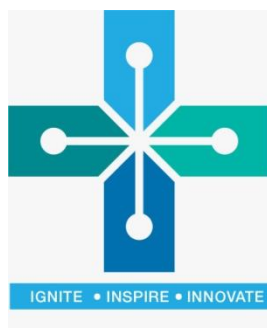


**St. PETER'S INSTITUTE OF HIGHER EDUCATION
AND RESEARCH**

(Deemed to be University U/S 3 of the UGC Act,1956)
Avadi, Chennai – 600 054.



B.Sc. (BIO CHEMISTRY) DEGREE PROGRAMME

(I to VI SEMESTERS)

REGULATIONS AND SYLLABI

REGULATIONS – 2016

(Effective from the Academic Year 2016-'17)

B.Sc. (BIO CHEMISTRY) DEGREE PROGRAMME

Regulations – 2016

(Effective from the Academic Year 2016-'2017)

1. Eligibility:

Candidates who have passed Higher Secondary Examinations with Chemistry and Biology or Chemistry, Botany and Zoology or Biochemistry and Chemistry conducted by the Government of Tamil Nadu or an Examinations accepted by the Institute as equivalent thereto are eligible for admission to three year B.Sc. (Bio Chemistry) Degree Programme.

2. Duration:

Three years comprising 6 Semesters. Each semester has a minimum of 90 working days with a minimum of 5 hours a day.

3. Medium:

English is the medium of instruction and examinations except for the language subjects.

4. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of degree only if he/she has undergone the prescribed course of study in the University for a period of not less than three academic years (6 semesters), passed the examinations of all the six semesters prescribed carrying 136 credits and also fulfilled such conditions as have been prescribed thereof.

5. Choice Based Credit System:

Choice Based Credit System is followed with one credit equivalent to one hour for theory paper and two hours for a practical work per week in a cycle of 18 weeks (that is, one credit is equal to 18 hours for each theory paper and one credit is equal to 36 hours for a practical work in a semester in the Time Table. The total credit for the B.Sc. (Bio Chemistry) Degree Programme (6 semesters) is 136 credits.

6. Weightage for a Continuous and End Assessment:

The weightage for Continuous Assessment (CA) and End Assessment (EA) is 25:75 unless the ratio is specifically mentioned in the Scheme of Examinations. The question paper is set for a minimum of 100 marks.

7. Course of Study and Scheme of Examinations:

I SEMESTER

Code No.	Course Title	Credits	CA	EA	Total
116UTMT01 / UTET01 / UHIT01/ 116UFRT01	Part I : Language -I (Tamil -I / Telugu -I / Hindi – I / French - I)	3	25	75	100
116UEHT02	Part II : English –I	3	25	75	100
116UBYT03	Part III Core Subject: Nutritional Biochemistry	5	25	75	100
116UBYT04	Allied Paper- I: Chemistry - I	3	25	75	100
116UBYT05	Non Major Elective -I: Health and Nutrition	2	25	75	100
116UCCT01	Soft Skills (Common to all UG Branches)	2	50	50	100
Total		18	175	425	600

II Semester

Code No.	Course Title	Credits	CA	EA	Total
216UTMT01 / UTET01 / UHIT01 / 216UFRT01	Part I : Language -II (Tamil - II / Telugu - II / Hindi - II / French - II)	3	25	75	100
216UEHT02	Part II : English -II	3	25	75	100
216UBYT03	Part III Core Subject:	Cell Biology	5	25	75
216UBYP01		Core Practical -I	4	40	60
216UBYT04	Allied Paper- II: Chemistry - II	3	25	75	100
216UBYP02	Allied Practical : Chemistry	4	40	60	100
216UBYT05	Non Major Elective -II: Human diseases and Preventive Aspects	2	25	75	100
216UCCT02	Soft Skills (Common to all UG Branches)	2	50	50	100
Total		26	255	575	800

III Semester

Code No.	Course Title	Credits	CA	EA	Total
316UTMT01 / UTET01 / UHIT01/ 316UFRT01	Part I : Language -III (Tamil -III / Telugu -III / Hindi -III/ French -III)	3	25	75	100
316UEHT02	Part II : English -III	3	25	75	100
316UBYT03	Part IV Core Subject:	Chemistry of Biomolecules I	5	25	75
316UBYT04	Allied Paper- III: Microbiology - I	3	25	75	100
316UCCT03	Soft Skills (Common to all UG Branches)	2	50	50	100
Total		16	150	350	500

IV SEMESTER

Code No.	Course Title	Credits	CA	EA	Total
416UTMT01 / UTET01/ UHIT01 / 416UFRT01	Language -IV (Tamil -IV / Telugu -IV / Hindi-IV / French -IV)	3	25	75	100
416UEHT02	English -IV	3	25	75	100
416UBYT03	Core Subject:	Chemistry of Biomolecules- II	5	25	75
416UBYP01		Core Practical II	4	40	60
416UBYT04	Allied Paper- IV: Microbiology - II	3	25	75	100
416UBYP02	Allied Practical : Microbiology	4	40	60	100
416UEST01	PART IV: Environmental Studies (Common to all UG Branches)	2	25	75	100
416UCCT04	Soft Skills (Common to all UG Branches)	2	50	50	100
Total		26	255	545	800

V SEMESTER

Code No.	Course Title	Credits	CA	EA	Total
516UBYT01	Core Subject:	Enzymes	5	25	75
516UBYT02		Metabolism	5	25	75
516UBYT03		Analytical Biochemistry	5	25	75
516UBYT04	Core Elective Paper -I Physiology	5	25	75	100
516UVET01	Value Education (Common to all UG Branches)	2	25	75	100
Total		22	125	375	500

VI SEMESTER

Code No.	Course Title	Credits	CA	EA	Total	
616UBYT01	Core Subject:	Clinical Biochemistry	5	25	75	100
616UBYT02		Molecular Biology	4	25	75	100
616UBYP01		Core Practical III	4	40	60	100
616UBYP02		Core Practical IV	4	40	60	100
616UBYT03	Core Elective Paper II : Immunology	5	25	75	100	
616UBYT04	Core Elective Paper III: Biotechnology	5	25	75	100	
616UEAT01	Extension Activities (Common to all UG Branches)	1	-	-	-	
Total		28	180	420	600	

Course content: The syllabus consists of theory and practical papers. The students are expected to present seminars on special topics.

8. Passing Requirements: The minimum pass mark (raw score) be 40% in End Assessment (EA) and 40% in Continuous Assessment (CA) and End Assessment (EA) put together. No minimum mark (raw score) in Continuous Assessment (CA) is prescribed unless it is specifically mentioned in the Scheme of Examinations.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

PART – I TAMIL/OTHER LANGUAGES:

TAMIL/OTHER LANGUAGES OTIHER THAN ENGLISH: Successful candidates passing the examinations for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II ENGLISH:

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART - III CORE SUBJECTS, ALLIED SUBJECTS, AND PROJECT/ELECTIVES :

Successful candidates passing the examinations for Part-III Courses together and securing the marks (i),60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Part-III Courses together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the THIRD Class. .

PART-IV: Passing requirement as given in para 8 is applicable for Environmental Studies (EVS) and Value Education but there is no classification of successful candidates. Extension Activity is rated as satisfactory by the Head of the Department as requirement for the award of degree.

10. Grading System: Grading System on a 10 Point Scale is followed with 1 mark = 0.1 Grade point to successful candidates as given below.

CONVERSION TABLE

(1 mark = 0.1 Grade Point on a 10 Point Scale)

Range of Marks	Grade Point	Letter Grade	Classification
90 to 100	9.0 to 10.0	O	First Class
80 to 89	8.0 to 8.9	A	First Class
70 to 79	7.0 to 7.9	B	First Class
60 to 69	6.0 to 6.9	C	First Class
50 to 59	5.0 to 5.9	D	Second Class
40 to 49	4.0 to 4.9	E	Third Class
0 to 39	0 to 3.9	F	Reappearance

Procedure for Calculation

Cumulative Grade Point Average (CGPA)	=	$\frac{\text{Sum of Weighted Grade Points}}{\text{Total Credits}}$
	=	$\frac{\sum (CA+EA) C}{\sum C}$
Where Weighted Grade Points in each Course	=	Grade Points (CA+EA) multiplied by Credits
	=	(CA+EA)C
Weighted Cumulative Percentage of Marks(WCPM)	=	CGPAx10

C- Credit,

CA-Continuous Assessment,

EA- End Assessment

11. Effective Period of Operation for the Arrear Candidates :Two Year grace period is provided for the candidates to complete the arrear examination, if any.

12. National Academic Depository (NAD): All the academic awards (Grade Sheets, Consolidated Grade Sheet, Provisional Certificate, Degree Certificate (Diploma) and Transfer Certificate) are lodged in a digital format in National Academic Depository organized by Ministry of Human Resource Development (MHRD) and University Grants Commission (UGC). NAD is a 24x7 online mode for making available academic awards and helps in validating its authenticity, safe storage and easy retrieval.

Registrar

13. Syllabus

I Semester

116UBYT03 - NUTRITIONAL BIOCHEMISTRY

UNIT-I

Concepts of food and nutrition. Basic food groups- energy yielding, body building and functional foods. Units of energy. Calorific and nutritive value of foods. Measurement of calories by bomb calorimeter. Basal metabolic rate (BMR) - definition, determination of BMR and factors affecting BMR. Respiratory quotient (RQ) of nutrients and factors affecting the RQ. SDA- definition and determination.

UNIT-II

Physiological role and nutritional significance of carbohydrates, lipids and proteins. Evaluation of proteins by nitrogen balance method - Biological value of proteins - Digestibility Coefficient, Biological Value, Protein Energy Ratio and Net Protein Utilization. Protein energy malnutrition- Kwashiorkor and Marasmus. Clinical manifestations and management. Obesity (elementary details)

UNIT-III

Balanced diet, example of a low and high cost balanced diet – for infants, children, adolescents, adults and elderly people. Role of dietary fiber. Vitamins- definition and types of vitamins. Sources, requirement, biological functions, deficiency symptoms of thiamine, riboflavin, niacin, pyridoxine, pantothenic acid, folic acid, biotin, cyanocobalamin, vitamins C, A, D, E and K. Hypervitaminosis.

UNIT-IV

Minerals- sources, requirement, physiological functions, deficiency and toxicity of calcium, sodium, potassium, iron, magnesium, chromium, cobalt, copper, manganese, molybdenum, selenium, iodine and zinc.

UNIT-V

Human rights – introduction- definition, scope and need for study of human rights and relations. Categories- civil and political rights, economic relations and social relations. Institutions : International and National- United Nations Human Rights Commission, State Human Rights Commission. International Convention on civil and political rights. International convention on economic and social rights. National Human Rights Act- National Commission for minorities, SC/ST and Women, Students activity- assignment, case study, term paper.

Books Recommended:

1. Garrow, JS , James WPT and Ralph A (2000) . Human nutrition and dietetics (10th ed) Churchill Livingstone
2. Andreas M. Papas (1998). Antioxidant Status, Diet, Nutrition, and Health (1st ed) CRC Press
3. M.Swaminathan (1995) Principles of Nutrition and Dietetics. Bapco
4. Margaret Mc Williams (2012) . Food Fundamentals (10th ed) Prentice Hall
5. Tom Brody (1998). Nutritional Biochemistry (2nd ed) , Academic Press, USA
6. Aravind Kumar (ed) (1999). Human rights and social movements, Anmol publishers.
7. Piarey Lal Mehta, Neena Verma, P I Mehta (1999) Human Rights Under the Indian Constitution. Deep & Deep Publications Pvt. Ltd.

ALLIED PAPER –I – CHEMISTRY - I

Unit 1: NUCLEAR CHEMISTRY

Fundamental particles of nucleus, isobars, isotones and isomers – Differences between chemical reactions; fusion and fission – Radio active series, group displacement law – Mass defect, derivation of $1\text{amu} = 931\text{ MeV}$ – nuclear binding energy and calculation – Applications of radio isotopes – carbon dating, and medicinal applications.

Unit 2: INDUSTRIAL CHEMISTRY

Fuels- Classification-gaseous fuels like water gas, producer gas, liquefied petroleum gas, gobar gas, Compressed natural gas - Fertilizers- Classification – urea ,Ammonium sulphate, superphosphate, Triple super phosphate, potassium nitrate- manufacture and uses - Silicones - Preparation, properties and applications.

Hardness of water: temporary and permanent hardness, disadvantages of hard water - Softening of hard water - Zeolite process, demineralization process and reverse osmosis - Purification of water for domestic use: use of chlorine, Ozone and UV light - Definition and determinations of BOD and COD.

Unit 3: FUNDAMENTALS OF ORGANIC CHEMISTRY

Classification of organic compounds -.Hybridization in methane, ethane, acetylene, benzene - classification of reagents - electrophiles, nucleophiles and free radicals - Classification of reactions addition, substitution, elimination, condensation and polymerisation - Polar Effects - Inductive effect, resonance, hyper-conjugation, steric effect - Keto-enol tautomerism - electrophilic substitution mechanism in benzene (Nitration and Sulphonation) – Heterocyclic compounds - Preparation, properties and uses of furan, Thiophene, pyrrole and pyridine

Unit 4: THERMODYNAMICS

Definition of Certain terms - system, surrounding, reversible and irreversible process - Limitations of I Law Need for II Law - Different Statements of II. Law - Carnot cycle - Efficiency - Carnot Theorem - Thermodynamic Scale Of Temperature - Entropy- Definition Unit and change of entropy for phase transformation 'Free energy nature of Process in terms of Free energy and entropy-Statement of Third Law.

Unit 5: CHEMICAL KINETICS

Rate of chemical reaction- Differential rate expression - order and molecularity - Integrated rate expression for first, second, and zero order reactions - Half-life period— Effect of temperature on rate - Activation energy . Arrhenius equation - Arrhenius reaction rate theory - Homogeneous and heterogeneous catalysis. Photochemistry • Statement of Grothus - Draper Law, Stark-Einstein's Law, Quantum Yield. Hydrogen chlorine reaction (elementary idea only) Photosynthesis, Photosensitisation, Phosphorescence Fluorescence, Chemiluminescence - Definition with examples.

BOOK FOR REFERENCE

1. Dr. Veeraiyan V., Text book of Ancillary Chemistry, Highmount Publishing house, Chennai-14. Edition - 2008. (Both In Tamil and English)
2. Vaithyanathan S. and Others, Text book of Ancillary Chemistry, Priya Publications, Karur-2. Edition-2006.
3. Soni P.. and Others, Text book of Organic chemistry, Sultan Chand and Company, New Delhi, Edition - 2006.

NON – MAJOR ELECTIVE PAPER

116UBYT05 - HEALTH AND NUTRITION

UNIT – I

Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet and calorific value.

UNIT – II

Vitamins-definition, classification, sources, properties , functions and deficiency symptoms. Recommended daily allowances.

UNIT – III

Sources and functions of dietary fats, role of fats and lipids in health. Calorific value.

UNIT – IV

Minerals- Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus, Potassium, Copper, Iron, Zinc and Selenium. Minerals in biological systems and their importance –Iron, Calcium, Phosphorus, Iodine, Copper, Zinc.

UNIT - V

Role of proteins and carbohydrates in health. Functions of protein and carbohydrate and their calorific value. Dietary sources and deficiency disorders – Kwashiorkor and Marasmus – supplementation programmes in India and their implications.

Books Recommended

1. S.Davidson and J.R.Passmore (1986) Human Nutrition and Dietetics, (8th ed), Churchill Livingstone.
2. J. S. Garrow, W. Philip T. James, A. Ralph (2000), Human Nutrition and Dietetics (10th ed), Churchill Livingstone.
3. M.Swaminathan (1995) Principles of Nutrition and Dietetics, Bappco.
4. Margaret Mc Williams (2012) . Food Fundamentals (10th ed) ,Prentice Hall.
5. M.Swaminathan (1995) Principles of Nutrition and Dietetics. Bappco.

116UCCT01 - Soft Skills (Common to all UG Branches)

Semester-I-. Essentials of Language and Communication – Level I

Unit I

Recap of Language Skills – Speech, Grammar, Vocabulary, Phrase, clause, sentence, Punctuation.

Unit II

Fluency building

What is fluency – Why is fluency important – Types of fluency – Oral fluency – Reading fluency – Writing fluency – Barriers of fluency – How to develop fluency.

Unit III

Principles of communication: LSRW in communication.

What is meant by LSRW Skills – Why it is important – How it is useful – How to develop the skills?

Oral – Speaking words, articulation, speaking clearly.

Written communication – Generating ideas/ gathering data organizing ideas, Setting goals, Note taking, Outlining, Drafting, Revising, Editing and Proof reading.

Non verbal communication – Body language, Signs and symbols, Territory/Zone, Object language.

Recommended Texts:

1. Hewing, Martin. 1999. Advanced English Grammar: A Self-study Reference and practice Book for South Asian Students. Reprint 2003. Cambridge University Press. New Delhi.
2. Lewis, Norman. 1991. Word Power Made Easy. Pocket Books.
3. Hall and Shepherd. The Anti-Grammar Book: Discovery Activities for Grammar Teaching Longman.
4. Powell. In Company. MacMillan.
5. Cotton, et al. Market Lader. Longman.

II Semester

216UBYT03 - CELL BIOLOGY

UNIT-I

Cell theory, cell as basic unit of life. Classification of Viruses, Bacteria and Fungi. Structure and organization of prokaryotic and eukaryotic cells. Comparison between plant and animal cells, General structure of cytoskeleton - structure, composition and functions of microfilaments, microtubules and intranuclear filaments.

UNIT-II

Subcellular organelles: The ultrastructure of cell wall, plasma membrane, nucleus, mitochondria, rough and smooth endoplasmic reticulum, Golgi apparatus, lysosome, peroxisome, chloroplast and glyoxisome and their function.

UNIT-III

Biomembrane – structure, organization and basic functions, fluid mosaic model, Transport across cell membrane – uniport, symport and antiport. Passive and active transport and water channel.

UNIT- IV

Organization of cells into tissue. Types of tissue. Cell – cell adhesion, cell matrix adhesion. Extracellular matrix– components and their biological role.

UNIT-V

Organisation of prokaryotic and eukaryotic genome, chromosomes, types, structure and function. Cell division, mitosis, meiosis, their significance. Cell cycle – phases of cell cycle.

Books recommended:

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments (6th ed). John Wiley & Sons. Inc.
2. Bruce Alberts and Dennis Bray (2013), Essential Cell Biology, (4th ed), Garland Science.
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2010). Cell and Molecular Biology. (8th ed). Lippincott Williams and Wilkins, Philadelphia.
4. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. (5th ed). Sunderland, Mass. Sinauer Associates, Inc.
5. Wayne M. Baker (2008) the World of the Cell. (7th ed). Pearson Benjamin Cummings Publishing, San Francisco. Cell Biology
6. P.S.Verma and V.K.Agarwal. (2004) Cell Biology, Genetics, Molecular Biology, Evolution and Ecology (14th ed), S.Chand and Company Ltd

216UBYP01 - CORE PRACTICAL – I

Titrimetric procedures

1. Estimation of glycine by Sorenson's formal titration.
2. Estimation of calcium from milk.
3. Estimation of iron.
4. Estimation of oxalate.
5. Estimation of Vitamin C (Ascorbic acid)

Group experiments

1. Stages of cell division.
2. Identification of plant, animal and bacterial cell.

Biochemical Preparation

1. Preparation of starch from potatoes.
2. Preparation of casein and lactalbumin from milk.
3. Preparation of albumin from eggs.
4. Preparation of haemoglobin from blood.
5. Preparation of cellulose from plant material.

SEMESTER II - ALLIED PAPER – II – CHEMISTRY - II**Unit1: CO-ORDINATION CHEMISTRY**

Definition of terms - Classification of Ligands - Nomenclature - Chelation - EDTA and the application - Werner's Theory - Effective Atomic Number - Pauling's theory- Postulates - Applications to $\text{Ni}(\text{CO})_4, \text{Ni}(\text{CN})_4, (\text{CO}(\text{CN})_6)^{3-}$ • Merits and Demerits of. Werners and Pauling's theory - Biological Role of haemoglobin and Chlorophyll (elementary idea only) - Applications of co-ordination compounds in qualitative analysis and Quantitative analysis like Separation of. copper and cadmium ions; Nickel and cobalt ion; Identification of metal ions like Cu, Fe and Ni. Estimation of Ni using DMG and Al using Oxine.

Unit 2:BIOMOLECULES

Classifications, preparation and reactions of glucose and fructose. Discussion of open and ring structure of glucose. Mutarotation. Interconversion of glucose to fructose and vice versa - Preparation and properties of sucrose. Properties of starch, cellulose and derivatives of cellulose - Diabetes - causes and control :measures RNA and DNA (elementary idea only) - Amino acids: Classification, preparation and properties of alanine -preparation of dipeptide using Bergman method.

Unit 3: PHASE DIAGRAM

Phase rule: Definition of terms, application of phase rule to water system - reduced phase rule and its application to Pb-Ag system. Freezing mixture - Completely miscible and partially miscible liquid systems - upper and lower critical solution temperatures

Unit 4: ELECTROCHEMISTRY

Galvanic cells – emf - standard electrode potential - reference electrodes -electrochemical series and its applications - Determination of pH using electrometric method - Electroplating process -Nickel and Chrome plating - Different type of cells - primary cell, Secondary cell and fuel cells -Corrosion and methods of prevention, .Conductometric titrations - hydrolysis of salts. Derivation of Kh - Definition of pH and its determination by colorimetric method. Buffer solution -; Henderson's equation. Applications of pH and buffer in biological processors and industries - Corrosion and its prevention.

Unit 5: ANALYTICAL CHEMISTRY

Introduction to Qualitative and Quantitative Analysis - Principle of volumetric analysis - Separation techniques - extraction - distillation - crystallization— Chromatographic separations - Principles and applications of column , paper, thin layer, gas-liquid and ion-exchange.

BOOKS FOR REFERENCE

1. Dr. Veeraiyan V., Text book of Ancillary Chemistry, Highmount Publishing house, Chenna-14. Edition -206o. (Both in Tamil and English)
2. Vaithiyanathan S. and Others, Text book of Ancillary Chemistry, Priya Publications, Karur-2. Edition -2006.
3. Soni P.L and Others, Text book of Organic chem/sfry, Sultan Chand and Company, New Delhi, Edition-2006.
4. Soni P.L. and Others, Textbook of Inorganic Chemistry, Sultan Chand and Company, New Delhi, Edition -2006.
5. Puri B.R., Sharma and Pathania, text book of Physical Chemistry, Vishal Publishing Co., New Delhi. Edition-2006.
6. Dara S.S., Text book of Environmental chemistry and Pollution Control.- S.Chand and Co., NewDelhi, Edition 2006.

NON –MAJOR ELECTIVE PAPER

216UBYT05 - HUMAN DISEASES AND PREVENTIVE ASPECTS

UNIT-I

Diseases –definition –Examples for bacterial, viral and fungal diseases. Endemic and epidemic diseases –causes and symptoms. Major diseases of young children with special reference to diarrhea, primary complex, whooping cough, Kwashiorkor and Marasmus and their preventive aspects.

UNIT-II

Cancer- differences between benign and malignant tumors. Growth characteristics of cancer cells. Agents causing cancer- physical, chemical, biological. Prevalence of cancer in South India. Cancer therapy- surgery, radiation and chemotherapy. Cancer prevention.

UNIT-III

Diabetes mellitus –causes and types. Type I and type II diabetes mellitus. Role of antidiabetic drugs. Dietary prevention of diabetes mellitus. Examples for antidiabetic medicinal plants. Kidney stones –causes –influence of diet.

UNIT-IV

Cardiovascular disease –causes and symptoms. Role of dietary lipids. HDL and LDL as risk factors. Dietary prevention of CHD. Hypolipidemic medicinal plants and their products. Liver diseases –jaundice, hepatitis –causes and symptoms. Dietary prevention of disease progression.

Books recommended

1. M.N.Chatterjee and Rana Shinde (2007).Textbook of Medical Biochemistry (7th ed)
2. Ambika Shanmugam (2012) Fundamentals of Biochemistry for Medical Students (7th ed), Lippincott Williams & Wilkins
3. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics (2014) (7th ed), Saunders
4. A.Catherine Ross (2012) Modern nutrition in health and diseases (11th ed) . Lippincott Williams and Wilkins
5. Michael.G.Wohl, Robert.S.Goodhart, Maurice E.Shils (1999).Modern nutrition in health and disease (9th ed) , Lippincott Williams and Wilkins

216UCCT02 - SOFT SKILLS (COMMON TO ALL UG BRANCHES)

Semester-II- Essentials of Language and Communication – Level – II

Unit-I

Speaking Skills

Formal and Informal Conversation – Conversation in the work place – Interviews – Public Speech – Lectures.

Unit – II

Listening Skill

Comprehending – Retaining – Responding – Tactics – Barriers to Listening – Overcoming listening barriers – Misconception about listening.

Unit – III

Reading Skill

Acquiring reading – Reading Development – methods teaching – Reading difficulties.

Unit – IV

Writing skill

Note-making – CV's – Report writing, copy writing, Agenda – Minutes – Circular – Essay writing on any current issues – paragraph – Essay writing, Writing Research papers – Dissertation.

Unit- V

Business Correspondence

Meaning of Business correspondence – Importance of Business Correspondence essential qualities of a business letters. Different types of business letters – cover letter, thank you letters, message through email and Fax, Acceptance letters, rejection letters, and withdrawal letters.

Recommended Texts:

1. Minippally, Methukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw – Hill. New Delhi.
2. SasiKumar. V and P.V. Dharmija. 1993. Spoken English: A Self-Learning Guide Conversation Practice. 34th reprint. Tata McGraw – Hill. New Delhi.
3. Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting
4. Through to Family, Friends and Business Associates. Prentice Hall Press. New York.
5. John, Seely The Oxford guide to writing and speaking. Oxford U P, 1998, Delhi.
6. The Process of Writing: Planning and Research, Writing, Drafting and Revising.

III Semester

316UBYT03 - CHEMISTRY OF BIOMOLECULES I

UNIT-I

Carbohydrates - classification and biological significance, physical properties, stereo isomerism, optical isomerism and mutarotation. Configuration of aldo and keto trioses, tetroses, pentoses and hexoses. Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and ketone groups. Structure and properties of reducing disaccharides (lactose & maltose), non-reducing disaccharide (sucrose). Identification of ketose, pentose, reducing and non - reducing sugars.

UNIT-II

Occurrence, structure and functions of polysaccharides- starch, glycogen and cellulose.(structural elucidation is not needed). Structure and biological significance of mucopolysaccharides - hyaluronic acid, chondroitin sulphate and heparin. Composition and functions of inulin, agar, pectin, chitin, dextran, gum arabic and alginic acid. (structures are not necessary).Structure of bacterial cell wall polysaccharides (peptidoglycan and teichoic acid), blood group polysaccharides and glycoproteins.

UNIT-III

Aminoacids - biological role. General structure of amino acids. 3- and 1-letter abbreviations. Classification of amino acids based on nature of R group (polar, non polar, acidic, basic, neutral). Modified amino acids in protein, non protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids.

UNIT-IV

Composition and biological importance of peptides. Examples of peptide hormones. Solid state peptide synthesis. Structure of oligopeptides like glutathione, vasopressin and oxytocin, Peptidases – exo and endo peptidases. Classification of proteins based on composition, solubility, and functions. Properties of proteins- salting in and salting out, denaturation and renaturation, UV absorption. Estimation of protein by Biuret, Folin's phenol and UV methods.

UNIT-V

Definition and biological significance of hydrogen bond, hydrophobic interactions and van der waals forces. Levels of organization of protein structure – primary structure – composition, Outline of protein sequencing, Secondary structure – α helix (egg albumin), β -pleated sheath (keratin), triple helix (collagen). Tertiary structure – forces involved in maintenance of tertiary structure like hydrogen bond, hydrophobic interactions, van der waals force, disulphide linkage and ionic bonds with reference to myoglobin. Quaternary structure with reference to haemoglobin.

Books Recommended:

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.
2. Voet.D & Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Metzler D.E (2003). The chemical reactions of living cells (2nd ed), Academic Press.
4. Zubay G.L (1999) Biochemistry , (4th ed), Mc Graw-Hill.
5. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman.
6. Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.

ALLIED PAPER - III

316UBYT04 - MICROBIOLOGY - I

316UCCT03 - SOFT SKILLS (COMMON TO ALL UG BRANCHES)

Semester- III- COMPUTING SKILLS – LEVEL - I

Objective:

The major objective in introducing the course is to impart hands on training to students in Microsoft Office essentials like MS Word, MS Excel and MS Access. The course is basic course offered at two levels exclusively meant for students who have no computer knowledge. Course is designed as a practical oriented course and not for chalk and board teaching.

Pre- requisite : NIL

Unit 1 : Introduction to computers – classification of computers; Computers inside – Hardware (processing, memory i/o, storage etc), Software (Systems, application); Operating Systems – DOS, LINUX, UNIX, Windows ; Programming – Overview, need and skills; Networking Basics; Virus; Hacking

Unit 2 : Word processing - Operating of word documents like open, close, save, print ; Editing Text – tools, formatting , bullets, layout ; Navigating word – Keyword, mouse, document formatting ; paragraph alignment - indentation, headers, footers, numbering; printing – preview, options

Unit 3 : File Management – Importance of file management, backing of files, files and folders- editing, deleting, retrieving, renaming, subfolders; Manipulating windows – minimize, maximize; power point basics- terminology- templates, viewing

Unit 4 : Spreadsheets – MS Excel – opening, entering text and data, formatting, navigating; Formulas- entering, handling and copying; charts- creating, formatting and printing, header and footer, centering of data; printing

Unit 5 : Networking - Internet explorer; www – working, browsing, searching, saving; bookmark – features, favorite, create, delete ; printing webpage; email – creating, receiving, reading and sending messages

Note – Unit 2 -5 are to be taught as practical with hands on experience

References :

1. Introduction to Computers – Peter Norton, Tata McGraw-Hill, India
2. Microsoft 2003 – Jennifer Ackerman Kettel et al., Tata Mc-Graw Hill, India
3. Working In Microsoft office 2006– Ron Mansfield , Tata Mc-Graw Hill, India

Examinations :

1. Sessional tests could be based on Theory and practical
2. End semester is based on practical examination only
- 3.

IV Semester

416UBYT03 - CHEMISTRY OF BIOMOLECULES II

UNIT-I

Lipids- Chemical nature, biological functions and classification of lipids. Fatty acids – definition, classification – saturated, unsaturated, hydroxy and cyclic fatty acids, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides – structure and general properties, Isolation of fats (Folch method) and identification. Characterization of fats – iodine value, saponification value, acid number, acetyl number, Polensky number, Reichert-Meissl number.

UNIT-II

Sterols – structure of cyclopentanoperhydrophenanthrene nucleus. Animal sterol : cholesterol - properties and functions. Plant sterol : stigmasterol – Functions, Ergosterol : Functions. Lipoproteins : general structure , classification : chylomicrons, VLDL, LDL, IDL, HDL – composition and biological roles. Classification, structure, properties and biological functions of phospholipids and sphingolipids.

UNIT-III

Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA : A, B, C, Z DNA, structure and biological significance, superhelicity. Isolation, purification, identification and estimation of DNA. Properties of DNA – hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing.

UNIT-IV

Isolation, purification, identification and estimation of RNA. Salient features of prokaryotic and eukaryotic RNA. RNA as a genetic material. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA- location and role. Secondary and tertiary structure of tRNA. Action of nucleases of pancreas, spleen and venom on RNA.

UNIT-V

Heterocyclic rings of biological importance - pyridine, pyrrole, quinoline, pteridine, thiazole, imidazole, indole with examples. General structure of carotenoids, terpenes and heme. Identification and biological significance of terpenoids, carotenoids, alkaloids, flavanoids .Bile salt, bile pigments – structure and functions. Salient features and properties of penicillin, streptomycin, tetracycline.

Books Recommended:

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.
2. Voet.D and Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Metzler D.E (2003). The chemical reactions of living cells (2nd ed), Academic Press.
4. Zubay G.L (1999) Biochemistry , (4th ed), Mc Graw-Hill.
5. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman.
6. Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.

416UBYP01 - CORE PRACTICAL – II

I. Titrimetric methods

1. Determination of saponification value of an edible oil.
2. Determination of acid number of an edible oil.
3. Determination of iodine value of an edible oil.

II. Qualitative analysis

1. Analysis of simple sugars- glucose, fructose, galactose, mannose, sucrose, lactose, maltose and starch.
2. Analysis of amino acids - tyrosine, tryptophan, arginine, cysteine and histidine
3. Tests for protein- Solubility, Biurette, Xanthoproteic, Million's tests. Denaturation by heat, pH change. Precipitation by heavy metals and by acidic reagents.

III. Colorimetry

1. Estimation of Protein by Biuret method.
2. Estimation of inorganic phosphorus by Fiske and Subbarow method.
3. Estimation of amino acids by Ninhydrin method.
4. Estimation of DNA.
5. Estimation of RNA.
6. Estimation of carbohydrate by Dubois method.

ALLIED PAPER - IV

416UBYT04 - MICROBIOLOGY - II

416UEST01 - ENVIRONMENTAL STUDIES (COMMON TO ALL UG BRANCHES)

CORE MODULE SYLLABUS FOR ENVIRONMENTAL STUDIES FOR UNDER GRADUATE COURSES OF ALL BRANCHES OF HIGHER EDUCATION

Vision

The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing problems of pollution, loss of forest, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. The United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 and world Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. It is clear that no citizen of the earth can afford to be ignorant of environment issues. Environmental management has captured the attention of health care managers. Managing environmental hazards has become very important.

Human beings have been interested in ecology since the beginning of civilization. Even our ancient scriptures have emphasized about practices and values of environmental conservation. It is now even more critical than ever before for mankind as a whole to have a clear understanding of environmental concerns and to follow sustainable development practices. India is rich in biodiversity, which provides various resources for people. It is also basis for biotechnology. Only about 1.7 million living organisms have been described and named globally. Still many more remain to be identified and described. Attempts are made to conserve them in ex-situ and in-situ situations. Intellectual property rights (IPRs) have become important in a biodiversity-rich country like India to protect microbes, plants and animals that have useful genetic properties. Destruction of habitats, over-use of energy resource and environmental pollution have been found to be responsible for the loss of a large number of life-forms. It is feared that a large proportion of life on earth may get wiped out in the near future.

In spite of the deteriorating status of the environment, study of environment has so far not received adequate attention in our academic programmes. Recognizing this, the Hon'ble Supreme Court directed the UGC to introduce a basic course on environment at every level in college education. Accordingly, the matter was considered by UGC and it was decided that a six months compulsory core module course in environmental studies may be prepared and compulsorily implemented in all the University/Colleges of India. The experts committee appointed by the UGC has looked into all the pertinent questions, issues and other relevant matters. This was followed by framing of the core module syllabus for environmental studies for undergraduate courses of all branches of Higher Education. We are deeply conscious that there are bound to be gaps between the ideal and real. Genuine endeavour is required to minimize the gaps by intellectual and material inputs. The success of this course will depend on the initiative and drive of the teachers and the receptive students.

SYLLABUS

Unit 1 : Multidisciplinary nature of environmental studies

Definition, scope and importance, need for public awareness. (2 lectures)

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

- a. Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b. Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c. Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

- d. Food resources : World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e. Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f. Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles. (8 lectures)

Unit 3 : Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems :-
 - (a) Forest ecosystem
 - (b) Grassland ecosystem
 - (c) Desert ecosystem
 - (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit 4 : Biodiversity and its conservation (8 lectures)

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 5 : Environmental Pollution (8 lectures)

Definition

- Cause, effects and control measures of :-
 - a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Marine pollution
 - e. Noise pollution
 - f. Thermal pollution
 - g. Nuclear hazards
 - Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
 - Role of an individual in prevention of pollution.
 - Pollution case studies.
 - Disaster management : floods, earthquake, cyclone and landslides.

Unit 6 : Social Issues and the Environment (7 lectures)

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Unit 7 : Human Population and the Environment (6 lectures)

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- VII
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

Unit 8 : Field Work

- Visit to a local area to document environmental assets rivers/forest/grassland/hill/mountain.
- Visit to a local polluted site – urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond,river,hill slopes,ect. (Field work Equal to 5 lecture hours)

416UCCT04 - SOFT SKILLS (COMMON TO ALL BRANCHES)

Semester- IV- COMPUTING SKILLS – LEVEL II

Objective:

The major objective in introducing the course is to impart hands on training to students in Microsoft Office essentials like MS Word, MS Excel and MS Access. The course is basic course offered at two levels exclusively meant for students with no computer knowledge. Course is designed as a practical oriented course and not for chalk and board teaching.

Pre- requisite : Essentials of Microsoft office as given in Level I

Unit 1 : Word processing - Auto formatting; Paragraph and character styles – creating , modifying and using styles; Templates – modifying, attaching and controlling; Tables and columns - creating, manipulating and formulating; mail merge; labels- creating

Unit 2 : Data Management – MS Access - Introduction, concepts and terms; database and tables- creating, data types, editing fields, renaming, resizing of fields, finding, sorting and displaying of data –printing

Unit 3 : Spreadsheets – MS Excel – Worksheets – moving, copying, sorting, inserting of cells, rows, columns; Charts – creating, editing, adding, rotating, printing, deleting and controlling; graphics- creating and placing, drawing lines and shapes; using multiple worksheets ; printing

Unit 4 : Presentations – Power point- starting, browsing and saving, creating, editing, formatting of text and paragraphs, inserting tables and charts; Presentation through slides, handouts and printing.

Unit 5 : Graphics and Multimedia - Clip art – create and insert; shapes- draw, insert and copy; create a flow

Note – Unit 1 -5 are to be taught as practical with hands on experience

References :

1. Introduction to Computers – Peter Norton, Tata McGraw-Hill, India
2. Microsoft 2003 – Jennifer Ackerman Kettel et al., Tata Mc-Graw Hill, India
3. Working In Microsoft office 2006– Ron Mansfield , Tata Mc-Graw Hill, India

Examinations :

1. Sessional tests could be based on Theory and practical
2. End semester is based on practical examination only

V Semester

516UBYT01 - ENZYMES

UNIT-I

Enzymes- definition and chemical nature of enzymes. General properties; Nomenclature and classification; enzymes as catalysts- Activation energy. Enzyme specificity- Active site ; Lock and key hypothesis and Induced fit theory, Allosteric site, Regulatory enzymes- allosteric enzymes with suitable examples. Isoenzymes ; with reference to LDH and CK .

UNIT-II

Methods of isolation of enzymes: Homogenisation techniques, intracellular localization of enzymes ; isolation of intracellular enzymes ; separation procedure based on molecular size - dialysis , ultrafiltration , molecular exclusion chromatography methods based on solubility - isoelectric precipitation. Salting in and salting out - methods based on electric charge - electrophoresis, Ion exchange chromatography.

UNIT-III

Coenzymes , function and action of TPP , PLP , NAD / NADP, FMN, FAD , coenzyme A, lipoic acid and Biotin. Multienzyme complexes , Metallo enzymes, Industrial uses of enzymes - food and pharmaceutical industries. Biosensors and their applications, immobilized enzymes and methods of immobilization.

UNIT-IV

Enzyme Kinetics : Rate of enzyme catalyzed reaction, Derivation of Michaelis - Menten equation. Lineweaver Burk plot and Eadie Hofstee plot. Factors affecting enzyme activity - pH, temperature , activators , cofactors , concentration of enzyme and substrate. Determination of Km value by any 3 methods.

UNIT-V

Enzyme inhibition - reversible and irreversible inhibition - types of reversible inhibitors: competitive, non competitive , uncompetitive inhibitors. (derivation not required). Mechanism of enzyme activity , covalent catalysis , proximity and orientation , acid - base catalysis . Mechanism of action of chymotrypsin.

BOOKS RECOMMENDED:

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed), W.H.Freeman
2. Voet.D and Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, and Victor W. Rodwell (2012), Harper's Illustrated Biochemistry, (29th ed), McGraw-Hill Medical
4. Trevor Palmer (1995), Understanding Enzymes (4th ed), Ellis Horwood Ltd

516UBYT02 - METABOLISM

UNIT-I

Biosynthesis and degradation of tyrosine, tryptophan and sulphur containing amino acids, Formation of melanin and epinephrine, nor-epinephrine from tyrosine.

UNIT-II

Metabolism of carbohydrates – reactions, inhibitors and energetics of glycolysis, Cori cycle, citric acid cycle, glyoxalate cycle, gluconeogenesis and HMP shunt pathway. Glycogenolysis, glycogenesis and regulation of glycogen metabolism.

UNIT-III

Metabolism of lipids. Degradation of saturated fatty acids. - β oxidation. Degradation of triglycerides, phospholipids (lecithin). Biosynthesis of saturated fatty acids, triglycerides, phospholipids (lecithin). Biosynthesis of cholesterol and ketone bodies.

UNIT-IV

Metabolism of amino acids – Amino acid pool. Oxidative deamination – role of dehydrogenases and oxidases. Non-oxidative deamination – role of pyridoxal phosphate with reference to serine and cysteine. ammonia detoxification. Decarboxylation – formation of histamine, cadaverine, gamma amino butyric acid and serotonin. Transamination reaction – mechanism and Schiff's base formation Transamidation-formation of creatine and transpeptidation- urea cycle – compartmentation and enzymes of urea cycle.

UNIT-V

Biological oxidation – Redox reactions, redox couples – redox potential – standard redox potential and its measurement. Electron transport in mitochondria – components of electron transport chain. Reactions, energetics and inhibitors of electron transport. Oxidative phosphorylation – mechanism of chemi-osmotic theory. Inhibitors of oxidative phosphorylation – uncouplers and ionophores. Substrate level phosphorylation. High energy compounds – definition, structure and free energy of hydrolysis of phosphoenol pyruvate, 3-phosphoglycerate, creatine phosphate, ATP, GTP and acyl CoA. Lippman ATP cycle.

Books Recommended:

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.
2. Voet.D and Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman.
4. Denise R Ferrier (2013), Biochemistry (Lippincott's Illustrated Reviews),(6th ed), Lippincott Williams and Wilkins.
5. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, and Victor W. Rodwell (2012), Harper's Illustrated Biochemistry, (29th ed), McGraw-Hill Medical.

UNIT-I

Definition of Molality, Molarity, Normality, Osmolarity, Definition of pH, pOH, determination of pH- Glass electrode, , Isoelectric pH, Zwitter ion, buffers, Henderson–Hasselbalch equation, Tonicity, Donnan membrane equilibrium and application. Buffers in body fluids, Red blood cells, tissues . Measurement of oxygen consumption - the Clark oxygen electrode.

UNIT-II

Basic principles of sedimentation, centrifugal force, centripetal force, sedimentation rate. Types of centrifuges, types of rotors – fixed angle, vertical , swinging bucket , zonal, elutriator rotors. Preparative centrifugation – differential centrifugation – fractionation of subcellular organelles, density gradient centrifugation – gradient preparation, separation and recovery of sample. Isopycnic centrifugation,. Isodensity centrifugation, analytical centrifugation.

UNIT-III

General principles of chromatography – partition and adsorption chromatography. Paper chromatography – principle, sample application, development – ascending , descending and radial, detection of amino acids and sugars. Thin layer chromatography – principle, instrumentation and applications (separation of alkaloids). Column chromatography – principle, factors affecting resolution. Basic principles and applications of Affinity chromatography.

UNIT-IV

General principle of electrophoresis, factors affecting migration rate – electrical potential, nature of the sample, nature of buffer, nature of the supporting medium. Tiselius moving boundary electrophoresis. Principle, procedure and application of paper, cellulose acetate, agarose and starch gel electrophoresis. Isoelectric focusing. Principle and applications of SDS-PAGE and Immuno electrophoresis.

UNIT-V

Basic principles of electromagnetic radiation, energy, wavelength, wave number and frequency. Absorption and emission spectrum. Beer Lambert law – UV and Visible range. Colorimetry, Spectrophotometry- principle, instrumentation and applications. Spectrofluorimetry- principle, instrumentation and applications with reference to riboflavin. Flame photometry – atomic absorption and emission - principle, instrumentation and applications with reference to sodium and potassium analysis.

Books Recommended:

1. Keith Wilson , John Walker (2010) Principles and Techniques of Biochemistry and Molecular Biology (7th ed) Cambridge University Press
2. David Sheehan (2009), Physical Biochemistry: Principles and Applications (2nd ed), Wiley-Blackwell
3. David M. Freifelder (1982) Physical Biochemistry: Applications to Biochemistry and Molecular Biology, W.H. Freeman
4. Rodney F. Boyer (2012), Biochemistry Laboratory: Modern Theory and techniques, (2nd ed), Prentice Hall
5. Kaloch Rajan (2011), Analytical techniques in Biochemistry and Molecular Biology, Springer

ELECTIVE PAPER - I
516UBYT04 - PHYSIOLOGY

UNIT-I

Structure of digestive system, digestion and absorption of carbohydrates, lipids and protein, Mechanism of HCl formation in stomach, role of various enzymes and hormones involved in digestive process and defecation. Excretory system – structure and function of kidney, structure of a nephron, mechanism of urine formation.

UNIT-II

Composition of blood cells, plasma components, lymph and blood groups. Bleeding and clotting time. Mechanism of blood clotting. Circulatory system- basic anatomy of heart. Systemic, pulmonary and portal circulation. Heart beat, cardiac cycle and pacemaker.

UNIT-III

Nervous system – Brain (parts of brain and ventricles), spinal cord, central and autonomous nervous system (sympathetic and parasympathetic). Structure of a neuron, synaptic transmission. Reflex action and neurotransmitters. Muscular system- types of muscles, structure and composition of skeletal muscle structure of a myofibril, mechanism of muscle contraction and theories of muscle contraction.

UNIT-IV

Respiratory system- composition of air, significance of O₂, carbon dioxide and nitrogen in biological system. Partial pressure of oxygen and carbon dioxide. Gaseous exchange in the lungs, tissue, arterial and venal capillaries, Role of kidney and lungs in maintaining the pH of blood.

UNIT-V

Hormones- classification of hormones, endocrine glands and their secretion. Insulin, thyroxine, growth hormone. Structure and function. Steroid hormones. Corticosteroids- sex hormones – testosterone and estrogen, menstrual cycle.

Books Recommended:

1. John E. Hall (2010). Guyton and Hall Textbook of Medical Physiology (12th ed), Saunders.
2. Best and Taylor (1990), Medical Physiology (12th ed), Lippincott Williams and Wilkins.
3. Walter F. Boron , Emile L. Boulpaep (2012) Medical Physiology (2nd ed), Saunders.
4. Anne Waugh (2010) Ross and Wilson Anatomy and Physiology in Health and Illness Elsevier.

516UVET01 - VALUE EDUCATION (COMMON TO ALL UG BRANCHES)

PART- IV VALUE EDUCATION - III YEAR – FIFTH SEMESTER CREDITS : 2

Objective : Values are socially accepted norms to evaluate objects, persons, and situations that form part and parcel of sociality. A value system is a set of consistent values and measures. Knowledge of the values are inculcated through education. It contributes in forming true human being, who are able to face life and make it meaningful. There are different kinds of values like, ethical or moral values, doctrinal or ideological values, social values and aesthetic values. Values can be defined as broad preferences concerning appropriate courses of action or outcomes. As such, values reflect a person's sense of right and wrong or what "ought" to be. There are representative values like, "Equal rights for all", "Excellence deserves admiration". "People should be treated with respect and dignity". Values tend to influence attitudes and behavior and help to solve common human problems. Values are related to the norms of a culture.

Unit I: Value education-its purpose and significance in the present world – Value system – The role of culture and civilization-Holistic living – Balancing the outer and inner – Body, Mind and Intellectual level- Duties and responsibilities.

Unit II : Salient values for life- Truth, commitment, honesty and integrity, forgiveness and love, empathy and ability to sacrifice, care, unity , and inclusiveness, Self esteem and self confidence, punctuality – Time, task and resource management – Problem solving and decision making skills- Interpersonal and Intra personal relationship – Team work – Positive and creative thinking.

Unit III : Human Rights – Universal Declaration of Human Rights – Human Rights violations – National Integration – Peace and non-violence – Dr. A P J Kalam's ten points for enlightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.

Unit IV: Environment and Ecological balance – interdependence of all beings – living and non-living. The binding of man and nature – Environment conservation and enrichment.

Unit V : Social Evils – Corruption, Cyber crime, Terrorism – Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against women-How to tackle them.

Books for Reference:

1. M.G.Chitakra: Education and Human Values, A.P.H.Publishing Corporation, New Delhi, 2003

VI Semester

616UBYT01 - CLINICAL BIOCHEMISTRY

UNIT-I

Scope of clinical biochemistry. Blood glucose homeostasis. Maintenance of blood glucose by hormone with special reference to insulin and glucagon. Abnormalities in glucose metabolism. Diabetes mellitus-types, causes, biochemical manifestations, diagnosis and treatment, Inborn errors of carbohydrate metabolism. Galactosemia, fructosuria and Glycogen storage diseases.

UNIT -II

Liver function test, Tests based on bile pigment metabolism. Carbohydrate metabolism, plasma proteins and lipids. Detoxification and excretory functions of liver, Jaundice - classification, biochemical changes and differential diagnosis for jaundice.

UNIT-III

Kidney function tests, measurement of urine pH, volume, specific gravity, osmolality, sediments in urine-RBC, WBC, epithelial cells, casts and calculi. Normal and abnormal constituents in urine, Inulin, urea and creatinine clearance tests. Concentration and dilution tests. Phenol red test. Levels of plasma protein and its significance related to kidney function. Proteinuria

UNIT-IV

Disorders of lipid metabolism-normal levels of cholesterol, triglycerides, phospholipids, free fatty acids and lipoprotein in blood. Abnormal levels of these lipids in diseases. Lipidosis, Atherosclerosis, hyper and hypo lipoproteinemias, sphingolipidoses, Niemann-Pick disease, Gaucher's and Tay-Sach's disease - causes and pathology.

UNIT-V

Hormonal disorders-Acromegaly, Cushing's syndrome, Addison's disease, Goitre, Grave's disease, Hyper para thyroidism - clinical features. Clinical enzymology - enzymes of diagnostic importance : LDH, creatine kinase, transaminases, phosphatases, pancreatic lipase, amylase and choline esterase. Isoenzymes of lactate dehydrogenase.

Books Recommended:

1. Thomas M.Devlin (2014) Textbook of Biochemistry with Clinical Correlations (7th ed). John Wiley & Sons
2. Montgomery R, Conway TW, Spector AA (1996),Biochemistry: A Case-Oriented Approach (6th ed), Mosby Publishers, USA.
3. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics (2014) (7th ed),Saunders
4. Dinesh Puri, (2002), Text book of Biochemistry : A clinically oriented approach - Churchill Livingstone Inc., India.
5. M.N.Chatterjee and Rana Shinde (2007).Textbook of Medical Biochemistry (7th ed)

616UBYT02 - MOLECULAR BIOLOGY

UNIT-I

DNA as the unit of inheritance. Griffith, Avery, McLeod, McCarthy, Hershey and Chase experiments and their significance. Definition of gene, organization of gene and non-coding sequence in prokaryotes, mitochondrial DNA, plasmid DNA. Viral genome- bacteriophages (M13 and Φ X174), animal virus (influenza virus), plant virus (TMV).

UNIT-II

Prokaryotic replication- model of replication- semiconservative mode of replication- replication forks, semi-discontinuous replication, Okazaki fragments. Bacteriophages M13 and Φ X174 replication, rolling circle model of replication. Enzymology of replication- role of DNA polymerases I, II, III, gyrase, topoisomerases, helicase, ligases and SSB proteins. Theta replication in E.Coli- initiation events at Ori C, elongation events on the replication fork and termination- fidelity of replication- inhibition of replication.

UNIT-III

Transcription- prokaryotic RNA polymerases- role of sigma factor. TATA box, promoter, closed and open promoter complexes- initiation, elongation and termination of transcription, post transcriptional modifications in prokaryotes (tRNA and rRNA). Inhibitors of transcription.

UNIT-IV

Genetic code- characteristics of genetic code- Wobble hypothesis- protein biosynthesis- activation of amino acids, initiation, elongation and termination of translation in prokaryotes. Inhibitors of protein biosynthesis.

UNIT-V

DNA damage, Mutation- types of mutation with examples, causes- physical and chemical agents, site- specific mutagenesis and mutational hot spots. DNA repair by direct reversal of damage, photoreactivation, excision repair, recombination repair, SOS repair.

Books recommended:

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments (6th ed). John Wiley & Sons. Inc.
2. Bruce Alberts and Dennis Bray (2013), Essential Cell Biology, (4th ed), Garland Science.
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2010). Cell and Molecular Biology. (8th ed). Lippincott Williams and Wilkins, Philadelphia.
4. James.D.Watson (2013) Molecular Biology of the Gene (7th ed), Benjamin Cummings
5. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. (5th ed). Sunderland, Mass. Sinauer Associates, Inc.
6. David Freifelder (1992) Essentials of Molecular Biology (2nd ed) Jones & Bartlett Pub

616UBYP01 - CORE PRACTICAL III

- 1.** Collection and preservation of urine sample.
- 2.** Qualitative analysis of normal constituents of urine such as urea, creatinine, phosphorus, calcium and abnormal constituents such as calcium, sugar, protein, amino acid, ketone bodies and bile pigments with clinical significance.
- 3.** Quantitative Analysis of Urine
- 4.** Urea
- 5.** Uric acid
- 6.** Creatinine
- 7.** Calcium
- 8.** Paper chromatography: Separation and detection of amino acids and simple sugars
- 9.** Separation of polar lipids by Thin layer chromatography

616UBYP02 - CORE PRACTICAL – IV

- 1.** Collection and preservation of blood sample
- 2.** Haematological studies
 - a.** RBC counting
 - b.** Total and differential count of white blood cells
 - c.** Packed cell volume
 - d.** Erythrocyte sedimentation rate
 - e.** Blood clotting time
 - f.** Blood grouping
- 3.** Quantitative estimation in blood
 - a.** Haemoglobin
 - b.** Glucose
 - c.** Cholesterol
 - d.** Urea
 - e.** Creatinine
 - f.** Protein by Lowry's method.
- 4.** Enzyme assay
 - a.** AST
 - b.** ALT
 - c.** Alkaline phosphatase

616UBYT03 - CORE ELECTIVE PAPER – II - IMMUNOLOGY

UNIT-I

Types of immunity- innate and acquired. Humoral and cell mediated immunity. Immune system – functions and structural components – lymphoreticular system – lymphoid organs- primary and central lymphoid organs – structure and functions of lymphoid cells – types and functions of B, T and null cells. Role of phagocytes and mast cells.

UNIT-II

Antigens – definition – types – haptens, isoantigens, neoantigens. Factors affecting antigenicity and immunogenicity of antigens. Antibodies – definition and classification. General structure and functions of IgM, IgD, IgA, IgG and IgE, Isohemeagglutinins and natural antibodies. Clonal selection theory of antibody formation. Complement – biochemical functions. Activation by classical and alternative pathways.

UNIT-III

Antigen – antibody interaction – types – precipitation and agglutination mechanism. Applications of agglutination reaction in diagnosis of diseases – Vidal test – complement fixation test. Blood grouping- major and minor blood groups. Erythroblastosis fetalis, Blood transfusion. Mismatched blood transfusion and its consequences, Principle and applications of RIA and ELISA.

UNIT-IV

Immunization practices- passive and active immunization. Commonly used vaccines- killed and live attenuated. Vaccination schedule for children. Production of polyclonal and monoclonal antibodies- principle and applications.

UNIT-V

Disorders of immune system – hypersensitivity – causes, types and pathology of type I, II, III and IV hypersensitivity – Auto immunity – causes and the pathology of Rheumatoid arthritis, systemic lupus erythematosus, Hashimoto's thyroiditis, thyrotoxicosis, autoimmune hemolytic anemia. Disorders of B-cells, T-cells and complement deficiency.

Books recommended

1. Judy Owen , Jenni Punt Kuby (2013) ,Immunology (Kindt, Kuby Immunology) (7 ed) W. H. Freeman & Co
2. Janis Kuby (1997),Immunology (3rd ed), W. H. Freeman & Co
3. David Male (2012) , Immunology, (Immunology (Roitt) (8th ed), Saunders
4. Ivan Roitt and Peter Delves (2001), Roitts Essential Immunology (10th ed)
5. Donald M. Weir (1998), Immunology (8th ed) , Churchill Livingstone

616UBYT04 - CORE ELECTIVE-III - BIOTECHNOLOGY

UNIT-I

Scope and importance of biotechnology. Recombinant DNA technology- Definition, restriction endonucleases- types, role, recognition sequences, cleavage pattern, modification of cuts ends, vectors- plasmid, cosmid, phage. Enzymes used in rDNA technology- DNA ligases, Alkaline phosphatase, polynucleotide kinase, linkers, homopolymer tailing, end labeling and construction maps of PBR322, λ bacteriophage.

UNIT-II

Steps in genetic engineering- Construction of genomic library. Synthesis of cDNA Construction of cDNA library. Gene transfer methods- transformation, conjugation, transduction, microinjection and electroporation. Selection-selectable markers, chromogenic substrate and screening of clones- colony hybridization, screening with antibodies.

UNIT-III

Plant tissue culture- basic requirements for culture, M S medium, callus culture, protoplast culture. Vectors – Ti plasmid (cointegration vector and binary vector), Viral vectors- TMV, CaMV and their applications. Transgenic plants – pest resistant, herbicide resistant and stress tolerant plants.

UNIT-IV

Vectors for gene transfer in animal cells - SV 40 Vector. Basics of transfection methods- calcium phosphate precipitation, DEAE- dextran mediated transfection. Transgenic mice- retroviral transfer and stem cell mediated transfer, applications. Embryonic stem cell- definition, ES cell culture to produce differentiated cells, applications. PCR - application in clinical diagnosis and forensic science. Southern blotting, Northern blotting and ELISA – principle, method and applications.

UNIT-V

Production and applications of ethanol and streptomycin (industrial Biotechnology), Proteases (Enzyme biotechnology), Biogas, Biodiesel (Fuel biotechnology), Waste water treatment (Environmental Biotechnology), Vaccines and monoclonal antibodies (Medical biotechnology).

Books Recommended:

1. David Freifelder (1992) Essentials of Molecular Biology (2nd ed) Jones & Bartlett Pub
2. Click B.R. and Pasternark J.J (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA. (4th ed) American Society for Microbiology
3. James D. Watson , Amy A. Caudy , Richard M. Myers , Jan Witkowski (2006) , Recombinant DNA: Genes and Genomes - a Short Course (3rd ed), W.H. Freeman & Co
4. Satyanarayana U (2008), Biotechnology, Books & Allied (P) Ltd.
5. Casida L (2007) Industrial Microbiology , New Age International
6. Reed G (2004) Prescott and Dunn's Industrial Microbiology, CBS Publishers & Distributors

616UEAT01 - EXTENSION ACTIVITIES (COMMON TO ALL UG BRANCHES)

A candidate shall be awarded a maximum of 1 Credits for Complusory Extension Service.

All the Students shall have to enrol for NSS /NCC/ NSO (Sports & Games) Rotract/ Youth Red cross or any other service organizations in the college and shall have to put in Complusory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

Registrar