SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc. Biochemistry

Under Faculty of Science

B. Sc. Syllabus structure

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year (Semester – I)

Course No.	Course Title	Periods /Week	Total Periods	Internal evaluation	External evaluation	Credits
	Theory Papers					
CCBC-I-101	Communication Skills-1	03	45	10	40	02
CCBC-I-102	Basic Chemistry	03	45	10	40	02
CCBC-I-103	Basic Microbiology	03	45	10	40	02
CCBC-I-104	Basic Biotechnology	03	45	10	40	02
CCBC-1-05	Introduction to Bio-Molecules	03	45	10	40	02
CCBC-I-106	Technical Biochemistry	03	45	10	40	02
CCBC-1-107	Evolutionary Biology	03	45	10	40	02
						14

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Distribution of credits for B.Sc. Biochemistry

Under Faculty of Science

B. Sc. Syllabus structure

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year –(Semester – II)

Course No.	Course Title	Periods /Week	Total Periods	Internal Evaluation	External Evaluation	Credits
	Theory Papers					
CCBC-II-201	Communication Skills-II	03	45	10	40	02
CCBC-II-202	Inorganic & Physical Chemistry	03	45	10	40	02
CCBC-II-203	Stereochemistry	03	45	10	40	02
CCBC-II-204	Microbial Technology	03	45	10	40	02
CCBC-II-205	Biological Metabolism	03	45	10	40	02
CCBC-II-206	Bio physical & Biochemical Techniques	03	45	10	40	02
CCBC-II-207	Nutritional Biochemistry	03	45	10	40	02
	Total					**14**
	Practical Papers (for I & II Semester)					
LCBC-I-1	Laboratory Course Chemistry	04	60	20	80	04
LCBC-I-2	Laboratory Course Micro biology & Biotechnology	04	60	20	80	04
LCBC-I-3	Laboratory Course Biochemistry	04	60	20	80	04
LCBC-1-4	Laboratory Course In Technical Biochemistry	04	60	20	80	04
						16
	1st + 2nd Semester Total Credits (14 +14 + 12) =					**44**

Note:

1. Laboratory Courses includes Skill enhanced Practicals as mentioned therein.
2. The Practical examination will be conducted at the end of year.
3. Practicals in the Laboratory course papers will be conducted throughout year i.e. during first and second semester.
4. Internal evaluation includes conduction of One internal test (Theory/Objective or both in one paper).
5. Internal evaluation for laboratory course should be for skill enhancement based practicals.

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year- Semester – I

Title of the Paper:- Communication Skills-I (CCBC-I-101)

Hours: 45

Unit-I Grammar

Word Classes (Open & Closed), The Sentence & its kinds, Phrase, Clause, Simple,

Complex, Compound Sentences. Transformation of sentences, Tenses and Voice.

Punctuation & Capitalization, Common Errors.

Unit-II Vocabulary

Word Formation, Synonyms and Antonyms, One Word Substitution, Homophones & Homonyms.

Unit-III Communication Skills

Definition, Types of Communication, Process of Communication, Barriers to Communication, Non Verbal Communication, Principles of Effective Communication.

Unit-IV Writing Skills- Letter Formats, Memo Format, News Paper Advertisements, Curriculum Vitae, Personal Interview.

Unit-V Phonetics

44 sounds of English, Consonants, Vowels and Diphthongs. Transcription of Words.

Reference Books:

1. Technical Communication- Raman & Sharma- Oxford
2. Technical Communication: A Reader centered approach, Anderson Thomson
3. English Grammar & Composition- Pal & Suri- S. Chand
4. Course in Technical English- Somaya Publication
5. A Practical English Grammar ï A.J. Thomson A.V.Martinet
6. Written Communication in English ï Sarah Freeman Orient Longman Pvt.Ltd.
7. English for Practical Purpose-Patil, Valke- Mac Milan
8. Developing Communication Skills by Krishna Mohan & Meera Banerjee
9. Personality Development by Dr. T. Bharathi, Neelkamal Publications.

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year- Semester – I

Title of the Paper:- Basic Chemistry (CCBC-I-102)

Periods: 45

Unit –I: Chemical Bonding 10

Definition, Types of chemical bonding Ionic bond, covalent bond, Co-ordinate bond, Metallic bond, Vander wall's bond, Hydrogen bond.

Theories of bonding –Valence bond Theory, Molecular orbital Theory.

Concept of Hybridization, Types of Hybridization – SP,SP^2 , SP^3,dSP^2,dSP^3,d^2SP^3 hybridization with suitable examples.

Unit –II: Study of Organic Compounds 10

Empirical, structural & Molecular formula, Nomenclature & classification of organic compounds, Determination & estimation of C, H, N & Halogens.

Unit –III: Mechanism of organic Reactions 12

- Types of reagents – Electrophiles, Nucleophiles
- Electron Mobility : Inductive effect, Resonance, Hyper conjugation (With one example each)
- Reactive intermediates – carbocation, carbanion, free radicals, carbenes, Arynes & nitrenes.
- Aromaticity & Huckel Rule.
- Types of Reactions: Substitution, Addition, Elimination, Rearrangement, Redox Reaction.

Unit –IV:Solid State 13

- Definitions of unit cell, space lattice
- Laws of crystallography – Law of constancy of interfacial angles, Law of Rational indices, Law of symmetry.
- Symmetry elements in crystal, Determination of miller indices study of crystal structure – Nacl, Kcl, Cscl.
- X-ray crystallography, Derivation of Bragg's equation.

Reference Books:-

1. Text book of Inorganic chemistry - Puri & Sharma.
2. Concise inorganic chemistry - J.D.Lee
3. Text book of inorganic chemistry - Guradeep Raj & Chatwal
4. Advanced organic chemistry - Bhal & Bhal
5. Physical chemistry - Bhal & Tuli
6. Advanced organic chemistry - P.L.Soni
7. Fundamentals of chemistry - Farooqui, Kuberkar & Wangikar.

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Syllabus B.Sc. Biochemistry

Under Faculty of Science

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year (Semester – I)

Title of the Paper:- Basic Microbiology (CCBC-I – 103)

Periods: 45

Unit I 10

- Scope of Microbiology: Microorganisms in human affairs and industry. History of Microbiology: Contributions of Anton van Leeuwenhoek, Joseph Lister, Paul Ehrlich, Edward Jenner, Louis Pasteur, Robert Koch and Alexander Fleming. Diversity of Microorganisms: General account of Bacteria, Fungi, Protozoa, Algae and Viruses

Unit II 10

- Prokaryotic Cell: Cell wall. Distinction between cell wall of Gram positive and Gram negative bacteria. Cell membrane, Cytoplasm, nucleoid, endospore, flagella, pili, glycocalyx. Structure of Archaea cell.
- Eukaryotic cell: Cell membrane, cytoplasm. Organelles: Nucleus, Mitochondria, Endoplasmic reticulum, Ribosomes, Golgi bodies, Lysosomes and Chloroplast. External structures-flagella, cilia and cell wall.

Unit III 10

- Taxonomy: Naming of microorganisms. Contribution of C. Linnaeus, Taxonomy hierarchy, Whittaker's five kingdom and Carl Woese's three domain classification system. Classification of bacteria and cyanobacteria: Bergery`s Manual of Systematic Bacteriology. Classification of Fungi and Protistean , Algae.

Unit IV. Microscopy: - 10

- General Principle of Microscopy: Image formation, Magnification, Numerical aperture, Resolving power, working distance, Focal length, Focal point.
- Principle, Construction, Working and Uses of compound microscope.

- Special features of: Contrast, Fluorescence, Dark field and Electron Microscope.

Unit V. Stain and Staining Procedure: - 05

- Definition of dye and stain.
- Classification of Stains : Acidic, Basic, Neutral
- Principle, Procedure, Mechanism of: Simple staining, Negative staining, Gram's staining, Acid fast staining, Cell wall, Capsule staining.

Reference Books:-

1) Introduction to Microbiology : Anderson D.A.
2) Textbook of Microbiology : Anantnarayan R. & C.KJ. Panikar
3) Industrial Microbiology : Casida
4) Microbiology 5th edition : Pelzar M.J., E.C.S. Chan, Krieg N.R.
5) General Microbiology 5th edition : Stainer R.Y., Ingraham J.L. & Painter P.R.
6) Handbook of research : Institution in India edited by I.B.C Staff Publication Indian Bibliography centre Varanasi, year – 1995.
7) Practical Microbiology : Dr.R.C.Dubey, Dr.D.K.Maheshwari.

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Syllabus B.Sc. Biochemistry

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year (Semester- I)

Title of the Paper:- Basic Biotechnology (CCBC-I-104)

Periods: 45

Unit I: Introduction 10

Definitions of Biotechnology, Historical account of traditional biotechnology, brewing, cheese making & silage production.

Recent discoveries from cell biology to biotechnology including the use of r-DNA technology & hybridoma.

Unit II:Food & Enzyme Biotechnology 10

a.Enzyme technology: Industrial enzymes, Immobilization of enzymes, Diagnostic enzymes, Enzyme analyser & electrode therapeutics.

b. Food & Beverages: Beer, wine, Distilled spirit, Baker's yeast, Milk products, Organic acids, SCP, SCO, Aminoacids, Vitamins & Flavonoids.

Unit III: Agriculture & Health Biotechnology 10

Health care: Penicillin & other antibiotics, Vaccine & steroid hormone.

Agriculture: Transgenic plants & animals, Microbial control of insects, Products from animal & plant cell culture.

Waste water treatment & biodegradation: Treatment systems & Biodegradation of xenobiotics.

Fuel & chemicals: Fuel alcohol, Biogas, Enhanced oil recovery, Industrial chemicals

Ethical & social impact of Biotechnology

Unit IV: Vectors and their use in Biotechnology 15

Molecular cloning,Enzymes used in molecular cloning, and Use of vector in molecular cloning

Vectors – Definition, properties for ideal vector, types of vector- Plasmid, cosmid, Phagemid, BAC,YAC

Prokaryotic expression vector, Eukaryotic expression vector, Shuttle vector.

Reference Books:

1. Basic Biotechnology: Bullol&Bullok

2. Basic Biotechnology: S. Ignacimuthu

3. Introduction of Biotechnology: Brown, Camball&Triest

4. Fundamentals of Biochemistry: A.C.Deb

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Syllabus B.Sc. Biochemistry

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year (Semester – I)

Title of the Paper:- Introduction to Bio-molecules (CCBC –I- 105)

Periods: 45

Unit I : Carbohydrates. 08

PIntroduction to carbohydrate, classification, properties of monosaccharide, osazone formation, mutarotation. Introduction to disaccharide (lactose, maltose, sucrose) and polysaccharide (Heparin, starch, and glycogen) biological function of carbohydrate

Unit II: Lipid and Fatty acids. 10

Introduction to lipid, occurrence, properties, classification of lipid. Importance of phospholipids, sphingolipid and glycerolipid. Biological function of lipid.Fatty acid, - Introduction, Nomenclature and classification of fatty acid Essential and non essential fatty acids.

Unit III: Amino acids and protein. 15

Introduction to amino acid, structure, classification of protein based on polarity. Properties (physical, chemical) Titration of amino acid. Essential and non essential amino acid. Amino and sequencing (EDMan and Sangar method).Protein Introduction to protein, classification of protein based on solubility, shape, composition and Function. Peptide bond – Structure of peptide bond. Denauration – renaturation of protein, properties of protein. Introduction to lipoprotein, glycoprotein and nucleoprotein. Biological function of protein (Protein structure)

Protein structure - Primary, secondary / tertiary and quaternary.

Ramchandran plot, β – turns and motif.

Unit IV : Nucleic acids 12

Introduction to nucleic acid, Difference between nucleotide and nucleoside, composition of DNA & RNA Structure of Nitrogen bases in DNA and RNA along with the nomenclature.

- DNA double helix (Watson and crick) model
- Intuduction of A, B, Z DNA.
- Gene, genome and chromosome.
- Types of RNA , structure of t – RNA (clover leaf model)

Reference Books:

- Biochemistry : U. Satyanarayana
- Biochemistry : Lubest Stryer
- Fundamental of Biochemistry : A.C. Deb
- Textbook of Biochemistry : Jain & Jain

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Syllabus B.Sc. Biochemistry

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Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year (Semester – I)

Title of the Paper :- Technical Biochemistry CCBC-I-106)

Periods : 45

Unit I -. 10

Basic concept in Techniques - Normality –definition, Examples. Molarity- Definition,examples.

Purification ,Centrifugation, Filtration, Dialysis, Homogenization, Adsorption, absorption, Partition, Centrifuge- types & application ,Density Gradient centrifugation, Sedimentation, Sedimentation coefficient,

Unit II – 10

Properties of Light -Light spectra, wave length, Plane polarized light, optical rotation ,Optical Rotatory Dispersion & Circular Dichroism , Absorbance – chromophore, Auxochrome, , Colorimeter - Instrumentation, Principal, working, Application , X-ray Diffraction studies

Unit III – 15

pH and buffer : Hydrogen ion concentration,Handerson – Hasselbalch equation, Buffer- definition, Types & its preparation,Buffers of biological importance such as carbonate-bicarbonate,phosphate,acetate,etc.,Hemoglobin buffering capacity,Mechanism of action of buffers in biological system, PH meter –instrumentation and application.

Unit IV- **10**

Use of Different Solvent system- for amino acid, Carbohydrate and Lipid separation.

Types of techniques – Analytical Technique – Definition, Examples. Separation Techniques- Examples. Application of Technical Biochemistry in Medical field, in research field & In Industrial field.

Reference Books:

- Biophysical and biochemical technique : Nath and Upadhya
- Fundamental of Biochemistry : A.C. Deb
- Textbook of Biochemistry : Jain & Jain

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Syllabus B.Sc. Biochemistry

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year (Semester – I)

Title of the Paper :- Evolutionary Biology CCBC-I-107)

Periods : 45

Unit – I 10P

Theories of the origin of life special creation, spontaneous generation abiotic synthesis of organic monomers and polymers, experiment of Milar's &Urey

Unit – II 13P

Theories of Evolution- Lamarck Darwin theory, concepts of variation, adaption, struggle fitness &natural selection, Mendelism, Evidence of Evolution- palentology, Anatomy, embryology

Unit -III 12P

Population Genetics – Population, Gene pool, Gene frequency, Hardy – Eeinberg law, migration and random genetics drift. Allopatricity, Sympartricity, Co-evolution,

Unit - IV 10P

Concept of species – Morphological, Biological & Evolutionary concept. Evolution of Prokaryotic & Eukaryotes mutation theory by Hugo de Veries.

REFERENCE BOOK

- Cel l biology Molecular Biology, Evolution & Genetics by Verma & Agrawal.
- Ev olution of Vertebrates- Colbert
- Ev olution-Lull

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CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. Biochemistry First Year- Semester – II

Title of the Paper:- Communication Skills-II (CCBC-I-201)

Hours: 45

Objective: To improve the skills in correct English in writing and pronunciation

Unit I: Grammar

Word Classes (Open & Closed), Sentence ï Kinds ï Transformation, Phrase, Clause and its kinds,

Simple, Complex & Compound sentences, (Only definitions & Structure)

Tenses - Use of verbs in the Sentences

Unit II: Vocabulary

Morphology, Synonyms & Antonyms, One Word Substitution, Homophones & Homonyms

Unit III Communication Skills

Definition & its all Types, Communication Cycle & Barriers, Principles for Effective Communication,

Varieties in English (Indian, British & American).

Unit IV: Writing Skills

Letters (Formal & Informal), Report Writing (Scientific and Formal), Memorandum, Curriculum Vitae,

Personal Employment Interview, Group Discussion.

Phonetics: 44 sounds, consonants, vowels & Diphthongs, Transcription of words, Accent, Syllable

cluster and Intonation.

Reference Books:

1. Developing of Communication Skills -Krishna Mohan & Meera Banerji
2. A Practical English Grammar A.J. Thomson -Oxford
3. Mastering English Grammar ï S.H.Burton
4. Technical Communication- Raman Sharma- Oxford
5. Written Communication in English ï Sarah Freeman Orient Longman Pvt. Ltd.
6. A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija
7. Radiance-Tengse

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Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year (Semester – II)
Tile of the Paper:- Inorganic & Physical Chemistry (CCBC-II-202)

Periods: 45

Unit I: Essential trace elements & its toxicity system. 10

Introduction of Trace elements, criteria for essential elements, Ultra trace metals & non- metals, toxicity & deficiency of trace elements.

Unit II: Role of metals & nonmetals ion in biological system 10

Role of metals in biological systems.

- Function of Biomineral, Biomineralisation.
- Role of Hydrolysis, oxido-reductases, Isomerases & synthatase enzymes.
- Role of non-metals in biological system.

Unit III: Thermodynamics 10

Definition of thermodynamics, terms-system, surrounding etc. Types of systems, Intensive & extensive properties, state & path functions & their differentials. Thermodynamic process, concepts of Heat & work. First law of thermodymics - statement, definition of internal energy & enthalpy Heat capacity, heat capacities at constant volume & pressure & their relationship, Joule's law, Joule Thomson effect, Joule Thomson coefficient & Inversion temperature.

Unit IV: Chemical Equilibrium & Phase Equilibrium 15

Chemical Equilibrium: Equilibrium constant & free energy, thermodynamics derivation of law of mass action. Reaction isotherm & isochore. Clapeyron equation, clausius clapeyron equation, applications, Numericals on vant Hoff's isochore.
Phase Equilibrium:
Statement & meaning of the terms, phase component & degree of freedom in phase rule equation, phase equilibria of one component systems, water & sulphur systems. Application of phase rule to Co2 system.

- Solid solution: Compound formation of confruent metting point (Mn-Zn) system & incongruent metting point (Nacl – H_2O) system, freezing mixtures, acetone, and dry ice melting.
- Liquid – Liquid mixtures – Ideal liquid mixtures, Rault's & Henry's law Non-ideal systems, azeotropes Hcl – H_2O system & ethanol – water.

Reference Book:

1. Principles of physical chemistry : Puri & Sharma
2. Elementals of physical chemistry : T.W.Atkin
3. Essentials of physical chemistry : Bhal & Tuli
4. Concepts of chemistry : Farooqui, Kuberkar & Naikwade

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry First Year (Semester – II)

Title of the Paper: - Stereochemistry (CCBC-II – 203)

Periods: 45

Unit I: Organic Stereochemistry 10

Isomerism, Types of isomerism, representation of organic molecules, optical isomerism. Plane polarized light, optical activity. Working of polarimeter angle of rotation, specific rotation d-l. Cause of optical activity symmetry, elements and chirality,

Unit II: Enantiomers 15

Enantiomers and their properties. Chiral and achiral molecule with 1 and 2 stereogenic centers. Diastereoisomers. Threo and erythreo diastereoismomers mesoforms. Relative and absolute configuration d-l rotation, Sequence Rule R & S nomenclature.

Geometrical isomerism cis and Trans isomerism and E and Z systems of nomenclature, conformational analysis of ethane, n-butane and cyclohexane.

Unit III:Recemisation and Resolution 07

Methods of Recemisation Resolutions of Recemie mixture

Unit IV:Inorganic Stereochemistry 08 P

Types of coordination complexes, isomerism of different coordination complexes. Geometric isomerism. Optical Isomerism with multidentate ligands

Reference Book:

1. Test book of Inorganic chemistry : Gurudeep Raj & Chatwal
2. Advanced Organic Chemistry : Bhal & Bhal
3. Advanced Organic Chemistry : P.L.Soni
4. Organic Chemistry : Marrison & Boyd.
5. Stereochemistry : P.S.Kalsi
6. Fundamentals of Chemistry : Farooqui, Kuberkar & Wangikar

Renuka Prakashan,

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Subject: Biochemistry (Honors)

B.Sc. Biochemistry

First Year (semester – II)

Title of the Paper: - Microbial Technology (CCBC -II – 204)

Periods: 45

Unit – I: - Ferment or, Screening, Stock culture and Inoculum: 11

- Definition and Scope of Industrial Microbiology
- Fermenter: Design and Role of different parts of Fermenter
- Screening methods:- Primary and secondary screening
- Stock cultures:- Primary stock, working stock, stock culture method
- Inoculums preparation

Unit – II: - Fermentation media and Product recovery operation 16

- Fermentation media: - Media composition, media sterilization and contamination.
  Media economics, screening for Fermentation media
- Fermentation process:- Batch, continuous, dual, solid state, surface Fermentation
- Downstream processing (Fermentation product recovery): Centrifugation, Flocculation, Filtration, dialysis, solvent extraction, adsorption and elution, distillation, precipitation, crystallization, counter – current distribution, chromatography, Ion exchange resin

- Detection and assay of fermentation product: physical, chemical and biological assay (penicillin and vitamin B_{12} bioassay in detail)

Unit – III: - Modern trends in microbial production of: 09

- Bioinsecticides
- Biofertilizers
- Immobilized enzymes
- Use of immobilized cell system in production of fine chemicals

Unit – IV: - Novel Technologies 09

- Mushroom cultivation
- Distilled Beverages and white Fermentation
- Steroids and sterols transformation

Reference Books:-

- General Microbiology : R.Y. Stainer
- General Microbiology vol. I & II : H.F. Daginawala & Powar
- Text book of microbiology : M.B. Deshmukh & P.S. Wakte
- Outline of Microbiology : A.N. Deshmukh
- Practical Microbiology : Dr. R.C.Dubey & Dr.D.K.Maheshwari

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry

First Year (Semester – II)

Title of the Paper:- Biological Metabolism (CCBC–II- 205)

Periods: 45

Unit I: a) Introduction to Metabolism 12

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

b)Carbohydrate Metabolism

Reaction and energetic of glycoysis, Alcoholic & Latic acid, Fermentation. Entry of Fructose. Galaclose Mannose, etc. Reaction and energetic of TCA cycle. Gluconeogenesis. Glycogenesis and glycogenolysis Reactions and Physiological significance of pentose phosphate pathway, Regulation of glycoysis , TCA cycle.

Unit II: Electron Transport chain and Oxidative Phosphorylation 07

Structure of Mitochondria, Sequence of electron carriers, site of ATP production, Inhibitors of electron transport chain. Hypothesis of mitochondrial oxidative phosphorylation (basic concepts). Inhibition and uncouplers of oxidative phosphorylation. Transport reducing potentials into mitochondria.

Unit III: Lipid Metabolism 12

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

Unit IV: Amino acid Metabolism 08

General reaction of amino acid metabolism transamination oxidative deamination and decarboxylation. Urea cycle, Glycogenic and ketogenic amino acids

Reference Books:

- Fundamentals of Biochemistry : Donald Voet, J.g.Voet & Pran
- Biochemistry : Geffrey L. Zubay
- Biochemistry : Lubert Stryer, W.H.Freeman & Co.

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Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry

First Year (Semester - II)

Title of the Paper :- Biophysical and Biochemical Techniques (LCBC-II- 206)

Periods: 45

Unit I: Chromatography 15

General principles and application of

1) Paper chromatography.
2) Thin layer chromatography.
3) Adsorption chromatography.
4) Ion-exchange chromatography.
5) Gas-liquid chromatography.
6) High performance liquid chromatography. (HPLC)
7) Molecular sieve chromatography.

Unit II: Electrophoresis 10

General principle and application of gel electrophoresis.

PAGE and SDS-PAGE, Isoelectric focusing.

Two dimensional electrophoresis and its applications.

Unit III: Spectroscopic techniques 12

Basic principle, laws of absorption (Lambert - Beers law).

Instrumentation for UV-Visible and IR Spectrophotometry and their applications.

Unit IV: Advanced Spectroscopic techniques 08

Principle and applications of NMR, mass spectroscopy, Fluorescent and Emission spectroscopy.

Reference Books:

1) Fundamentals of biochemistry- : Donald Voet, J.G. Voet and Pratt.
2) Biochemistry- : Geffrey L. Zubey.
3) Biochemistry- : Lubert Strayer and W.H. Freeman
4) Biophysical chemistry- : Upadhyay. Upadhyay. Nath.
5) Principles and techniques of - biochemistry and molecular biology : Keith Wilson and John Walker.

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Syllabus B.Sc. Biochemistry

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CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B.Sc. Biochemistry

First Year (Semester - II)

Title of the Paper :- Nutritional Biochemistry (LCBC-II- 207)

Periods: 45

Unit – I Energy Metabolism 07P

Energy value of food (Protein, carbohydrate, fats, & protein). BMR and factor affecting BMR Disease caused by mal nutrition's (Protein, mineral & vitamins).

Unit – II 07P

Nutritional aspect of carbohydrate lipid and protein and fiber. Disease related to digestion & absorption of food . Minerals major and minor minerals physiological and biochemical function assay.

Unit – III Protein Nutrition 07P

Protein food Nutritional significances of protein from milk, legumes, egg, meat, & fish. Protein efficiency ratio, biological value and digestibility coefficient.

Unit- IV Lipid Nutrition 12P

Composition, source of fat & oil function utilization, required daily allowances, excess & deficiency. Role of cholesterol & arteriosclerosis. Obesity – definition, complications prevention & treatment.

Unit – V Water & Mineral Metabolism 12P

Significance of water in metabolism. Dehydration & oedema. Source & significance of calcium & phosphate metabolism. Iodine metabolism. Significance, preservation of physiological PH & union and caution balance. Acid – base balance in body fluids.

References:

1. Nutrition and -Shubhangi Joshi
2. Principles of nutrition - E.D Wilson
3. Hardbook of nutrition - M.Swaminathan
4. Applied nutrition - R.Rajlaxmi

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Syllabus B.Sc. Biochemistry Practical

Under Faculty of Science

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

Annual Pattern Practical Paper

B.Sc. Biochemistry

B. Sc. First Year (I & II Semester)

Title of the Paper:- Lab course – Chemistry (LCBC I-1)

Periods: 60

1. Preparation of standard solutions (%, Molar, Molal and Normal) of acids and alkali, Stock and working solution.
2. Preparations of buffer solutions of known pH and molarity using pH meter (Bicarbonate/phosphate/acetate)
3. Qualitative Analysis of organic compound, Preliminary tests, Nature, detection of elements, functional groups, M.P. and their derivatives: Salicylic acid / pthalic acid, Aniline / Nitrobenzene, 1 -Napthol / 2 –napthol, Naphthalene / Carbohydrates.
4. Estimation of glycine
5. Estimation of unsaturation.
6. Estimation of phenol.
7. Estimation of Amine.
8. Estimation of Acids.
9. Prepare standard Na_2CO_3 solution. Standardize the given Hcl solution and estimate the amount of NaOH in the given solution.
10. Qualitative Analysis of Inorganic radicals (Two acidic & two basic radicals)
11. To study kinetics of cooling of H_2O.
12. Determination of Viscosity of liquid by Ostwald's Viscometer.
13. To Determine Surface tension of a given liquid by stalagno meter method
14. To study critical solution Temperature (CST) of phenol-water system
15. Determination of Heat of Reaction of displacement of copper by Zinc

Reference Book:

1. Textbook of Inorganic Qualitative Analysis : Vogel's.
2. Practical of physical chemistry : T.K.Choudhekar, Rajbhoj.
3. Practical of physical chemistry : Jahagirdar.
4. Textbook of organic Qualitative Analysis : Hynes
5. Vogel's Textbook of practical organic chemistry.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Syllabus B.Sc. Biochemistry Practical

Under Faculty of Science

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2016

Subject: Biochemistry (Honors)

B. Sc. First Year (I & II Semester)

Title of the Paper :- Lab Course in Microbiology & Biotechnology (LCBC I-2)

Periods: 60

1. Determination of equipments
   a. Microscope
   b. Hot air oven
   c. Autoclave
   d. Incubator
   e. P^H meter.
2. Hanging drop method for motility.
3. Micrometry measurement of size of bacteria.
4. Bacterial staining: Simple, Negative, Grams staining.
5. Preparation of media
   a. Nutrient broth
   b. Nutrient Agar
   c. MacConkeys broth
   d. MacConkeys Agar
6. Isolation of micro-organism by
   a. Streak plate method
   b. Spread plate method
   c. Pour plate method
7. Capsule staining (Hiss and Maneval's method)
8. Flagella staining.

9. Cultivation of anaerobes - (Candle Jar method)

10. Replica plate technique.

11. Effect of UV as mutagenic agent and photo reactivation.

12Alcohol production by *S.cerevisae*

13. Enumeration of air Microorganism by Solid & Liquid impingement method.

14. Isolation and Characterization of bacteria from soil.

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Subject: Biochemistry (Honors)

B. Sc. First Year (I & II Semester)

Title of the Paper:- Laboratory Course – Biochemistry (LCBC I-3)

Periods: 60

1. Preparations of Different biochemical reagents

a. Ninhydrin Reagent
b. Benedicts Reagent
c. Barfoeds Reagent
d. Biuret Reagent

2. Qualitative test for amino acid

a. Ninhydrin test for amino acid
b. Millions test
c. Sakaguchi test

3. Qualitative test for protein.

a. Precipitation with organic solvent
b. Precipitation with TCA
c. Precipitation with Ammonias sulphate

4. Qualitative test for carbohydrate

a. Molish test
b. Iodine test
c. Benedicts test
d. Barfoeds test
e. Osazone formation

5. Qualitative test for Nucleic acid

a. Orcinol test
b. Diphenyl amine test
c. Neumann's test

6. Qualitative test for lipid

a. Iodine test
b. saponification test
c. emulsification

7. Qualitative Test for Vitamin-

a) Thiamine

b) Ascorbic Acid

c) Riboflavine

Reference Books :-

- An Introduction to practical Biochemistry : David Plummer (TMH)
- Hawke's Physiological Chemistry :
- Laboratory Manual in Biochemistry : J. Jayaraman

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Subject: Biochemistry (Honors)

B. Sc. First Year (I & II Semester)

Title of the Paper:- Laboratory Course – Technical Biochemistry (LCBC I-4)

Periods: 60

1. Separation and identification of amino acids by paper chromatography.
2. Separation and identification of sugars by paper chromatography.
3. Separation of plant pigments on starch column.
4. Determination of Lambda max of $COCl_2$ verification of Beer-Lambert's and determination of molar absorption coefficient.
5. Separation of proteins by Biuret method.
6. Separation of proteins by Lawreys method.
7. Estimation of maltose by DNSA methods.
8. Separation of triglycerides (oils) on TLC.
9. Estimation of Amino acids.

10. Demonstration on spectrophotometer.