enzymes

CO2: Classify the metabolic reactions

CO3: Explain the fate of various cell metabolites.

CO4: Analyse different energy transformation laws

CO5: Understand the pathophysiology of metabolic diseases

Unit-I: Enzymology

(12 hrs.)

1.1 Introduction to Biocatalysts, differences between chemical and biological catalysis.

Nomenclature and classification of enzymes. Definition of holoenzyme, apoenzyme, coenzyme, cofactor. The active site, Enzyme specificity. Activation energy, transition state theory. Interaction between enzyme and substrate-lock and key, induced fit models. Fundamentals of enzyme assays, enzyme units.

1.2 Michaelis -Menten equation for the uni-substrate reaction (derivation not necessary), Significance of K_m and V_{max} Enzyme inhibition (Reversible and Irreversible) Outlines

of the mechanism of enzyme action, factors affecting enzyme activity (temperature, pH, enzyme. and substrate concentration). Commercial application of enzymes.

Unit- II: Bioenergetics and Biological oxidation (10 hrs.)

- 2.1 Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds.
- 2.2 Oxidation-reduction reactions. Organization of electron transport Chain. Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation.

Unit-III: Carbohydrate Metabolism. (10 hrs.)

- 3.1 Overview of metabolism Glycolytic pathway, energy yield. The fate of pyruvate-formation of lactate and ethanol, Citric acid cycle, Anaplerotic reactions. Pentose phosphate pathway. regulation, energy yield. Glycogenolysis and glycogenesis. Gluconeogenesis Disorders of carbohydrate metabolism- Diabetes Mellitus.
- 3.2. Photosynthesis- Light and Dark reactions, Calvin cycle, C₄ Pathway.

Unit-IV: Amino acid and Lipid Metabolism

- 4.1 General reactions of amino acid metabolism- transamination, decarboxylation and deamination, Urea cycle and regulation, Biosynthesis of creatine. Inborn errors of aromatic and branched-chain amino acid metabolism
- 4.2 β - oxidation of fatty acids, Biosynthesis of triacylglycerol, Disorders of lipid metabolism.

Unit-V: Metabolism of Nucleic acids and porphyrins (12 hrs.)

- 5.1 Biosynthesis and regulation of purine and pyrimidine nucleotides De novo and the salvage pathway, Heme Biosynthesis.
- 5.2 Catabolism of purines and pyrimidines, Degradation, Disorders of nucleotide metabolism- Gout, Lesch-Nyhan syndrome, and porphyria.

Skill / Hands-on (2hrs.)

- Schematize the metabolic reactions
- Identification of biologically relevant metabolites

- Calculation of Energy transformations
- Connecting different metabolisms to TCA cycle

Co-curricular Activities:

(2hrs.)

- Metabolites Structure practicing sessions
- Assignments on metabolic disorders
- Drawing chart for whole Intermediary Metabolism

Prescribed Textbooks

1. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936
2. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
3. Biochemistry 3rd Edition 2006 by Satyanarayana, Chakrapani 3rd revised
4. Outlines of Biochemistry, 5th Edition by E E Conn, PK Stumpf 693. John Wiley and Sons, New York. 1987
5. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13:978-1-4641-0962-1

Reference text Books

1. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New Jersey), ISBN:978-0-470-28173-4.
2. Biochemistry, A problem Approach, 2nd Edn. Wood, W.B. Addison Wesley 1981.
3. Principles of Biochemistry White-A, Handler, Pand Smith E.L. Mc Graw Hill.

**MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)**

MODEL QUESTION PAPER SEMESTER END EXAMINATIONS

**Subject: Biochemistry
Course Title: Enzymology, Bioenergetics &
Intermediary Metabolism**

Maximum Marks: 100

Date

**Semester: III
Course Code: 20BCCCIM34**

Maximum Time: 3Hrs.

Reg No.

SECTION-A

Answer **ALL** questions

20 X 1 = 20 M

1. A _____ is a biocatalyst that increases the rate of the reaction without being changed.
 - A. Aluminum oxide
 - B. Silicon dioxide
 - C. Enzyme
 - D. Hydrogen peroxide
2. Name the enzyme which is non-proteinaceous.
 - A. Ribozyme
 - B. Peptidase
 - C. Xylanase
 - D. Cellulase
3. Enzyme increases the rate of reaction by lowering the _____ Energy.
 - A. activation
 - B. Emitted
 - C. Absorbed
 - D. Residual
4. What is the nature of an enzyme?

- A. Vitamin
- B. Lipid
- C. Carbohydrate
- D. Protein

5. Breakdown of Glycogen is called

- A. Glycogenolysis
- B. Lipolysis
- C. Alkalosis
- D. Glycolysis

7. For photosynthesis green plants require:

- A. Chlorophyll only
- B. Light
- C. Carbon dioxide and water
- D. All of the above

8. Diabetes Mellitus is an impairment of _____ metabolism.

- A. Carbohydrate
- B. Lipid
- C. Fats
- D. Nucleic acids

9. β - oxidation) is _____ of fats with odd number of carbon atoms.

- A. Catabolism
- B. Anabolism
- C. lipogenesis
- E. change from even

10. Degradation of Triacylglycerol yields

- A. Fatty acids + Glucose
- B. Fatty acids + Glycerol
- C. Fatty acids + Fats

D.2 Fatty acids

11. Fatty acids are elongated in
 - A. Microsomes
 - B. Mitochondria
 - C. Cytoplasm
 - D. Desmosomes

12. Lecithin brings about even dispersion of
 - A. Fats and Oils
 - B. Fats and sugars
 - C. Different Fats
 - D. Different Oils

13. Which of the following is not the precursor for the de novo purine biosynthesis?
 - A. Aspartic Acid
 - B. Glycine
 - C. Glutamine
 - D. Arginine

14. Which of the following cofactor is used during the conversion of uracil to thymine?
 - A. S-Adenosyl Methionine
 - B. Tetrahydrofolate
 - C. Tetrahydrobiopterin
 - D. Biotin

15. Which of the following is the degradation product of pyrimidines?
 - A. beta-alanine
 - B. Uric acid
 - C. Allantoin
 - D. Glycine

16. Identify activator of the enzyme "Glutamine: Phosphoribosylpyrophosphate amidotransferase" a committed step of de novo biosynthesis of purines?

- A. Adenosine Monophosphate
- B. Guanosine Monophosphate
- C. Inosine Monophosphate
- D. Phosphoribosyl Pyrophosphate

17. Transamination reaction in amino acid synthesis is catalyzed by enzyme_____

- A. Nitric oxide synthase
- B. Decarboxylase
- C. Aminotransferase
- D. Glutamate decarboxylase

18. Krebs-Henseleit cycle. Is also known as

- A. urea cycle
- B. Uric acid cycle
- C. Bile Cycle
- D. TCA cycle

19. Name the amino acid which does not take part in transamination during amino acid catabolism.

- A. Proline
- B. Threonine
- C. Lysine
- D. Serine

20. Which of these is a hereditary disease caused due to an error in amino acid metabolism?

- A. Homocystinuria
- B. Albinism
- C. Phenylketonuria
- D. Branched-chain ketoaciduria

SECTION-B

Answer any **FOUR** questions

4 X 8 =32M

21. Outline the mechanism of enzyme inhibition.

22. Give an account of anaplerotic reactions.

23. Explain the process of beta-oxidation of fat
24. Give an account of the biosynthesis of Haem porphyrin.
25. Describe the processes of decarboxylation and deamination.
26. Enumerate steps with the glycolytic pathway with structures.

SECTION-C

Answer any **FOUR** questions

4 X12=48M

27. Write the classification of the enzymes.
28. Discuss light and dark reactions of photosynthesis.
29. Organize different stages of the synthesis of cholesterol biosynthesis
30. Show the process of Haem biosynthesis with structures.
31. Summarize the ultimate fates of the carbon skeletons of the amino acids.
32. What is the other name for the citric acid cycle. Describe the cycle with structure.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

Blueprint

Subject: Biochemistry
Course Title: Enzymology, Bioenergetics
& Intermediary Metabolism

Semester: III
Course Code: 20BCCCIM34

Maximum Marks: 100

Maximum Time: 3Hrs.

SECTION – A

Answer **ALL** questions

20 x 1 = 20 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 10 RBT2 – 10
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions

4 x 8 = 32 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 3; RBT2 – 3
22	II	8	
23	III	8	
24	IV	8	
25	V	8	
26	I / II / III / IV / V	8	

SECTION – C

Answer any **FOUR** questions

4 x 12 = 48

M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 3; RBT2 – 3
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Biochemistry

Semester: III

Course Title: Enzymology-Practical

Course Code:20BCP3EN31

No. of hours: 30

LTP 002

Credits: 1

Course objectives

- Learn the various Enzymes assays
- Quantitation of biologically important parameters.

Course outcomes

After completion of the practical, students will be able to

CO1: perform assays for different enzymes

CO2: Efficiently quantitate different biologically important parameters.

1. Assay of amylase.
2. Assay of urease.
3. Assay of catalase
4. Effect of pH, the temperature on enzyme activity.
5. Effect substrate concentration on enzyme activity.
6. Estimation of Haemoglobin by Cyanmethemoglobin method.
7. Estimation of Urea by Diacetyl Monoxime (DAM) Method
8. Estimation of Blood Glucose by Dinitrosalicylic acid method.

Prescribed Textbook

1. Experimental Biochemistry: A Student Companion by Beige Sashidhar Rao, Vijay Deshpande.
2. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. Andreas Hoffman and Samuel Cloekie.
3. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.

Reference Textbook

1. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
2. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press.
3. Analytical Biochemistry, Holmes, and Hazel peck, Longman, 1983.
4. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

Subject: Biochemistry

Semester: III

Course Title: Enzymology Enzymology-Practical

Course Code: 20BCP3EN31

Maximum Marks: 50

Maximum Time: 3Hrs.

Scheme of Valuation of Semester End Practical examination

1	Major	7 + 5 = 12M
	Estimation of Urea by Serum Urea by Diacetyl Monoxime (DAM) Method	
2	Minor	4 + 4 = 8M
	Assays/Analyze	
	Assay the activity of Catalase enzyme,	
3.	Principles/Identification	2 X 5= 10M
3	Viva	10M
4	Record	10M

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Biochemistry

Semester: IV B

**Course Title: Microbiology, Immunology
&Molecular biology**

Course Code 20BCCCMB44

No. of hours:60

LTP:400

Credits:4

Course objectives

- To understand the concepts of different interdisciplinary fields
- To acquire basic knowledge about the Molecular Biology
- To impart knowledge of Immunology
- To provide information on Microbiology
- To emphasize the importance of other applied fields biochemistry

Course outcomes:

At the end of the course, the student can

CO1: Gain knowledge about the different interdisciplinary fields

CO2: Classify the Microorganisms

CO3: Explain the details of nitrogen Utilization

CO4: Analyse different biochemical processes

CO5: Understand the basic concepts of Immunology and Molecular Biology

Unit-I: Microbiology

(12 hrs.)

1.1 Introduction to microbiology, Introduction to Bergey's Manual of Systematic Bacteriology, Bacterial structure: Cell wall, cell membrane, Flagella, Fimbriae, nucleoid region, growth curve.

1.2 Introduction to viruses, plant viruses: Tobacco mosaic virus (TMV), Tomato spotted wilt virus (TSWV), and animal viruses: Retroviruses structure, life cycle (Lytic and Lysogenic)

Unit-II: Nitrogen Fixation

(12 hrs.)

2.1 The Nitrogen cycle, non-biological and biological nitrogen fixation, photosynthesis-pigments, Photosystems: I & II, mechanism Nitrogenase system.

2.2 Utilization of nitrate ion, Ammonia incorporation into organic compounds. Synthesis of glutamine and regulatory mechanism of glutamine synthase.

Unit-III: Applied Biochemistry (12 hrs.)

3.1 Fermentation Technology: Batch, continuous culture techniques, principle, types of fermenters. Pasteur effect. Industrial production of chemicals- alcohol, acids (citric acid), solvents (acetone), antibiotics (penicillin)

3.2 Enzyme Technology: Immobilization of enzymes and cells, industrial applications, enzymes in Bioremediation.

Unit- IV: Immunology (12 hrs.)

4.1 Organs and cells of the immune system. Innate and acquired immunity, Cell-mediated and humoral immunity (T-cells and B-cells). Immunoglobulins, the structure of IgG. Epitopes / antigenic determinants. haptens. Adjuvants.

4.2 Monoclonal antibodies. Antigen-antibody reactions- Precipitations, agglutination, Complement Fixation. Blood group antigens. Immunodiagnostics- ELISA. Vaccines and their classification: Traditional vaccines, live attenuated, dead, modern vaccines- recombinant and peptide vaccines. Outlines of hypersensitivity reactions.

Unit- V: Molecular biology (12 hrs)

5.1 DNA replication, transcription, and repair leading and lagging strands, Okazaki fragments, inhibitors of DNA replication.

5.2 Protein synthesis- Genetic code, translation, inhibitors of protein synthesis. Outlines of cloning technology, plasmids, vectors, restriction enzymes, PCR, applications of cloning in agriculture, industry, and medical fields.

Skill / Hands-on (2hrs.)

- Memorize the Genetic code of all 20 amino acids
- Identification of genetic basis of a particular blood group
- Immobilization techniques of cell and Enzymes
- Charts showing Connecting the lysogenic and lytic cycles of viral replication

Co-curricular Activities: (2hrs.)

- Schematic models of DNA replication, protein synthesis process

- Assignments
- Schematic representations through Charts

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

MODEL PAPER FOR SEMESTER END EXAMINATION

Subject: Biochemistry
Course Title: Microbiology, Immunology
and Molecular Biology
Maximum Marks: 100
Date

Semester: IV B
CourseCode:20BCCCMB44

Time: 3Hrs.

Reg No.

SECTION-A

Answer **ALL** questions

20 X 1 = 20 M

1. _____ is a process of entrapment of an enzyme without changing its catalytic activity
 - A. Immobilization
 - B. Immortalization
 - C. Immolation
 - D. Immigration

2. Name the enzyme which adds primer in DNA replication
 - A. Primrose
 - B. Primase
 - C. Nucleotidase
 - D. Nucleosidase

3. An enzyme that cuts DNA. At specific site is called _____ enzyme .
 - A. Restriction
 - B. Emission
 - C. Adsorption
 - D. Residual

4. What is a nature Genetic code?

- A. Virtual
- B. LeetCode
- C. Unambiguous
- D. Error-prone

5. A short fragment of DNA is involved in the replication of _____ strand.

- A. Glutamine
- B. Lagging
- C. Alanine
- D. Leading

1. For photosynthesis green plants require

- A. Chlorophyll
- B. Magnesium
- C. Carbon monoxide
- D. Nitrogen

2. Photosystems I & II absorb light at

- A. 700 nm and 680nm
- B. 600nm and 780nm
- C. 600nm and 700nm
- D. 700nm and 600nm

3. Light reaction of Photosynthesis is also called

- A. Hill's Reaction
- B. Down-Hill' Reaction
- C. Kerb's Reaction
- D. D.Pentose phosphate reaction

6. 11. Glucose is produced as a product of _____ reaction.

- A. Photosynthesis
- B. Respiration
- C. Oxidation

7. D.Reduction

11. Yeasts breakdown _____ produce alcohol and carbon dioxide as their by-products. of

- a. Glucose
- b. Mannose
- c. Galactose
- d. Different Oils

12. Which of the following is not involved in the biosynthesis of glutamine?

- A. Aspartate
- B. α -glutarate
- C. Oxaloacetate
- D. Arginine

13. Which of the following is used for raw material for citric acid?

- a. Starch
- A. B.Trehalose
- B. C.Cellulose
- C. Mannose

14. Which of the following is the function of nitrogenase?

- A. Uric acid to Allantoin
- B. Fixes ammonia. (N_2) into atmospheric nitrogen
- C. Fixes atmospheric nitrogen (N_2) into ammonia.
- D. Fixes atmospheric nitrogen (N_2) into ammonia.

15. Which of the following fermentation involves continuous addition of medium

- A. Continuous
- B. Fed-batch
- C. Batch
- D. Bubble

16. Haptens are non-specific substances that intensify _____

- A. Immune response
- B. Infection

- C. Antibody
- D. Clotting process

17. A sudden change from anaerobic to aerobic process is known as

- A. Aerobic twist
- B. Anaerobic twist
- C. Pasteur effect
- D. Oxygen effect

18. All antibodies are immunoglobulins but all immunoglobulins are not _____.

- A. Antibodies
- B. Antigens
- C. Haptens
- D. Adjuvants

19. Which of these antibiotics is involved in Cell wall synthesis inhibition.

- A. Penicillin
- B. Gentamycin
- C. Chloramphenicol,
- D. Keto acids

SECTION-B

Answer any **FOUR** questions

4 X 8 =32M

- 21. Outline the mechanism of protein synthesis with structures.
- 22. Write the classification of the microorganisms based on the preferred range of temperature
- 23. Explain the process of monoclonal antibody production.
- 24. Give an account of different types of inhibitors of DNA replication
- 25. Describe the processes of Nitrogen fixation.
- 26. Enumerate steps of citric acid production

SECTION-C

Answer any **FOUR** questions

4 X12=48M

- 27. Explain the process of Leading and Lagging strand synthesis
- 28. Write briefly about photosystems I and II.
- 29. Describe different types of Immobilization techniques.

30. Enlist the different types of antigen-antibody reactions
31. Summarize the different phases of bacterial growth.
32. What is the nitrogen cycle? Describe the cycle with structures.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

Blueprint

Subject: Biochemistry
Course Title: Microbiology, Immunology
and Molecular Biology
Maximum Marks: 100

Semester: IV B
Course Code: 20BCCCMB44
Maximum Time: 3Hrs.

SECTION – A

Answer **ALL** questions

20 x 1 = 20 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 10 RBT2 – 10
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions

4 x 8 = 32 M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 3; RBT2 – 3
22	II	8	
23	III	8	

24	IV	8	
25	V	8	
26	I / II / III / IV / V	8	

SECTION – C

Answer any **FOUR** questions

4 x 12 = 48

M

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 3; RBT2 – 3
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)

Subject: Biochemistry

Title: Applied Biochemistry-Practical

No. of hours: 30

Semester: IV - B

Course Code 20BCP5AB41

Credits: 1

Course objectives

- To Learn basic applied biochemical Techniques
- To Enhance Knowledge on Immunochemical Techniques
- To Impart knowledge on the sensitivity of organisms to various antibiotics

Course outcomes

After completion of the practical, students will be able to

CO1: Correlate the normal values to those present in diseased conditions,

CO2: perform biochemical tests,

1. Demonstration of amylase production
2. Antibiotic sensitivity by paper disc method.
3. Immobilization of enzyme and testing its activity
4. Single radial Immunodiffusion Assay-Mancini method
5. Analysis of Blood group antigens ABO blood group system
6. Isolation of plasmid from bacteria
7. Demonstration of PCR reaction in a thermal cycler.
8. Spotters.

Prescribed Textbooks

1. Varley's Practical Clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London, 1988).
2. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. Andreas Hoffman and Samuel Cloekie.
3. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.

Reference Textbooks

1. Clinical diagnosis and management by Lab methods (John Bernard Henry, W.B. Salunders Company, 1984).

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA
(Affiliated to Krishna University, Machilipatnam)

Scheme of Valuation of Semester End Practical examination

Subject: Biochemistry
Course Title: Applied Biochemistry-Practical
Maximum Marks: 50

Semester: IV B
Course Code: 20BCP5AB41
Maximum Time: 3Hrs.

1	Major Immobilization of enzyme and testing its activity	7 +5 = 12M
2	Minor Determination /Analyse Analysis of Blood Groups	4 + 4 = 8M
3.	Principles/Identification	2 X 5= 10M
4.	Viva	10M
5.	Record	10M