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 Second Year (Semester III)

Course No.	Course Title	Periods /Week	Total Periods	Internal evaluation	External evaluation	Credits
	Theory Papers					
CBCS-II-301	English I	03	45	10	40	02
CBCS-II-302	Advanced Chemistry	03	45	10	40	02
CBCS-II-303	Advanced Microbiology	03	45	10	40	02
CBCS-II-304	Genetics	03	45	10	40	02
CBCS-II-305	Enzymology I	03	45	10	40	02
CBCS-II-306	Cell Biology	03	45	10	40	02
CBCS-II-307	Human Physiology	03	45	10	40	02
SEC I	Skill Enhancement Course A(compulsory)	04	60	25	25	02
	Skill Enhancement Course B(optional)					
Total						**16**

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)

Course No.	Course Title	Periods /Week	Total Periods	Internal evaluation	External evaluation	Credits
	Theory Papers					
CBCS-II-301	English I	03	45	10	40	02
CBCS-II-302	Advanced Chemistry	03	45	10	40	02
CBCS-II-303	Advanced Microbiology	03	45	10	40	02
CBCS-II-304	Genetics	03	45	10	40	02
CBCS-II-305	Enzymology I	03	45	10	40	02
CBCS-II-306	Cell Biology	03	45	10	40	02
CBCS-II-307	Human Physiology	03	45	10	40	02
SEC I	Skill Enhancement Course A(compulsory)	04	60	25	25	02
	Skill Enhancement Course B(optional)					
Total						**16**

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Under faculty of Science

B.Sc. Biochemistry

Second Year (Semester – IV)

Course No.	Course Title	Periods /Week	Total Periods	Internal evaluation	External evaluation	Credits
	Theory Papers					
CBCS-II-401	English II	03	45	10	40	02
CBCS-II-402	Fermentation and Nano Technology	03	45	10	40	02
CBCS-II-403	Advanced Biotechnology	03	45	10	40	02
CBCS-II-404	Molecular Biology	03	45	10	40	02
CBCS-II-405	Enzymology II	03	45	10	40	02
CBCS-II-406	Membrane Biochemistry	03	45	10	40	02
SEC -II	Skill Enhancement Course A1(Compulsory) **OR** Skill Enhancement course B-1(Optional)	04	60	25	25	02
						14

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B.Sc. Biochemistry Second Year Annual Practicals

Practical papers(for III and IV semester)	Paper Title	Periods /Week	Total periods	internal evaluation	Credits
LCBC-II-1	Laboratory course Chemistry	**04**	**60**	**20**	**04**
LCBC-II-2	Laboratory course Enzymology and human physiology	**04**	**60**	**20**	**04**
LCBC-II-3	Laboratory course Genetics-Molecular biology-cell biology	**04**	**60**	**20**	**04**
LCBC-II-4	Laboratory course Fermentation and Nano Technology	**04**	**60**	**20**	**04**
LCBC-II-5	Laboratory course Nutrition and Microbiology	**04**	**60**	**20**	**04**
					20
III and IV semester total credits(16+14+20) = 50					

(Note : 01 credit = 25 marks)

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B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Advanced Chemistry (CCBC-302)

Periods: 45
Credits :2

UNIT–I Heterocyclic Compounds 12

Introduction, importance, classification, five and six membered ring containing one hetero atom, structure, synthetic method, Physical and chemical of followings.

- Furan
- Pyrrol
- Thio-Phene
- Pyran
- Quinoline
- IndolS

UNIT–II Organic Spectroscopy 11

UV and visible spectroscopy ï absorption laws, types of electronic transitions, auxochrome, chromophore, conjugated dienes, Woodward ï Fieser based numerical for calculating Amax

IR spectroscopy ï molecular vibrations, frequency, types of vibrations. IR region, applications of IR spectra to find out the structures of alkenes, aromatic Hydrocarbons, alcohols, phenols, Ethers, carbonyl Compound, ketones, carboxylic acids.

UNIT – III Organic Reactions and Applications 11

Study of following reactions, mechanisms with their applications Aldol, Perkin, Beyer-villiger, Diels-Alder, Knoevenagel, Friedel-craft, Opponager oxidation, Reformat sky reaction.

UNIT– IV Electrochemistry 11

Introduction, conductance, specific, equipment conductance, variation, molar concentration. Arrhenius theory, transport number and determination, conduct metric titrations, kohtrauchôs law and an application.

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, Aurangabad - 431 001.
7. A Text book of chemistry : Kuberkar, Rashmi Publication, Nanded.

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)

Title of the Paper: Advanced Microbiology (CCBC-303)

Periods: 45
Credits : 2

Unit-1-Microbiology of water 12

Microbial flora of water: Biotic and Abiotic factors affecting number of organism in natural water. Bacteriological examination of water: Sample collection tests, detection of coli forms in water (Presumptive, conformed, completed tests), (SPC standard plate count), membrane filter count, MPN, detection of fecal streptococci and clostridium. Determining sanitary quality of water bacteriological evidence, significance of index organism (*E-coli*, streptococcus facalis). IMVIC test & elevated temperature.

Unit-2-Microbiology of food 11

Microbiology of Food : Microbial spoilage of food, chemical changes caused by micro-organisms, Principles of Food preservation, control of micro-organisms by use of low and high temperature, dehydration, aseptic handling, pasteurization, lyophilization, radiation pressure for control of micro-organisms.

Unit-3- Waste Water Microbiology 11

Definition of sewage, chemical composition of sewage, Measurement of strength of sewage by BOD and COD sewage treatment, disposal, objective, importance of sewage disposal. Methods of sewage Treatment ï Single dwelling unit, septic tank, evaporation tank, imhalf tank. Secondary Biological Treatment ï Tricking filter, Activated sludge process, oxidation pond, activated sludge digestion. Chemical treatment: Chlorination. Disposal of treated sewage, sludge as fertilizers.

Unit- 4- Advanced Microbial Techniques 11

Microbial techniques used for isolation of bacteria, Antimicrobial activity by using disc diffusion techniques, Measurement of cell mass by turbid metric method , WIDAL test for diagnosis test for diagnosis of *S.typhi,* Bioremediation and phytoremediation.

References :

1. Community Nutrition - MC.Laren
2. General Microbiology - R.Y.Stainer
3. General Microbiology Vol.I &II - H.F.Daginawala & Pawar
4. Text book of Microbiology - M.B.Deshmukh, P.S.Wakte & others.

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Genetics (CCBC-304)

Periods: 45
Credits :2

Unit -1-Mendelism and chromosome theory 12

Introduction and history of genetics
Mendelôs principles and its applications, Mendelôs laws (I, II, III), Genotype, Phenotype
Chromosomal theory of inheritance
Phenomenon of Dominance
Inheritance pattern in human (Sex linked, Autosomal, Mitochondrial, Unifactorial, multi- factorial)

Unit -2-Linkag and crossing over/Recombination 11

Chromosomal theory of linkage, crossing over and its significance, types of crossing over
Recombination in Bacteria (transformation, transduction, conjugation)
Sex determination in plants and animals, sex linkage
Epistasis

Unit-3-Mutations 11

Introduction, classification (spontaneous and induced)-Base substitution, addition, deletion, frame shift mutation and applications of mutation.

Unit-4-Gene interaction and allelic variation 11

Chi square test, Recombination frequency
Multiple alleles (ABO antigen), pseudoalleles
Chromosome mapping, Gene Frequency
Chromosomal abberriations (structural, numerical)

Reference Books:

1. Basic Genetic - Hartle, Freifelds, Seryder.
2. Genetics - Stricberger M.W., Marmillan Publication Inc. (1976)
3. Expending horizons (Introduction to biotechnology by B.D.Singh (Kalyani Punlicatiion)- 2009.
4. Principles of gene manipulation, S.B.Primrose (6^{th} Editioin).
5. Principle of genetics - Gardner, et-al.
6. Genetics ï P.K.Gupts, Rastogi Publication Meerut ï 2001

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Distribution of Credits for B. Sc. Biochemistry
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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Enzymology I (CCBC-305)

Periods: 45
Credits :2

Unit-1Basic concept in enzymology 11

Terms involved in enzymology, Nomenclature of enzymes, classification of enzymes, properties. Coenzyme- Structure and function , TPP, NAD, NADP, FAD, FMN. Enzyme specificity, Mechanism of enzyme action- Lock and key model, induced fit model.

Unit-2 Enzyme Kinetics 11

Importance of kinetics, Concept of steady state and rapid Equilibrium kinetics .Factor affecting enzyme activity, temperature, pH, Concentration, Substrate, Measurements of velocity and its importance. Derivation of Michalies ï menton equation, Single and double reciprocal plots. Unit of enzyme activity, Enzyme turnover number.

Unit-3Mechanism of enzyme action 12

Distribution and localization of enzymes in eukaryotic cell. Mode of enzyme catalysis- covalent, proximate or orientation effect, acid base etc. Chemistry of active center, chemical modification studies by active site directed reagents physical methods for determination of active site conformation. Various theories of mechanism of enzyme action, Structure, function relation of Rib nuclease and chymotrypsin.

Unit -4 Method of purification of enzymes

Centrifugation, ammonium precipitation, solvent precipitation.

Reference Books:

1. Biochemistry ï Zuby.
2. Biochemistry ï Stryer.
3. Principle of Biochemistry- Lehninger.
4. Fundamental of enzymology- price and Stevens.

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Cell Biology (CCBC-II-306)

Periods: 45
Credits : 2

Unit -1 Introduction 12

Cell chemistry, diversity of cell size and shape, structure of eukaryotic and prokaryotic cell.
Cell theory, cellular organelles like plasma membrane, nucleus, cell wall, lysosomes, mitochondria, peroxisome, and chloroplast.
Various enzymes present in cell, membrane transport.
Intracellular compartments and trafficking

Unit-2 Cell cycle and its control 11

Cell cycle –G and S phase
Cell division- mitosis and meiosis
Cell motility- cilia, flagella in prokaryotes and eukaryotes
Control of Cell cycle and cancer
Genetic rearrangement in progenitor cells, oncogenes, tumor supresior genes, metastasis, apoptosis.

Unit-3 Central dogma of life 11

Introduction to transcription and translation,
Cytoskeleton, microfilaments, microtubules, actin, myosin, intermediate filaments.

Unit – 4 - Protein localization

11

Synthesis of cytosolic and secretory protein
Import of proteins to nucleus, chloroplast, peroxisomes, mitochondria.
Receptor mediated endocytosis

References :

1. Cell Biology by Givald Karp.
2. Cell Biology, Genetics, Molecular Biology Evolution and Ecology by P.S. Verma, V.K. Agarwal.
3. Cell & Molecular Biology by P.K.Gupt.

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Human Physiology(CCBC II -307)

Periods: 45
Credits : 2

Unit - I Digestive System 08

Generalized structure of digestive tract and associated digestive gland. Function of different parts peristalsis, regulation of olive, gastric, pancreatic Intestinal and bile secretion. Absorption ï (Carbohydrate, protein, lipid minerals and vitamin) transport and excretion of nutrients.

Unit - II Circulatory System 08

Anatomy of heart, Histology of artery, vein and capillary. Blood ï composition of blood. Histology of blood cell, blood group. Function of blood. Lymphatic system.

Unit - III Respiratory System 08

08

Structure and function of lung, trachea bronchiole. Mechanism of respiration ï role of intercostals muscle, stemum, diaphragm during inhalation and exhalation. Gases exchange CO_2 and O_2 Bohrôs effect.

Unit - IV Excretion and Osmorgulation **08**

Anatomy of kidney.Structure of a typical uriniferous tubule. Mechanism of ultra filtration, Urine formation and acidification of Urine. Counter current mechanism.Haemodialysis.Significance of excretion and osmorgulation

Unit - V Nervous System **08**

Brain ï anatomy and function of different parts of brain. Structure of a typical neuron. Transport and conduction of reflex and reflex arcs.

Mechanism of synaptic transmission. Neurotransmitters. Structure and function of neuromuscular functions. Neuro muscular Junction. Acetyl cholinesterase.

Unit - VI Reproductive System **08**

Make reproductive system and physiological role of testis. Female reproductive system and physiology role of ovary. Spermatogenesis, oogensis, menstrual cycle ovarian & uterine cycle.

Reference Books :

1. Human physiology Vol.II & I.C.C. Chatterjee.
2. Text book of Medical physiology - Guyton
3. Text book of Human Biochemistry G.P.Talwar
4. Biochemistry ï U.Satayanarayana & U.Chakrapani Book

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)

Title of the Paper: Skill Enhancement Course (SEC I) (Compulsory)

Periods :60

Credits : 2

To study following biochemical techniques

1) Thin layer chromatography
2) WIDAL test
3) Gel electrophoresis
4) Column chromatography
5) Extraction of biomolecules by soxhalet apparatus
6) ELISA technique demonstration
7) Demonstration of PCR
8) Demonstration of HPLC
9) Spectrospigmomanometer
10) Plant tissue culturing tec

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester III)
Title of the Paper: Skill Enhancement course (Optional)

To study following techniques

1) Demonstration of PCR
2) Demonstration of NMR
3) Demonstration of X-ray crystallography
4) Demonstration of southern blotting
5) Demonstration of northern blotting
6) Thin layer chromatography.

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)

Title of the Paper: Fermentation and nanotechnology(CCBC-II-402)

Periods:45

Credits : 2

Unit 1 – Introduction to fermentation Technology 12

Introduction to fermentation
Types of Bioreactors ï fluidized bed reactor, plug flow reactor, ideally mixed reactor, non-ideally mixed reactor, TFR.
Measurement and control of environment- measurement of volume, mass, weight, gas flow, temperature, pressure, pH etc
Use of mutant and recombinant DNA technology in fermentation

Unit 2 – Fermentation process 11

Fermentation kinetics,
Fermentation process in industrial production of citric acid
Antibiotic production (Streptomycin, penicillin)
Vitamin production (vitamin c, vitamin B-12)
Ethanol production

Unit – 3 Mammalian cell culture in fermenter 11

Use of mammalian culture in fermenter,
Types of mammalian culture used in fermentation
Insulin production

Unit – 4 Nanotechnologies 11

Introduction to Nanotechnology
Nanoparticles (size, types, properties and characteristic of nanoparticles)
Biosynthesis of nanoparticles (physical, chemical, biological)
Tools and techniques used for identification and characterization of nanoparticles
Applications of nanotechnology

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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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Advanced Biotechnology (CCBC-II-403)

Periods: 45
Credit : 2

Unit - I Biotechnology and Health Care 12

Vaccines: An ideal vaccine, conventional vaccines, DNA vaccine, Recombinant vaccines. Disease diagnosis: DNA/RNA probes, Monoclonal antibodies. Disease Treatment: Product from non-recombinant organisms, Products from recombinant Gene therapy.

Unit - II Fuel Biotechnology 09

Biofuel : Introduction, useful features, advantages Biodiesel: Lipids as a source of biodiesel from hydrocarbons. Biogas: The substrate, the digester, the microorganism, process, factors, effecting biogas yields, Advantages &disadvantages.

Unit - III Bio control Agents 08

Bioinsecticides, Bioherbicide, Bioweedicide, Disease control, Advantages limitation, Golden rice, Bio plastic.

Unit – IV Recovery of Metals 08

Desulphurization of coals, Merits of using microbes for ore leaching, Limitation of microbial ore leaching, application of microbial leaching, Bioaggumentation.

Unit – V Intellectual Property Rights 08

Introduction, Protection of intellectual property rights, Trade secrets, patent copyrights, and Good laboratory practices (GLP) plant variety protection.

Reference Books :

Genes III - Lewin B, Oxford University Press, New York (2000)
Satyanarayanna (2006), Textbook of Biotechnology, U.Satynarayana.
Biotechnology ï Expanding Horizons, B.D. Sign.
Basic Biotechnology ï P.K.Gupta, Rastogi Publication, Meerut (2001).

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Molecular Biology (CCBC-II-404)

Perios : 45
Credits : 2

Unit-1 Introduction to Molecular Biology

History of molecular biology
Evidences of DNA as a genetic material (experimental proof)
Gene (various methods in molecular biology)
Organization of genes and satellite DNA cot value
DNA ï protein interaction

Unit– 2 DNA replication

DNA replication in prokaryotes
Modes of replication (conservative, semiconservative and dispersive)
Mechanism of DNA replication (locus, RNA primer, okazaki fragment, enzymes, factors involved in replication)

Unit-3 Transcription

Major steps in transcription (initiation , elongation , termination)
RNA polymerase, sigma factor
Inhibitors of transcription
Post translational modifications (poly A tail , s cap)

Unit-4 Translation

Steps involved in translation (initiation , elongation , termination)
Inhibitors of transcription
Post translational modifications

Unit-5 DNA repair

Repair of DNA
Types of damages , Excise repaire and recombination
SOS repair and photoreactivation
Regulation of gene action – concept of operon , regulation of gene(lac operon)

References:

Principle of Biochemistry : lehninger
Biochemistry : Stryer
Biotechnology : B D Sing
Micribiology : presscot

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper:Enzymology II (CCBC-II-405)

Periods 45
Credits :2

Unit-1 Enzyme Inhibition 12

Enzyme inhibitor types, kinetics of enzyme inhibition, role of coenzyme in metabolism. Role of metals in enzyme kinetics. Activator kinetics, Bi substrate kinetics, Kinetic for reversible enzyme catalyzed reaction, Haldane relationshipô

Unit-2 Biological control 12

Multienzyme complexes and their significance in metabolic control. Membrane bound enzymes in metabolic control. Compartmentalization of enzymes and substrate, the shuttle systems.

Unit-3 Enzyme regulation 11

Allosterism, nature of allosteric enzymes and sigmoid kinetics, mode of action, allosteric , regulation. Product inhibition, feed back control, enzyme induction and repression. Mode of hormonal action on enzymes. Concept of receptors, agonist and antagonists.

Unit-4 Enzyme Technology 10

Industrial uses of enzymes- Food and pharmaceutical industries. Clinical enzymology- serum enzymes in health and diseases.

Immobilized enzyme technology-

designer enzymes-Abzymes .Biosensor- Ribozymes

Reference Books:

1. Biochemistry ï Zuby.
2. Biochemistry ï Stryer.
3. Principle of Biochemistry- Lehninger.
4. Fundamental of enzymology- price and Stevens

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)

Title of the Paper:Membrane Biochemistry (CCBC-II-406)

Periods : 45

Credits : 2

Unit-1 Biomembrane 08

Definition, structure and assembly , constituents of bacterial cell envelope , assemetry , flip-flop , protein ï lipid interaction , factors affecting physical properties of membrane

Unit-II Membrane models and transport system 07

Biological and physical models-energetics and transduction phenomenon ,Membrane transport ï diffusion , passive , active and facilitated , transport role of proteins in process , exocytosis , receptor mediated endocytosis osmoregulation

Unit III Membrane channels 08

Role of Na ,K, ATPase and passive permeability of the plasma membrane to Na. K and Cl, Voltage and ligand gated ion channels, ATP-ADP exchanger**.** Na, H dependent processes and phosphotransferase synthesis. Specialized mechanism for transport of macromolecule, gap junction, Nuclear pores, toxin Control of transport process, binding proteins, hormone effects and the role of lipids

Unit – IV Molecular mechanisms 08

Ion translocating antibiotics, valimomycin, gramicidin, ouabain, group translocation, ionophores, electrical gradient , energy coupling mechanism, assembly of virus membrane receptor

Unit-V Penetrating the defenses 07

How antimicrobial agents reach their targets, cellular permeability barrier to drug penetration, some examples of modes of penetration of antimicrobial agents, the exploitation of transport systems in the design of new antimicrobial agents.

Unit VI -Nerve Transmission 08

Structure of neuron, axon, dendrectes, Synapse neuromuscular junction . Neuro transmitters mechanisms of nerve conduction, adrenergic neuron and muscarinic neurons, GABA, NMDA. Structure and function of acetyl choline recptors

Reference Books:

1. Membrane and their cellular function By IB Filnean, R.Coleman and RH Michell, 1994, Blackwell publication.
2. Biochemistry ï Zuby.
   Biochemistry ï Stryer.
3. Principle of Biochemistry- Lehninger.

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B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Skill Enhancement Course II (SEC II) (Compulsory)

Periods :60
Credits : 2

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1) Detection of blood group in human
2) Production of ethanol by fermentation
3) Paper chromatography
4) Streaking, spreading, pouring techniques for microbial culture.
5) Demonstration of ECG
6) Demonstration of drug designing
7) Separation of biomolecules by dialysis
8) Antibody ï antigen interaction
9) Detection of blood sugar levels
10) Determination of blood cholesterol

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Skill Enhancement course II (Optional)

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1) Column chromatography
2) Paper chromatography
3) ELISA techniques
4) Separation of bimolecules by dialysis
5) Detection of blood sugar.
6) Detection of blood cholesterol.

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Lab course Chemistry (LC-II-01)
Periods : 60
Credits : 4

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1. Determination of pH of the sample solution by pH meter.
2. Determination of unknown concentration of the sample solution by colorimetric method.
3. Separation or amino acid by thin layer chromatography method.
4. Extraction of caffeine from lea leaves.
5. Demonstration of Flame photometer.
6. Estimation of glycine by iodometric method.
7. Extraction of alkaloids.
8. Estimation of paracetamol
9. Conductometric titration of NH4OH with acetic acid
10. Determination of saponification value of given oil or fat
11. Preparation of urea formaldehyde resin
12. Determine the concentration of cu+2 ion in the given solution, titrating it against standard EDTA solution by colorimetric measurement.
13. To study the effect of addition of electrolyte (KU /NaCl) on solubility of weak organic acid at room temperature
14. Verify Beers law by colorometric measurements
15. Determine the molecular weight of a high polymer by viscosity measurements.

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Semester pattern effective from June 2016
Subject: Biochemistry(honors)

B.Sc. Biochemistry Second Year(Semester IV)
Title of the Paper :Lab cource Enzymology and human physiology(LC-II-02)

Periods : 60
Credits : 4

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1. Cellular fractionation and study of Marker Enzyme with reference to their localization. Determination of specific activity of enzyme(a-amylase/invesrtase/urease.)
2. Determination of optimum pH of enzyme.
3. Determination of optimum temperature of enzyme .
4. Determination of Km of enzyme .
5. Determination of Enzyme activity in presence of activators.
6. Determination of activity in presence of inhibitors.
7. . Demonstration of reversibility of enzyme reaction.
8. Extraction of urease from jack bean / horse grams
9. Extraction of Pectinase
10. Identification of histological specimen ï liver, adrenal , pancreas, thyroid , testis and ovary.
11. Preparation and preservation of blood serum and plasma.
12. Preparation of blood smear and DLC (Importance in various disease conditions).
13. Enumeration of RBCs and WBCs for determining health status.
14. Bleeding time and Clotting time.
15. Determination of blood groups (A,B, AB, O and Rh) and itôs significance.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,NANDED-431606,MS,INDIA
Distribution of Credits for B. Sc. Biochemistry
Under faculty of Science
B. Sc. Syllabus
CBCS(choice based credit system)
Semester pattern effective from June 2016
Subject: Biochemistry(honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper: Lab course genetics-molecular biology-cell biology(LC-II-03)

Periods : 60
Credits : 4

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1. Problems based on Mendelôs law
2. Study of transformation
3. Study of conjugation
4. Restriction digestion of DNA
5. Ligation of DNA
6. Separation of DNA fragments by Electrophoresis.
7. Demonstration of Southern Blotting & Northern Blotting
8. Study of mitosis
9. Study of meiosis
10. Isolation of mitochondria from cabbage
11. Isolation of chloroplast from spinach leaves

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Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year (Semester IV)
Title of the Paper :Lab course of Fermentation and Nanotechnology(LC-II-04)

Periods : 60
Credits : 4

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1) Production of citric acid by Aspergillus niger and estimation of citric acid by titration method.
2) Immobilization of yeast cell by gel entrapment method.
3) Production of alcohol by starch.
4) Quantitative estimation of alcohol produced.
5) To detect alcohol produced by idoform test.
6) Study of mammalian cell cultures.
7) Production of vita. B12
8) Production of wine
9) Demonstration of biological synthesis of nanoparticles.
10) Biological synthesis of nanoparticles from microorganisms.
11) Biological synthesis of nanoparticles from plant source.
12) Biological synthesis of nanoparticles from fungus.
13) Biosynthesis and characterization of nanoparticles.

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Semester pattern effective from June 2016
Subject: Biochemistry (honors)

B.Sc. Biochemistry Second Year(Semester IV)
Title of the Paper :Lab course of Nutrition and microbiology(LC-II-05)

Periods : 60
Credits : 4

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1. Milk analysis ï total solids, lactose estimation by Lane ï Eynon volumetric method (specific gravity by lactometer).
2. Detection of Adulterants in food.
   Detection of probable adulteration in the following :
   A) Oil ï groundnut
   B) Spices ï Black pepper
   C) Cinnamon ï Chilly powder.
   D) Cereals ï Jowar
   E) Beverages ï Tea and coffee
   F) Pulses ï Gram flour
   G) Food products mango pulp.
3. Qualitative test for the detection of adulteration in milk and milk products.
4. Determination of activity in Curd / Paneer / Milk, - by titration method.
5. Isolation of Albumin from egg white by ammonium sulphate precipitation.
6. Isolation of cholesterol and lecithin from egg yolk by Fractionation method.
7. Extraction of oil in oil content in oil seed by colorimetric method.
8. Extraction of oil in oil seed by Soxhlet method.
9. Isolation and quantification of DNA from yeast.
10. Isolation and quantification of RNA from yeast.
11. Hyper chromic effect of DNA.
12. Isolation of antibiotic resistant mutant of e-coli
13. Study of IMVIC test
14. Study of standard plate count
15. Study of DMC(Direct microscopic count)
16. Isolation of microorganisms from wound.