

DEPARTMENT OF BIOCHEMISTRY



Syllabi for Complementary Course for
Model III Zoology and Industrial Microbiology &
Model III Botany and Biotechnology Programmes
Under Credit Semester System
(with effect from 2019 admissions)



St Berchmans College
Founded 1922

AUTONOMOUS | College with Potential for Excellence | Reaccredited by NAAC with A Grade

Affiliated to Mahatma Gandhi University, Kottayam, Kerala
Changanassery, Kottayam, Kerala, India-686101

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Assistant Professor

Dept. of Microbiology & Biochemistry

S B College, Changanassery



PROGRAMME OBJECTIVES

- To understand physiology and physiopathology at the molecular level; the molecular basis of diagnosis, therapeutics, disease prevention and health promotion.
- Become familiar with and understand the basic structures and functions of cells in the human body, applying biomedical concepts and terminology.
- Apply biochemical analysis and reasoning in order to solve problems related to physiology and cellular physiopathology.
- Learn to use a biochemical approach in the study of cellular functions that will provide an understanding of future advances in the molecular bases of physiology, physiopathology, diagnostics, therapeutics, disease prevention, health promotion and the continuous updating of knowledge.

PROGRAMME OUTCOME

- The students are able to apply biochemical analysis and reasoning in order to solve problems related to biochemistry.
- To provide an understanding of future advances in the molecular bases of physiology, physiopathology, diagnostics, therapeutics, disease prevention, health promotion and the continuous updating of knowledge.

The Course aims to prepare students:

- To acquire and apply the relevant biochemical information in order to solve potential biomedical problems.
- Provide students with basic theoretical and practical knowledge of the principal methodologies and techniques for investigation of biomolecules; operation, potential and limitations and selected personal experiences of laboratory work. Understand the theoretical and practical basis of biochemistry as applied to the investigation and measurement of cell functions.
- Assist students in understanding the scientific method.
- Help students develop observation and critical analysis skills: collection, evaluation and classification of data; deducing conclusions; formulating hypotheses.
- Assist students in developing self-learning and the ability to keep knowledge and skills up to date; team work and communication.



OUTLINE OF THE COMPLEMENTARY COURSES

Course Code	Course Title	Hours /Week	Total Hours	Credit	ISA	ESA	Total
Semester I							
BDBC101	Biophysical Chemistry	2	36	2	15	60	75
BDBC1P01	Biophysical Chemistry (P)	2	36	1	5	20	25
Semester II							
BDBC202	Biomolecules	2	36	2	15	60	75
BDBC2P02	Qualitative Analysis of Biomolecules (P)	2	36	1	5	20	25
Semester III							
BDBC303	Enzymology and Biological Techniques	3	54	3	15	60	75
BDBC3P03	Enzymology and Chromatographic Techniques (P)	2	36	1	5	20	25
Semester IV							
BDBC404	Metabolism	3	54	3	15	60	75
BDBC4P04	Quantitative Analysis of Biomolecules (P)	2	36	1	5	20	25





SEMESTER I

BDBC101: BIOPHYSICAL CHEMISTRY

Total Hours: 36

Credit: 2

Objectives:

- To acquire basic knowledge about how physical methods can be applied to understand biological processes.

Outcome:

- Developing an understanding of the relation between structure, function and dynamics of biological macromolecules.
- Developing an understanding of the forces governing protein folding and misfolding.

Module 1: Water, Acids, Bases and Buffers (14 h)

Dissociation of water, ionic product of water, concepts of pH, pOH, simple numerical problems of pH, determination of pH using indicators, pH meter and theoretical calculations. Dissociation of weak acids and electrolytes, Bronsted theory of acids and bases, shapes of titration curve of strong and weak acids and bases. Meaning of K_a and pK_a values, Buffers: buffer action, buffers in biological system, Henderson -Hasselbach equation with derivation, simple numerical problems involving application of this equation.

Module 2: Solutions (6 h)

Meaning of normality, molarity, molality, percentage solution, mole fractions, simple numerical problems from the above, Fundamental principles of diffusion and osmosis, biological importance of osmosis. Isotonic, hypotonic and hypertonic solutions.

Module 3: Colloids (8 h)

Meaning of true solution, colloidal solution, and coarse suspension, distinction between lyophilic and lyophobic sols, Fundamental study of Donnan equilibrium- application in biological system, membrane permeability, methods of preparation of colloidal solution, separation of colloidal solutions, elementary study of charge on colloids, Tyndall effect, emulsion and emulsifying agents, application of colloidal chemistry.

Module 4: Isomerism and bonding in biomolecules (8 h)

Classification of isomerism, Intra and Intermolecular interactions in biological system: Hydrogen bond, Covalent bond, hydrophobic interaction, disulphide bond, Peptide bonds, glycosidic bond, Phosphodiester linkage, Vander waal's forces.



Reference

1. *A Text Book of Biochemistry* (1974) *E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen*, Oxford and IBH Publishing Co., New Delhi.
2. *Principles Of Physical Chemistry* (2008) by Puri Br, Sharma Lr, Madan S Pathania Vishal Publishing Co, India ISBN: 8188646008 ISBN-13: 9788188646005, 978- 8188646005
3. *Biochemistry: A Students Survival Guide* (2002) Hiram. F. Gilbert Publishers: McGraw-Hill ISBN 0-07-135657-6
4. *Biochemistry* (2012) Reginald H. Garrett and Charles M. Grisham Publisher: 5th Edition, Cengage Learning, ISBN-13: 978-1133106296 ISBN-10: 1133106293.
5. *A Text Book of Biophysics* (2005) R N Roy Publisher: New Central Book Agency(P) Ltd., Calcutta, India, ISBN: 8173811458
6. *Lehninger Principles of Biochemistry*(2004) David L. Nelson, Cox, Fourth Edition ; Publisher: W. H. Freeman; ISBN-10: 0716743396 ISBN-13: 978-0716743392



PRACTICAL

BDBC1P01: BIOPHYSICAL CHEMISTRY

Total Hours: 36

Credit: 1

1. Preparation of solutions:
 - Percentage solutions
 - Molar solutions
 - Normal solutions
 - Dilution of Stock solutions
2. Bioinstrumentation (**Any one to be performed**)
 - (a) Use of pH meter
 - Standardization of pH meter.
 - Measurements of pH of solutions using pH meters.
 - (b) Colorimetry and Spectrophotometry techniques-Verification of Beer –Lambert's law
3. Preparation of buffers using the Henderson Hasselbach equation

Reference

1. Hawk's Physiological Chemistry, P.B. Hawk (Author), B.L. Oser (Editor) 14th Edition McGRAW Hill Book Company LTD, New York ISBN- 10: 0070478007, ISBN-13: 978-0070478008
2. Experimental Biochemistry: A Student Companion (2005), Beedu Sasidhar Rao & Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi ISBN 81-88237-41- 8.
3. Biochemical Methods (2008) S. Sadasivam and A. Manickam, New Age International (P) Limited, ISBN-8122421407, 9788122421408



SEMESTER II

BDBC202: BIOMOLECULES

Total Hours: 36

Credit: 2

Objectives:

- Students will be given an introduction to the fundamentals and concepts of biochemistry the structure and functions of proteins, carbohydrates, lipids and nucleic acids.

Outcome:

- Learn the structure and function of biological molecules like nucleic acids, proteins, carbohydrates and lipids.

Module 1: Carbohydrates (10 h)

Carbohydrates: Classification, monosaccharides, D and L forms of glyceraldehyde, Isomerism of carbohydrates, Structure (linear and cyclic structures) of glucose, galactose, mannose and fructose, epimers and anomers with examples, mutarotation and its explanation by ring structures, reactions of sugars (due to functional groups - hydroxyl, aldehyde and ketone), action of acids and alkali on sugars, Reducing actions of sugars., Structure of methyl α - D glucopyranose, 2- deoxy α - D ribofuranose. Amino sugars, glycosides. Structure and biological importance of disaccharides-sucrose, lactose, maltose, isomaltose, trehalose and cellobiose (elucidation of the structures is not included). Structure and important properties of the following structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans- heparin, hyaluronic acid.

Module 2: Lipids (8 h)

Lipids: Definition, basic ideas about the biochemical functions of lipids, classification of lipids with examples, classification of fatty acids, physical and chemical properties of fatty acids, structure of the following fatty acids- stearic acid, oleic acid, linoleic acid, arachidonic acid. Structure of triacylglycerol. Saponification number, acid number and iodine number of fats. Essential and non-essential fatty acids with examples. Compound lipids: membrane lipids- Structure and functions of phospholipids- phosphatidic acid, lecithin, cephalin, and phosphatidyl serine, Functions of Sphingolipids. Steroids: Structure and functions of cholesterol and ergosterol.



Module 3: Proteins (8 h)

Amino acids: Definition, stereoisomerism, structure of 20 standard amino acids - single letter abbreviations of amino acids, classification of amino acids based on charge and polarity, essential and non-essential amino acids, ionization of amino acids. Non-standard amino acids, Peptides: Formation of peptide bond. Classification of proteins. General properties of proteins. Denaturation of proteins and precipitation reactions of proteins. Elementary study of primary, secondary, tertiary and quaternary structure of proteins, forces stabilizing the structure of protein. Outline of protein sequencing (only basic principles of the methods employed).

Module 4: Nucleic acids (6 h)

Nature of nucleic acids, Structure of purines and pyrimidines, nucleosides, nucleotides, phosphodiester linkages, Structure of Nucleic acids- Watson-Crick DNA double helix structure, Brief study of: circular DNA, super coiling, denaturation of nucleic acids- hyperchromic effect, T_m-values and their significance, Types of RNA and DNA, Unusual bases in nucleic acids. DNA sequencing: Sanger and Dideoxy methods.

Module 5: Vitamins and Minerals (4 h)

Vitamins: Definition, classification- fat-soluble and water-soluble: General idea on the sources, chemical nature (without structure), functions and deficiency disorders of vitamins (night blindness, xerophthalmia, rickets, osteomalacia, scurvy, berry-berry, pellagra). Minerals: source and functions of macrominerals (Ca, P, Mg, Na, K) and micro minerals (Fe, F, I).

Reference:

1. Lehninger Principles of Biochemistry(2004) David L. Nelson, Cox, Fourth Edition ; Publisher: W. H. Freeman; ISBN-10: 0716743396 ISBN-13: 978-0716743392
2. *A Text Book of Biochemistry* (1974) E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, Oxford and IBH Publishing Co., New Delhi.
3. Biochemistry (2004) Donald Voet, Judith G. Voet Publisher: John Wiley & Sons Inc ISBN: 047119350X ISBN-13: 9780471193500, 978-0471193500
4. Principles Of Biochemistry (1995), Geoffrey L Zubay, William W Parson, Dennis E Vance Publisher: Mcgraw-hill Book Company, Koga ISBN:0697142752
5. Principles Of Biochemistry (2006); Robert Horton H , Laurence A Moran, Gray Scrimgeour K Publisher: Pearson ISBN: 0131977369, ISBN-13:9780131977365, 978-0131977365
6. Biochemistry (2007) Jeremy M. Berg John L. Tymoczko Lubert Stryer Publisher: 6th



Edition B.i. publications Pvt. Ltd ISBN:071676766X ISBN-13: 9780716767664, 978-716767664

7. Biochemistry (2008); Rastogi, Publisher: McGraw Hill ISBN:0070527954 ISBN-13: 9780070527959, 978-0070527959
8. Fundamentals of Biochemistry (2008) J. L. Jain, Sunjay Jain and Nitin Jain Publishers: S. Chand & Co Ltd ISBN: 81-219-2453-7.
9. Biochemistry (2012) Reginald H. Garrett and Charles M. Grisham 5th Edition
Publisher: Cengage Learning, ISBN-13: 978-1133106296 ISBN- 10: 1133106293
10. Harpers Illustrated Biochemistry (2012), Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell and P. Anthony Weil, 29th Edition (LANGE Basic Science); Publisher: McGraw-Hill Medical; ISBN 10: 007176576X; ISBN-13: 9780071765763



PRACTICAL

BDBC2P02: QUALITATIVE ANALYSIS OF BIOMOLECULES

Total Hours: 36

Credit: 1

- 1. Reactions of Carbohydrates, Amino acids, Proteins, Lipids and Non protein nitrogenous compounds**
 - A. Carbohydrates:** (Glucose, fructose, Maltose, Lactose, Starch, dextrin maybe given for analysis).
Molisch's test, Iodine test, Test for reducing sugars (Fehling's test, Benedict's test, Barfoed's test), Seliwanoff's test, Osazone test.(only demonstration)
 - B. Non protein nitrogenous compounds:** (Urea, Uric acid, creatinine) Urease test, Phosphotungstic acid test and Jaffe's test
2. Identification of Monosaccharide, Disaccharide, polysaccharide from a sample following a systematic scheme of analysis (only single component of above mentioned carbohydrates).
3. Identification of NPN following a systematic scheme for analysis (single components only need be given)

Reference:

1. Hawk's Physiological Chemistry, P.B. Hawk (Author), B.L. Oser (Editor) 14th Edition McGRAW Hill Book Company LTD, New York. **ISBN-10:** 0070478007, **ISBN- 13:** 978-0070478008
2. Experimental Biochemistry: A Student Companion (2005), Beedu Sasidhar Rao & Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi ISBN 81-88237-41-8.
3. Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (eds) Narosa Publishing House, New Delhi, ISBN 81-7319-302-9 p 15- 23, 33- 35, 50 -57.
4. Practical Biochemistry, R.C. Gupta & S. Bhargava (eds) CBS Publishers and Distributors, New Delhi, ISBN 81-239-0124-0 p 9 – 27.
5. Biochemical Methods (2008) S. Sadasivam and A. Manickam, New Age International (P) Limited, ISBN-8122421407, 9788122421408



SEMESTER III

BDBC303: ENZYMOLOGY AND BIOLOGICAL TECHNIQUES

Total Hours: 54

Credit: 3

Objectives:

- To provide a deeper insight into the fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes.
- To introduce students to the basic concepts and techniques used in molecular biology.

Outcome:

- Students will be able to define and explain major concepts in the biological techniques.
- Students will learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.

Module 1: Introduction to enzymes (14 h)

History of enzymology, holoenzyme, apoenzyme, and prosthetic group. Activation energy. Interaction between enzyme and substrate- lock and key model, induced fit model. Features of active site. Enzyme specificity and types with example. Enzyme Commission system of classification and nomenclature of enzymes: six major classes of enzymes with one example each. Coenzymes and their functions - NAD, NADP⁺, FAD, FMN, lipoic acid, TPP, pyridoxal phosphate, biotin and cyanocobalamin. Ribozymes, Measurement and expression of enzyme activity, Definition of IU, katal, enzyme turnover number and specific activity.

Module 2: Enzyme kinetics (14 h)

Factors affecting velocity of enzyme catalysed reactions-effect of substrate concentration, enzyme concentration, temperature and pH; K_m and its significance, Michaelis Menton equation (without derivation), Lineweaver- Burk plot, Explanation of competitive and non competitive type of inhibition, their explanation on the basis of double reciprocal plot. Brief study of allosteric regulation with an example. Brief study of the activation of zymogen form of enzymes, covalent modification of enzymes. Isoenzymes- Lactate dehydrogenase Elementary study of isolation of enzymes and the criteria of purity.

Module 3: Applications of enzymes (8 h)

Immobilized enzymes, Abzymes, Industrial uses of enzymes. Diagnostic and therapeutic enzymes (brief study of name of enzyme and role in diagnosis and therapy)



Module 4: Biological Techniques (18 h)

Chromatography - types of chromatography- adsorption chromatography, partition chromatography, ion exchange chromatography, gel permeation chromatography and affinity chromatography.

Electrophoresis - Principle, procedure and application of Agarose gel electrophoresis, Polyacrylamide gel electrophoresis, Isoelectric focussing, blotting techniques.

Colorimetry and Spectrophotometry: - Principles of colorimetry and spectrophotometry.

Centrifugation: Differential Centrifugation, Density gradient centrifugation.

Reference:

1. Lehninger Principles of Biochemistry (2004) David L. Nelson, Cox, Fourth Edition; Publisher: W. H. Freeman; ISBN-10: 0716743396 ISBN-13: 978-0716743392
2. A Text Book of Biochemistry (1974); E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, Oxford and IBH Publishing Co., New Delhi.
3. Biochemistry (2004) Donald Voet, Judith G. Voet Publisher: John Wiley & Sons Inc ISBN: 047119350X ISBN-13: 9780471193500,978-0471193500
4. Principles of Biochemistry (1995) Geoffrey L Zubay, William W Parson, Dennis E Vance Publisher: McGraw-Hill Book Company Koga ISBN:0697142752 ISBN-13: 9780697142757, 978-0697142757
5. Principles of Biochemistry, (2006) Robert Horton H , Laurence A Moran, Gray Scrimgeour K Publisher: Pearsarson ISBN: 0131977369, ISBN- 13:9780131977365, 978-0131977365
6. Biochemistry (2007) Jeremy M. Berg, John L. Tymoczko Lubert Stryer 6th Edition Publisher: B.i. publications Pvt. Ltd ISBN:071676766X ISBN- 13: 9780716767664, 978-716767664
7. Biochemistry (2008) Rastogi Publisher: McGraw Hill ISBN:0070527954 ISBN- 13: 9780070527959, 978-0070527959
8. Fundamentals of Enzymology: The Cell and Molecular Biology of Catalytic Proteins (2000) Nicholas C. Price, Lewis Stevens, and Lewis Stevens Publisher: Oxford University Press, USA ISBN: 019850229X ISBN-13: 9780198502296, 978-0198502296
9. Enzyme Mechanism (2007) P.K. Shivraj Kumar Publisher: RBSA Publishers ISBN: 8176114235 ISBN-13: 9788176114233, 978-8176114233
10. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry (2007) Trevor Palmer, Philip Bonner, **Second** Edition, Publisher: Horwood Publishing Limited ISBN:



1904275273 ISBN-13: 9781904275275,978-1904275275

11. Fundamentals of Biochemistry (2008) J. L. Jain, Sunjay Jain and Nitin Jain
Publishers: S. Chand & Co Ltd ISBN: 81-219-2453-7.
12. Introduction to Biophysics (2008) Pranab Kumar Banerjee Publishers: S. Chand &
Company Ltd ISBN: 81-219-3016-2 p 32.
13. The Tools of Biochemistry (1977) Cooper T.G. John Wiley and Sons, N.Y. USA.



PRACTICAL

BDBC3P03: ENZYMOLOGY AND CHROMATOGRAPHIC TECHNIQUES

Total Hours: 36

Credit: 1

Objective: The objective here is to make the students understand the basic steps involved in extraction and determination of enzymatic activities and Calculation of enzymatic activities from experimental data

1. Extraction of enzymes:

- Acid phosphatase from Fresh Potato (*Solanum tuberosum*)
- β - amylase from Sweet potato (*Ipomoea batates*)

2. Enzyme assay: (enzymes extracted from above experiment can be used)

- Acid phosphatase
- β - amylase

3. Biochemical separation techniques- Chromatographic Techniques Separation of amino acids by Paper chromatography

Reference:

1. Experimental Biochemistry: A Student Companion (2005), Beedu Sasidhar Rao (author) & Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi ISBN 81-88237-41-8.
2. Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (eds) Narosa Publishing House, New Delhi, ISBN 81-7319-302-9, p 110 - 155
3. Standard Methods of Biochemical Analysis (1999), S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067-5, p 184 – 255.
4. Biochemical Methods (2008) S. Sadasivam and A. Manickam New Age International (P) Limited, ISBN-8122421407, 9788122421408



SEMESTER IV

BDBC404: METABOLISM

Total Hours: 54

Credit: 3

Objectives:

- Understand the fundamental energetics of biochemical processes, chemical logic of metabolic pathways.
- Learn in detail about concepts to illustrate how enzymes and redox carriers and the oxidative phosphorylation machinery occur.

Outcome:

- Knowledge in the digestion and absorption of carbohydrates, proteins and lipids and its metabolic pathways in human body.
- Understand the function of specific anabolic and catabolic pathways and how these pathways are controlled and interrelated.

Module 1: Carbohydrate Metabolism (16h)

Digestion of carbohydrates and absorption of sugars, Reactions of glycolytic sequences with the names of enzymes and intermediates, Substrate level phosphorylation. Fate of pyruvate in alcoholic fermentation, Glycogenesis and glycogenolysis, Gluconeogenesis and pentose phosphate pathway. Reactions of citric acid cycle, Calculation of energy yield (as ATP) of aerobic and anaerobic oxidation of carbohydrates. Electron transport chain and Oxidative phosphorylation.

Module 2: Lipid Metabolism (14h)

Lipid digestion and absorption. Metabolism of triglycerides, Outline study of β -oxidation of saturated and unsaturated fatty acids. Fatty acid synthesis. Outline study of cholesterol biosynthesis.

Module 3 Protein Metabolism (10h)

Proteolytic enzymes of the gastrointestinal tract and their activation (from zymogen forms), Digestion of proteins, Absorption of amino acids from the intestine, Decarboxylation, deamination and transamination of amino acids (without molecular mechanisms), Urea cycle, Fate of carbon skeleton: entry into glucogenic and ketogenic pathways.



Module 4: Nucleotide Metabolism (6h)

Metabolism of nucleotide: Biosynthesis of purine and pyrimidine nucleotides -de novo and salvage pathway (no structure required), end products of purine and pyrimidine metabolism.

Module 5: Photosynthesis (8h)

Light reactions: cyclic and non-cyclic electron transport and photophosphorylation. Dark reactions: the path of carbon- C3 & C4 Pathways (structure not needed), glyoxylate cycle and its significance.

Reference:

1. Lehninger Principles of Biochemistry (2004) David L. Nelson, Cox, Publisher: W. H. Freeman; Fourth Edition; ISBN-10: 0716743396 ISBN-13: 978-0716743392
2. A Text Book of Biochemistry (1974), E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, Oxford and IBH Publishing Co., New Delhi,
3. Biochemistry (2004) Donald Voet, Judith G. Voet Publisher: John Wiley & Sons Inc ISBN: 047119350X ISBN-13: 9780471193500, 978-0471193500
4. Principles of Biochemistry (1995) Geoffrey L Zubay, William W Parson, Dennis E Vance Publisher: McGraw-Hill Book Company, Koga ISBN:0697142752
5. Principles of Biochemistry (2006) Robert Horton H, Laurence A Moran, Gray Scrimgeour K Publisher: Pearson ISBN: 0131977369, ISBN- 13:9780131977365, 978-0131977365
6. Biochemistry (2007) Jeremy M. Berg John L. Tymoczko Lubert Stryer 6th Edition Publisher: B.i. Publications Pvt .Ltd ISBN:071676766X ISBN-13: 9780716767664, 978-716767664
7. Biochemistry (2008) Rastogi Publisher: McGraw Hill ISBN:0070527954 ISBN-13: 9780070527959, 978-0070527959
8. Harpers Illustrated Biochemistry (2012), Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell and P. Anthony Weil, 29th Edition (LANGE Basic Science); Publisher: McGraw-Hill Medical; ISBN 10: 007176576X;ISBN-13: 9780071765763



PRACTICAL

BDBC4P04: QUANTITATIVE ANALYSIS OF BIOMOLECULES

Total Hours: 36

Credit: 1

A. Estimation of Carbohydrates: (Colorimetric)

1. Quantitation of total sugars by anthrone method and DNS method

B. Separation and Estimation of Lipids: (Colorimetric)

1. Estimation of Cholesterol by Zak's method

C. Estimation of Proteins and Amino acids: (Colorimetric)

1. Estimation of protein by Lowry's method
2. Determination of protein by Biuret method

D. Estimation of Nucleic acids: (Colorimetric)

1. Estimation of DNA by Diphenylamine method
2. Determination of RNA by orcinol method

Reference:

1. Experimental Biochemistry: A Student Companion (2005), Beedu Sasidhar Rao (author) & Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi ISBN 81-88237-41-8.
2. Introductory Practical biochemistry (2005), S. K. Sawhney & Randhir Singh (eds) Narosa Publishing House, New Delhi, ISBN 81-7319-302-9, p 15 - 109
3. Standard Methods of Biochemical Analysis (1999), S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067-5, p 49- 181, p 269- 285.
4. Biochemical Methods (2008) S. Sadasivam and A. Manickam New Age International (P) Limited, ISBN-8122421407, 9788122421408.



Model Question Papers

Reg number:.....

Name:.....

BSC DEGREE (SBCSS) EXAMINATION AUGUST 2019

Complementary course – Biochemistry

Common for B. Sc Biotechnology and Microbiology

BDBC101 Biophysical Chemistry

Time:3hrs

Total marks:60

Part A

Answer any 10 questions.

Each question carries 2 marks

1. What is buffer? Give two examples.
2. Define normality.
3. Prepare 2M ,250 ml Na OH solution.(mol wt of NaOH 40)
4. What is osmosis?
5. What is facilitated diffusion?
6. What do you mean by an isotonic solution?
7. Mention about the concepts of pH& pOH.
8. What is translational diffusion?
9. Define Isomerism.
10. What is mole fraction?
11. What is hydrogen bond?
12. Define osmotic pressure.

(10X2=20)

Part B

Answer any six questions

Each question carries 4 marks.

13. What are the methods of preparation of colloidal solution?
14. Calculate the final concentration if 2 L of 3 M NaCl, 4 L of 1.5 M NaCl and 4 L of water are mixed
15. Briefly explain the dissociation of electrolytes.
16. What are the factors affecting rate of diffusion?



17. Briefly note on hypertonic and hypotonic solution.
18. Give an idea about ionization of water.
19. Write down the applications of donnan membrane equilibrium.
20. What is tyndall effect? Explain with diagram
21. Write a note on lyophilic and lyophobic salts.

(6 x 4=24 Marks)

Part C

Answer any two questions

Each question carries 8 marks

22. Outline the determination of pH using indicators.
23. What is membrane permeability?
24. Write a short note on the electrical property of colloids.
25. Briefly explain about titration curve.

(2x8=16 marks)



REG NO:.....

NAME:.....

ST.BERCHMANS COLLEGE (AUTONOMOUS), CHANGANASSERY

UG SBCSS EXAMINATION MARCH 2019

Second Semester

B.Sc. Industrial Microbiology and Zoology (Double Core)

Complementary Course BDBC202 Biomolecules

Time: 3 Hrs

Total Marks: 60

Part A

Answer any 10 questions.

Each question carries 2 marks.

1. Write the single letter code for Glutamate and Tyrosine.
2. Draw the structure of stearic acid and oleic acid.
3. What are amino acids?
4. What is supercoiling?
5. Draw the structure of cellulose.
6. What do you mean by hyperchromic effect?
7. Write down any two biochemical functions of lipids.
8. Draw the structure of any two essential amino acids.
9. Write a note on precipitation reaction of proteins.
10. Mention about essential and non essential fatty acids with examples.
11. Draw the structure of cholesterol and ergosterol.
12. What is Chargaff's rule? (10X2=20)

Part B

Answer any six questions

Each question carries 4 marks.

13. Draw the linear and cyclic structure of galactose and mannose.
14. What is saponification number? Give example.
15. Outline the biochemical functions of folic acid.
16. Write down the important properties of glycogen.
17. Write a note on compound lipids.
18. How is peptide bond formed? Illustrate.
19. Explain denaturation of nucleic acids.



20. Write a note on glycosaminoglycans.

21. Write down the classification of aminoacids based on charge and polarity.

(6X4=24 marks)

Part C

Answer any two questions

Each question carries 8 marks.

22. Outline the physical and chemical properties of fatty acids.

23. Explain the primary and secondary structure of proteins.

24. Explain about the types of RNA.

25. Explain the classification of proteins.

(2x8=16 marks)



Reg no:.....

Name:.....

B.Sc. DEGREE (SB-C.S.S) EXAMINATION OCTOBER 2019

THIRD SEMESTER

Complementary course – Biochemistry

Common for B. Sc Biotechnology and Microbiology

BDBC303 ENZYMOLOGY AND BIOLOGICAL TECHNIQUES

Time:3hrs

Total marks:60

Part A

Answer any 10 questions.

Each question carries 2 marks.

1. What is holoenzyme?
2. What is LB plot?
3. Write down the principle of chromatography?
4. What are zymogens? Give example
5. Define IU and katal?
6. Explain lock and key model of enzymes?
7. Write down any 4 industrial uses of enzymes?
8. Write a note on isoelectric focusing?
9. Explain the significance of k_m value?
10. Distinguish colorimeter and spectrophotometry.
11. What do you mean by northern blotting?
12. Write down any 4 therapeutic enzymes?

(10X2=20)

Part B

Answer any six questions

Each question carries 4 marks.

13. Explain any 2 coenzymes with its function?
14. What is Michaelis Menton equation? Explain?
15. Briefly explain the covalent modification of enzymes?
16. Write a note on allosteric enzymes with example?
17. Briefly explain factors affecting velocity of enzyme catalyzed reactions?
18. Explain gel permeation chromatography?
19. Briefly explain about isoenzymes?



20. Explain differential centrifugation?
21. Explain immobilization of enzymes?

(6X4=24 marks)

Part C

Answer any two questions

Each question carries 8 marks.

22. Write an essay on gel electrophoresis?
23. Explain in detail about different types of chromatographic techniques?
24. Give an account of classification of enzymes?
25. Explain competitive and non-competitive type of inhibition of enzymes?

(2x8=16 marks)



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B.Sc. DEGREE (SBC.S.S) EXAMINATION OCTOBER 2019

FOURTH SEMESTER

Complementary course – Biochemistry

Common for B. Sc Biotechnology and Microbiology

BDBC303 METABOLISM

Time:3hrs

Total marks:60

Part A

Answer ten questions

Each question carries 2 mark.

1. What is photophosphorylation?
2. Differentiate PS1 and PSII?
3. What is glyconeolysis?
4. What is substrate level phosphorylation?
5. Explain cori cycle?
6. Distinguish between endo enzymes and exo enzymes?
7. Compute the total number of ATP molecules formed during the breakdown of one acetyl coA?
8. What are the two important sources of glucose to the organism?
9. Explain chemiosmotic theory?
10. What are glucogenic and ketogenic aminoacids?
11. Write a note on high energy compounds?
12. What are the significance of glyoxylate cycle? (10X2=20)

Part B

Answer any six questions

Each question carries 4 marks.

13. Explain electron transport chain?
14. Explain in detail the role of hormones in glycogen metabolism?
15. Write down the β oxidation of fatty acids?
16. Illustrate gluconeogenesis?
17. Describe pentose phosphate pathway and mention its significance?
18. Explain the C3 and C4 pathways?



19. Write down the de novo pathway for purine metabolism?
20. Illustrate urea cycle.
21. Write a note on digestion and absorption of lipids? (6X4=24 marks)

Part D

Answer any two questions

Each question carries 8 marks

22. Explain light reactions in photosynthesis?
23. Explain the reaction of glycolytic sequences with the names of enzymes and intermediates?
24. Explain the reaction sequences happening in kerb's cycle?
25. Explain cholesterol biosynthesis?
- (2x8=16 marks)



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