SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

I SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT11	Part-I	Tamil	6	3	25	75	100	3
	17UACH11		Hindi						
	17UACS11		Sanskrit						
2	17UACE11	Part-II	English	6	3	25	75	100	3
3	17UBCC11	Part-III Core	Biomolecules	5	3	25	75	100	5
4		Part-III Core	Core lab - I	2	-	-	-	-	-
5	17UBCS11	Part-IV SBS	Nutrition	3	3	25	75	100	3
6	17UCYA11	Part-III Allied	General Chemistry-I	4	3	25	75	100	4
7		Part-III Allied	Lab in Allied Chemistry	2	-	-	-	-	-
8	14UACVE1	Part-IV	Value Education	2	3	25	75	100	2
TOTAL				**30**				**600**	**20**

Passed in the BOS Meeting
held on 15-3-2017

Signature of Chairman/HOD

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : BIOMOLECULES**	**Subject Code : 17 UBCC11**
Semester : I	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

- To understand the structure and functions of Biomolecules such as Carbohydrates, Proteins, Amino acids, Lipids, and Vitamins.
- To recognize the structure and functional importance of Nucleic acids.
- To know about the physiological importance of biomolecules in the human system.
- To comprehend the occurrence, physical and chemical properties of biomolecules.

UNIT-I: Carbohydrates - occurrence and general importance of carbohydrates – Basic structure of glucose, its isomer and epimers and linkages – Biologically important disaccharides like lactose, maltose and sucrose. Polysaccharides – energy storage polysaccharides, starch and glycogen – structural polysaccharide – cellulose.

UNIT-II: Lipids – Fatty acids – Classification of some naturally occurring fatty acids into saturated acids, unsaturated acids into, branched chain acids, hydroxyl and keto derivatives and cyclic acids – physical properties of fatty acids – polymorphism, solubility, boiling point, absorption, spectrochemical properties of fatty acids – salt detergents and wetting agents, esters – reactions of unsaturated fatty acids – hydrogenation, halogenations and oxidation. Fats – chemical composition, physical and chemical properties of fats – Waxes – phospholipids – Classification – non phospholipids – steroids.

UNIT-III: Amino acids and proteins – Common amino acids of proteins – General properties of protein – colour, odour and taste, shape and size, composition, molecular weight, nature, denaturation, precipitation, solubility, optical activity, colour reaction, hydrolysis, Physical properties of amino acids – solubility, electrical properties, fundamental role of proteins in life – Composition of proteins – General properties of proteins – Rudimentary treatment of structure, classification of the proteins on the basis of their biological functions

UNIT-IV: Nucleic acids – fundamental role of nucleic acids in life processes – DNA and RNA – Structure of bases , nucleotides and nucleosides – bonds linking the various bases, primary, secondary and three – dimensional structures.

UNIT-V: Vitamins – Historical development to the discovery of vitamins- C – Brief mention of sources and physiological role of – Fat soluble vitamins – Vitamin A, D, E and K – Water soluble vitamins – Vitamin B complex, Vitamin C.

Text book(s):

1. J.L. Jain (2003) **Fundamentals of biochemistry**, S. Chand Publication.
2. Renuka Harekrishnan (1995) **Biomolecules and Enzymes**, II Edition, Indraji Pub.

Chapters and sections (For UNIT-I, II, III,IV and V)

UNIT-I : Biomolecules and Enzymes by Renuka Harekrishnan – Chapter –II – Pg.no. 11-67
UNIT-II: Fundamentals of biochemistry by J.L. Jain, Sanjay Jain and Nitin Jain – Chapter – VIII & IX – Pg. no. 123 - 172
UNIT-III: Biomolecules and Enzymes by Renuka Harekrishnan – Chapter –III – Pg.no. 68-109

Chapters and sections (For UNIT-I, II, III,IV and V)

UNIT-IV: Biomolecules and Enzymes by Renuka Harekrishnan – Chapter –V – Pg.no. 173-207
UNIT-V : Fundamentals of biochemistry by J.L. Jain, Sanjay Jain and Nitin Jain – Chapter – 33 – Pg. no. 959 – 1024

Reference books:

1. Biochemistry, Lubert Stryer et al., fifth edition, W.H. Freeman and company, NY, 2003
2. Outlines of Biochemistry, E.E.Conn and Stump, Fourth edition, Wiley Eastern Ltd, 1989
3. Biochemistry, Lehninger, A.L. Nelson, Cox
4. Biochemistry, Donald Voet & Judith Voet, Wiley International Edition, 2004.

Web site Links: (E-learning resources)

http://jpkc.gmu.cn/swhx/book/Biochemistry.pdf

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL- I**	**Subject Code :**
Semester : I	**HOURS : 2 hours / Week**	**CREDITS : -**

Objectives:

- To understand the techniques involved in the qualitative analysis of Biomolecules.
- To comprehend the biochemical preparation from natural sources.
- To recognize the instrumentation and principle behind colorimeter and pH meter.

1. Qualitative analysis of bioorganic compounds
    a. Analysis of Carbohydrates
    b. Analysis of amino acids
    c. Test for proteins
    d. Test for lipids- Test for cholesterol
    e. Qualitative and quantitative tests for DNA and RNA
2. Biochemical preparation
    a. Starch from potato
    b. Lactose from milk
    c. Casein from milk
    d. Caffeine from coffee seeds
3. Use of pH meter for the preparation of buffer
4. Verification of Beer- Lambert's law using colorimeter
    i) Determining the concentration of any given colored compounds using standard graph.

Reference Book(s):

1. S. Sadasivam and A. Manickam (1996); **Biochemical Methods**, II Edition, New Age International Pvt. Ltd.

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(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SBS	**Title : NUTRITION**	**Subject Code : 17 UBCS11**
Semester : I	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

- To understand the impact of nutrition in human system.
- To appreciate and recognize the nutritional requirements and calorific values in daily diet plan.
- To comprehend the nutritional requirements at various stages of human life span.

UNIT-I: Food groups, food habits, food fads and fallacies, changing food habits. Carbohydrates: kinds, functions, food sources – Fats: Kinds, functions, food sources, essential fatty acids and cholesterol

UNIT-II: Proteins: Kinds, functions, food sources, complete and incomplete proteins – Energy: Basal metabolism, measurement of BMR, factors affecting BMR, total energy requirement and energy value of foods.

UNIT-III: Protein nutritional Nitrogen balance, Quality of food proteins and requirements, protein nutrition abnormalities, protein deficiency disorder, PEM – Balanced diet formulation – Assessment of nutritional status.

UNIT-IV: Nutrition at various stages of growth and development – Diets for infants, children, adolescents, pregnant women, lactating mothers and older persons.

UNIT-V: Nutritional challenges of the future: Food production and food storages, future foods, new protein foods.

Text book(s):

1. B. Sivasankar (2002) **Food processing and preservation**, PHI Learning Pvt. Ltd. Publishers.
2. B. Srilakshmi (2007) **Food Science,** 6th Edition, New Age International Publication.

Chapters and sections (For UNIT-I, II, III,IV and V)

Unit- I : Nutrition and Dietetics by S.A. Joshi – Section – I – Pg.no.54-68
Unit – II : Nutrition and Dietetics by S.A. Joshi – Section – I – Pg.no. 25-31, 68-75.
Unit – III: Biochemistry – U.Satyanarayana & U.Chakrapani – unit -23- Pg.no. 510-518
Nutrition and Dietetics by S.A. Joshi –Section –III - Pg. no. 369-370, 382-403
Unit-IV : Nutrition and Dietetics by S.A. Joshi – Section –I -142-150
Unit –V: Nutrition and Dietetics by S.A. Joshi –Section –III - Pg. no.493-497

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Reference books:

1. Principles of Nutrition Determination Dietetics – Dr. M. Swaminathan
2. Advanced Textbook on food and Nutrition – Vol-I & II, Dr.M. Swaminathan, II edition
3. Normal and Therapeutic Nutrition – Corine Robinson.

Web site Links: (E-learning resources)

- http://www.hindustantimes.com/india/food-fallacies/story-WWzEzOIngVeLdcQyIuPm8K.html

Web site Links: (E-learning resources)

- http://blogs.arynews.tv/food-fads-fallacies/
- http://www.biologydiscussion.com/single-cell-protein/production-of-single-cell-protein-and-mushrooms/10392
- http://www.slideshare.net/UXTrendspotting/future-of-food-37191410

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SYLLABUS

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II SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT21	Part-I	Tamil	6	3	25	75	100	3
	17UACH21		Hindi						
	17UACS21		Sanskrit						
2	17UACE21	Part-II	English	6	3	25	75	100	3
3	17UBCC21	Part-III Core	Biochemical Techniques	5	3	25	75	100	5
4	17UBCCP1	Part-III Core	Core lab I	2	3	40	60	100	2
5	17UBCS21	Part-IV SBS	Pharmacology	3	3	25	75	100	3
6	17UCYA21	Part-III Allied	General Chemistry-II	4	3	25	75	100	4
7	17UCYAP1	Part-III Allied	Lab in Allied Chemistry	2	3	40	60	100	2
8	14UACES1	Part-IV	Environmental Studies	2	3	25	75	100	2
TOTAL				**30**				**800**	**24**

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B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : BIOCHEMICAL TECHNIQUES**	**Subject Code : 17 UBCC21**
Semester : II	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

- To understand the impact of the scientific instrumentation in the area of research.
- To appreciate and recognize the working principle and applications of Biochemical instrumentation.
- To comprehend the importance and applications of radioactive isotopes.

UNIT-I: Colorimetry: Light spectrum and its wavelength regions- Complementary colors. Molar Extinction co-efficient. Beer Lambert's law and its applications.

UNIT-II: Centrifugation – Theory, relation between RPM and g- Differential centrifugation, Density gradient centrifugation - Different centrifuges. Measurement of Gases: Manometry.

UNIT-III: Chromatography: Column, Paper and Thin layer chromatography, Adsorption partition, Ion exchange, Gas chromatography and HPLC, Gel filtration, Dialysis.

UNIT-IV: Electrophoresis- Principles- Instrumentation, Application of different types of Electrophoresis- Agarose, SDS PAGE. Principles and application of Western blotting.

UNIT-V: Radioisotopes in Biochemistry: Radioactivity. Elementary units, Deduction and contification- Auto radiography, fluorography, isotopic tracer technique, Isotope dilution method.

Text book(s):

1. Keith Wilson and John Walker (2000), **Practical Biochemistry**, 5th Edition, Cambridge University Press.
2. Upadhyay & Upadhyay (2009) **Biophysical & Biochemical Techniques,** Revised Edition, Himalaya Publishing House, Mumbai.

Chapters and sections (For UNIT-I, II, III,IV and V)

Unit I: Analytical Biochemistry by Dr. P. Palanivelu – Part –II – Pg.no. 14-22

Unit II : Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 107-113, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 10 -301 - 343

Unit III : Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 142- 167, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 11 -344 - 421

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Unit IV : Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 114 – 135, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 12 -422-478

Unit V: Fundamentals of biochemistry by J.L. Jain – Part- VI – Pg.no. 853-856, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 13 -479-545

Reference books:

1. Tools in Biochemistry, Terrance G.Cooper.
2. Separation methods in Biochemistry. CJOR Morris and Maris.
3. Spectroscopy in Biology and chemistry. Sow Hsinchen and Siney YI
4. The use of radioactive isotopes in the life sciences. Chapman and Acerey
5. Manometric and Biochemical techniques. Umbrit and Burris
6. Analytical Biochemistry by Dr. P. Palanivelu.

Reference books:

7. Modern Experimental Biochemistry 3rd edition, Rodney Boyer, Pearson education, 2004.

Web site Links (E-learning resources)

- http://www.bioteach.ubc.ca/wp-content/uploads/2008/08/5DAYLABLECTURE2013.pdf

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL- I**	**Subject Code : 17 UBCCP1**
Semester : II	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

- To understand the techniques involved in the qualitative analysis of Biomolecules.
- To comprehend the biochemical preparation from natural sources.
- To recognize the instrumentation and principle behind colorimeter and pHmeter.

1**. Qualitative analysis of bioorganic compounds**

a. Analysis of Carbohydrates
b. Analysis of amino acids
c. Test for proteins
d. Test for lipids- Test for cholesterol
e. Qualitative and quantitative tests for DNA and RNA

2. **Biochemical preparation**

a. Starch from potato
b. Lactose from milk
c. Casein from milk
d. Caffeine from coffee seeds

3. **Use of pH meter for the preparation of buffer**

4. **Verification of Beer- Lambert's law using colorimeter**

(i) Determining the concentration of any given colored compounds using standard graph.

Reference Book(s):

1. S. Sadasivam and A. Manickam (1996) **Biochemical Methods** II Edition, New Age International Pvt. Ltd.

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SBS	**Title : PHARMACOLOGY**	**Subject Code : 17 UBCS21**
Semester : II	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

- To learn basic scientific concepts and principles that will serve as the foundation for understanding the pharmacology of specific drugs.
- To understand the Pharmacology and clinical use of the major class of clinically important drugs.

UNIT-I: General Introduction to Pharmacology, Principle and concept of Pharmacology, Drug classes- herbal drugs and allopathy drugs.

UNIT-II: Route of administration, Drug metabolism- Drug distribution, transformation and elimination. Chemical pathways of drug metabolism Phase I and II reactions; Microsomal; and non microsomal metabolism of drugs, role of cyt P450.

UNIT-III: Pharmacological Classification of herbal extracts**,** Herbs and nutrition, Herbs and side effects. Herbal drugs for various diseases, herbal drug formulation

UNIT-IV: Scientific evaluation of traditional drugs. role of administration & acute toxic test on animals.

UNIT-V: Safety & efficacy of drugs, clinical studies with herbal drugs toxicology of crude extracts, herbal drug toxicity.

Text book(s):

1. **Pharmacological Microbiology**- Hegho WB and Rusellael.
2. **Pharmacological chemistry**- Satoskar Vol I and II

Chapters and sections (For UNIT-I, II, III,IV and V)

UNIT I : A concise text book of pharmacology.-N.Murugesh Pg.no. 1-3
UNIT II : A concise text book of pharmacology.-N.Murugesh Pg .no.12-19
UNIT III : A concise text book of pharmacology.-N.Murugesh Pg.no.4-8
UNIT IV : http://www.sciencedomain.org/abstract/4872
http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100- 879X2000000200004
UNIT V : http://naturalingredient.org/wp/wp-content/uploads/42020.pdf

Reference books:

1. Basic pharmacology- Henry, Hinter and Barbaroongle.
2. A concise text book of pharmacology.-N.Murugesh

Web site Links (E-learning resources)

- http://www.mednotes.net/notes/pharmacology/

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

III SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT31/ H31/S31	Part-I	Tamil/Hindi/ Sanskrit	6	3	25	75	100	3
2	17UACE31	Part-II	English	6	3	25	75	100	3
3	17UBCC31	Part-III Core	Enzymology and Enzyme Technology	5	3	25	75	100	5
4		Part-III Core	Core lab II - Lab in Biochemical Analysis	2	-	-	-	-	-
5	17UBCS31	Part-IV SBS	Medical Lab Technology	3	3	25	75	100	3
6	17UBCA31	Part-III Allied	Cell Biology and Genetics - Allied Biology Theory - I	4	3	25	75	100	4
7		Part-III Allied	Cell Biology and Genetics & Biodiversity and Conservation - Allied Biology Lab	2	-	-	-	-	-
8	17UBCN31	Part-IV NME	Health and Human Diseases - Non Major Elective – I	2	3	25	75	100	2
TOTAL				**30**				**600**	**20**

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : ENZYMOLOGY AND ENZYME TECHNOLOGY**	**Subject Code : 17 UBCC31**
Semester : III	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

- To provide a theory base and knowledge relevant to the enzymology principles including fundamental properties of enzymes, enzyme catalytic mechanisms and enzyme kinetics.
- To acquire insight about the production, extraction, purification, characterisation and application of enzymes.

UNIT I: Classification and Nomenclature of enzymes, Isolation, purification – Dialysis, Gel filtration chromatography, Ion exchange chromatography and Affinity chromatography, Functions and Characterization of enzymes.

UNIT II: Enzyme kinetics: Enzyme specificity – Stereo specificity, structural specificity, functional specificity. Enzyme activity – Oxidation, Reduction, Isomerization, phosphorylation, Acetylation, Methylation, Dehydration, Decarboxylation and Transamination.

UNIT III: Enzyme kinetics: Enzyme – Substrate complexes, Michaelis – Menten kinetics – Determination of K_m and V_{max} – Lineweaver – Burk plot, Hanes Woolf equation, Eadie – Hofstee equation, Factors influencing enzyme activity, Enzyme inhibition – Reversible inhibition – Competitive, non- competitive, Uncompetitive inhibition, Irreversible inhibition, Allosteric inhibition.

UNIT IV: Mechanism of Enzyme action – Chymotrypsin. Role of co-enzymes in Enzyme reactions – Co- enzyme A, NAD, FAD, TPP, pyidoxal phosphate, Zymogens – Activation of Digestive Enzymes – chymotrypsinogen, Trypsinogen.

UNIT V: Enzyme immobilization – methods – Adsorption, Covalent bonding, Cross linking, Entrapment, Encapsulation and its Applications, Clinical and Industrial applications of enzymes, Biosensors and their applications.

Text Books:

1. Renuka Harikrishnan., (2007) **An introduction to Biomolecules and Enzymes**, 5th edition, Indraji Pathipagam, Madurai.
2. Palanivelu. P., **Enzymes and Ribozymes**, Twenty first century publications.
3. Palanivelu. P.,**Basic concepts in Enzymology**, Twenty first century publications.

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Chapters and sections (For UNIT-I, II, III,IV and V)

Unit I: An introduction to Biomolecules and Enzymes,- Renuka Harikrishnan –Page.no 248-282
Unit II: An introduction to Biomolecules and Enzymes,- Renuka Harikrishnan –Page.no 283-288, 372-380
Unit III: Essentials of Biochemistry- U.Satyanarayana Page.no 41-56 ,299-344.
Unit IV: An introduction to Biomolecules and Enzymes,- Renuka Harikrishnan –Page.no 390-424
Unit V: An introduction to Biomolecules and Enzymes,- Renuka Harikrishnan –Page.no 425-459

Reference Books:

1. Alan fresht, (1997) Enzyme structure and mechanism, W.H.Freeman and company New York.
2. Donald Voet & Judith Voet; (2004) Fundamentals of Biochemistry, Wiley International 3rd edition.
3. Jain JL; (2008) Fundamentals of Biochemistry, 1st Single word edition, S. Chand & Company ltd.
4. A.L. Lehninger, D.L. Nelson and M.M. Cox. (1993): Principles of Biochemistry Worth publishers, New York.

Web site Links (E-learning resources)

- http://www.easybiologyclass.com/enzyme-cell-immobilization-techniques/

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SYLLABUS

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PART - III CORE	**Title : CORE PRACTICAL – II:– LAB IN BIOCHEMICAL ANALYSIS**	**Subject Code :**
Semester : III	**HOURS : 2 hours / Week**	**CREDITS : -**

Objectives:

- To discover about the fundamental approaches for experimentally investigating biochemical problems
- To learn the theoretical foundations and understand the applicability of the biochemical methods to realistic situations.

Analysis of Lipids:

1. Determination of Iodine number.
2. Determination of Saponification number.
3. Estimation of Total Cholesterol by Zak's method.

Analysis of Carbohydrates:

1. Estimation of glucose by Phenol sulphuric acid method.
2. Estimation of glucose by Anthrone method.
3. Estimation of glucose by Benedict's method.
4. Estimation of pentose by Bial's method.
5. Estimation of fructose by Seliwanoff method.
6. Estimation of Lactose in milk – by Benedict's method.
7. Estimation of Maltose by DNS method.

Analysis of Proteins:

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

Analysis of Vitamins:

1. Estimation of Ascorbic acid by Dye method.
2. Estimation of Niacin.

Analysis of Minerals:

1. Estimation of Phosphorous by Fiske-Subbarow method.
2. Estimation of Iron by Bathophenanthroline method.

Reference books:

1. Harold Varley, (1991) **Practical clinical biochemistry**, 5th edition, CBS Publishers.
2. J.Ochei and A. Kolhatkar, (2000) **Medical laboratory science**, Tata Mc graw Hill publication,
3. Carl A. Burtis & Co, Tietz (2006) **Text book of Clinical chemistry and Molecular Diagnostics** 4th edition, Elsevier Publication.

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SBS	**Title : MEDICAL LAB TECHNOLOGY**	**Subject Code : 17 UBCS31**
Semester : III	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

- To comprehend the theoretical basics of preclinical subjects such as Biochemistry, Pathology, Microbiology and Blood Banking.
- To gain insight about the diagnosis, treatment and prevention of disease through the use of clinical laboratory tests.
- To explain and apply basic principles of medical terminology, safety measures, universal precautions, infection control and potential sources of error as they relate to standard laboratory operating procedures and quality patient care.

Unit I Blood and urine analysis

Blood analysis- collection and preservation of blood- anticoagulants- normal haematological values- prevention of clotting. Blood banking urine analysis- collection and preservation of urine. Macroscopic and microscopic examination of urine culture- chemical examination of urinary calculi.

Unit II Mycology

Introduction to common fungal disease- Investigation of infectious candidiasis, Mycetomos, Cryptococcus.

Unit III Immunological Diagnosis

Collection and preservation of serum- Measurement of Antibodies, Agglutinations reaction, Precipitation reaction, Widals test, Serological tests for Syphilis- VDRL slide flocculation test, ELISA.

Unit IV Molecular Biology Techniques:

Polymerase chain reaction for detection of diseases- sample processing for DNA extraction- DNA fingerprinting.

Unit V Hematology and Blood banking

Complete Haemogram- grouping & "Rh" typing- Blood Bank setup- Blood collection screening, storage, cross matching& Blood transfusion.

Text Books:

1. M.Mukerjee (2005) **Medical lab technology,** Vol-I to III, McGraw-Hill Publication.
2. David friefelder (2000) **Molecular biology**, Jones – Bartlette Publishers.

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Chapters and sections (For UNIT-I, II, III, IV and V):

Unit I: http://www.thl.fi/publications/ehrm/product2/part_iii4.htm
https://en.wikipedia.org/wiki/Anticoagulant
http://www.med.unc.edu/md/wms/files/MS2%20Pulm%20Normal%20Labs.pdf
http://www.bd.com/vacutainer/labnotes/Volume14Number2/
http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html
http://www.aafp.org/afp/2006/0701/p86.html

Unit II: http://www.healthline.com/health/skin/cutaneous-candidiasis#Causes3
http://patient.info/in/doctor/mycetoma-madura-foot
http://emedicine.medscape.com/article/215354-overview

Unit III:vlab.amrita.edu/?sub=3&brch=69&sim=196&cnt=1
https://medlineplus.gov/ency/article/003515.htm

Unit IV:
http://envfor.nic.in/divisions/csurv/biosafety/Gef2/T5/16%20Dr%20Randhawa_%20Isolation%20&%20purification%20of%20genomic%20DNA.pdf
http://www.nbpgr.ernet.in/Portals/6/DMX/GENOMIC_RESOURCES/DNA%20extraction-Comparison%20of%20methodologies.pdf

Unit V: https://en.wikipedia.org/wiki/Complete_blood_count.
http://cfavm.org/notes/DrAlleman/Complete%20Hemogram%20.pdf

Reference books:

1. Clinical chemistry – Teetz.
2. Practical chemistry – Varley.
3. Immunology – Roitss.
4. Medical laboratory techniques by- Godger.
5. Haemotology- Ramnik sood.

Web site Links(E-learning resources)

- study.com/what_does_a_medical_lab_technician_do.html

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B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ALLIED	**Title : CELL BIOLOGY & GENETICS**	**Subject Code : 17 UBCA31**
Semester : III	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

- To describe the most important functions of the cell, its microscopic structure and the structure and function of the different cell organelles.
- To provide basic genetic terminology at a general level and describe the organisation and development of the genetic makeup on cellular, chromosomal and gene level and be able to explain the basic molecular genetic mechanisms in relation to the structure and function of the cells.

Unit I: Cell Structure – prokaryotic and eukaryotic (comparison) - plant and animal cells. Microscopy: Principles of Light and Electron microscopy. Plasma membrane – Chemistry and ultra-structure – Fluid Mosaic model- functions. Protoplasm – Chemistry and organization – microtubules and microfilaments (a brief account). Endoplasmic reticulum and Golgi complex – structure and functions.

Unit II: Lysosomes – ultra structure and functions, types. Ribosomes – ultra structure and functions. Chloroplast – ultra structure and chemistry, function – mechanism of photosynthesis and generation of ATP to be explained briefly. Mitochondria – ultra structure and functions (a brief account).

Unit III: Nucleus – Nuclear envelop –nucleolus-structure and function. Chromatin –structure - nucleosomes. Cell Cycle – G1, S & G2 phases (a brief account). Cell division: Mitosis and Meiosis – stages and their significance.

Unit IV: Mendelian Genetics-Mendel's experiments, Mendel's laws of inheritance, Test cross and Back cross. Allelic gene interaction-complementary genes (Flower colour in Sweet Pea), epistasis-dominant (Fruit colour in Cucurbita) and recessive (Coat colour in Mice). Non-allelic gene interaction-Incomplete dominance (Flower colour in Mirabilis) and multiple gene interaction (ABO Blood Group inheritance in Human).

Unit V: Linkage – Principles - linkage in Drosophila. Crossing over in Drosophila- mechanism and significance of crossing over (theories of crossing over are not necessary). Sex linked inheritance (Hemophilia and colour blindness).

Text Books:

1. N. Arumugam (2010). **Cell and Molecular Biology**.Saras Publications
2. V.K. Agarwal (2000). **Cell Biology**. S. Chand & Co., New Delhi.
3. R.P.Meyyan(2012). **Genetics**. Saras Publications
4. C.B.Powar (2010).**Cell biology**.Navodhaya publishing house.

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SYLLABUS

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Chapters and sections (For UNIT-I, II, III, IV and V):

Unit I: Cell biology,Genetics,Molecular biology,Evolution and Ecology-Dr.P.S.Verma and Dr.V.K.Agarwal

Pg.no:32-55,112-153

Chapters and sections (For UNIT-I, II, III, IV and V):

Unit II: Cell biology,Genetics,Molecular biology,Evolution and Ecology-Dr.P.S.Verma and Dr.V.K.Agarwal

Pg.no: 191-219 ,280-292

Unit III: Cell biology,Genetics,Molecular biology,Evolution and Ecology-Dr.P.S.Verma and Dr.V.K.Agarwal

Pg.no:243-256 ,318-341

Unit IV: Principles of Genetics – R.H.Tamarin- Part –II – Pg.no. 16-46

Unit V: Principles of Genetics – R.H.Tamarin- Part –VI – Pg.no. 110-146

Reference books:

1. B. Albert, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson (1983) Molecular biology of the cell, New York, Garland.
2. E.D.P. De Robertis, F.A. Saez and E.M.F. De Robertis (1990) Cell and Molecular Biology 3rd edition, McGraw – Hill Pub.
3. Gardener, J., Simmons, H.J. and Snustad, D.P. 1991.Principles of Genetics (5^{th}Edition).John Wiley & Sons, NewYork.

Web site Links (E-learning resources)

- http://biology.tutorvista.com/cell/cell-structure.html
- https://www.ascb.org/wp-content/uploads/2015/12/FawcettTheCellChapter6.pdf
- http://biology.tutorvista.com/animal-and-plant-cells/golgi-apparatus.html
- http://classes.uleth.ca/200603/biol3000b/18.pdf
- http://www.ncert.nic.in/html/learning_basket/biology/cc&cd.pdf
- https://www.nicholls.edu/biol-ds/biol155/Lectures/Cell%20Biology.pdf

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SYLLABUS

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PART - III ALLIED	**Title : Lab in Biology–Cell Biology and Genetics & Biodiversity and Conservation**	**Subject Code :**
Semester : III	**HOURS : 2 hours / Week**	**CREDITS : -**

Objectives:

- To obtain hands-on experience with experimental approaches used to solve problems in Cell Biology, Genetics and Biotechnology.
- To become familiar with some of the equipment and techniques commonly used to study the molecular basis of living systems and gain experience with the quantitative aspects of cellular and molecular biology research.
- To learn about biomes, biodiversity, and biological conservation and the difficulties associated with managing natural resources.

1. Study of Parts and functions of compound microscope
2. Study of Cell inclusions: Starch grains – smear of potato, banana or rice., Cystolith– Sections of *Ficus* leaves
3. Study of cell organelles using photomicrographs
4. Study of various stages of mitosis and meiosis using Allium *cepa* roots and *Rheo* flower buds.
5. Study of Survey of mendelian traits in man.
6. To work out simple genetic problems in monohybrid and dihybrid crosses.
7. Measuring Biodiversity – Species diversity index (Simpson's Index) of vegetation.
8. Analysis of the vegetation for frequency, density and abundance using quadrat method.
9. By using world and Indian map mark important Biodiversity regions.
10. Collection of endemic plants and animals photos with information by using websites, journals,
    Newspapers

Reference books:

1. N. Arumugam (2010). **Cell and Molecular Biology**. Saras Publications
2. V.K. Agarwal (2000). **Cell Biology**. S. Chand & Co., New Delhi.
3. R.P.Meyyan(2012). Genetics. Saras Publications
4. B. Albert, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson (1983) **Molecular biology of the cell**, New York, Garland.
5. E.D.P. De Robertis, F.A. Saez and E.M.F. De Robertis (1990) **Cell and Molecular Biology** 3rd edition, McGraw – Hill Publications.
6. CPR **Manual of Biodiversity** (2003) – Environmental Education centre, Chennai.
7. K.V. Krishnamurthy (2003) **An Advanced book on Biodiversity** – Principles and Practice – Oxford SIBH publishing Co. Pvt. Ltd., New Delhi.

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B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : HEALTH AND HUMAN DISEASES**	**Subject Code : 17 UBCN31**
Semester : III	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

- To comprehend the structure and function of the human body in health; signs and symptoms of disease;the molecular basis of disease;current treatment of disease and cutting edge therapeutics.

Unit I: Introduction- importance of being healthy –Physical and Mental Health - yoga - nutrition, exercise, Causes of disease- environment- age- living conditions- Life style- Obesity- BMI.

Unit II: Diseases- cause- symptoms- treatment of- heart diseases- jaundice- cancer.

Unit III: AIDS-Nosocomial diseases- traveling diseases- children and old age diseases- T.B- leprosy-Dengue-Bird flu.

Unit IV: Diseases prevention- healthy habits, disease prevention awareness- vaccination-immunization schedule.

Unit V: First aid measures- Accident care- Bleeding and Wound care- Fractures and dislocations- electrical shock- burns- breathing emergency- Allergies- pregnancy care.

Text Books:

1. **Clinical biochemistry**- Chatterjee
2. Kavanagh James. "**Emergency First Aid**" Waterford publisher.

Chapters and sections (For UNIT-I, II, III,IV and V)

Unit I: Biological Science-D.J.Taylor, N.P.O.Green, G.W.Stout. Page.no:495-500,527-531
Unit II: Biological Science-D.J.Taylor, N.P.O.Green, G.W.Stout. Page.no: 520-526.
Unit III: http://download.nos.org/srsec314newE/PDFBIO.EL28.pdf
Unit IV: http://www.immunize.org/catg.d/p2011.pdf
Unit V: http://www.redcross.org/images/MEDIA_CustomProductCatalog/m55540601_FA-CPR-AED-Part-Manual.pdf, https://www.city.sapporo.jp/shobo/kyukyu/documents/allpages.pdf

Reference books:

1. Microbiology- Alcamo.
2. Fundamentals of Biochemistry- A.C.Deb.
3. Kathleen handal. "The American Red Cross First Aid and safety Handbook."
4. www.wikipedia.com

Web site Links: (E-learning resources)

- http://kmbiology.weebly.com/human-health-and-disease---notes.html

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IV SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT31/ H31/S31	Part-I	Tamil/Hindi/ Sanskrit	6	3	25	75	100	3
2	I7UACE41	Part-II	English	6	3	25	75	100	3
3	17UBCC41	Part-III Core	Metabolism	5	3	25	75	100	5
4	17UBCCP2	Part-III Core	Core lab II – Lab in Biochemical Analysis	2	3	40	60	100	2
5	17UBCS41	Part-IV SBS	Biostatistics (Skilled)	3	3	25	75	100	3
6	17UBCA41	Part-III Allied	Biodiversity and Conservation - Allied Biology Theory - II	4	3	25	75	100	4
7	17UBCAP2	Part-III Allied	Cell Biology and Genetics & Biodiversity and Conservation - Allied Biology Lab	2	3	40	60	100	2
8	17UBCN41	Part-IV NME	Herbal Medicine - Non Major Elective – II	2	3	25	75	100	2
9		Part-V	Extension Activities	-	-	-	-	100	1
TOTAL				**30**				**900**	**25**

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	Title : METABOLISM	Subject Code : 17 UBCC41
Semester : IV	HOURS : 5 hours / Week	CREDITS : 5

Objectives:

- To understand the fundamental energetics of biochemical processes and chemical logic of metabolic pathways.
- To recognize the basic mechanisms of pathway regulation and understand the relation between biochemical defects and metabolic disorders.

UNIT I: Bioenergetics: High energy and low energy phosphates, Electron transport chain, Oxidative phosphorylation.

UNIT II: Carbohydrate metabolism: Conversion of simple sugars (Sucurose, Maltose, Lactose) into Glucose, Glycolysis, TCA cycle, Energetics of Glucose metabolism, HMP shunt and Gluconeogenesis, Glycogen metabolism – Glycogenesis, Glycogenolysis.

UNIT III: Lipid metabolism: Biosynthesis of Fatty acids, β – Oxidation of Fatty acids, Energetics of Fatty acid Oxidation, Ketone bodies metabolism, Metabolism of Triacyl glycerols, phospholipids, Cholesterol metabolism.

UNIT IV: Amino acid metabolism: A brief account of Amino acid metabolism – glycine, Cysteine, proline, Homoserine, phenylalanine, tyrosine, tryptophan.

UNIT V: Nucleic acid metabolism: Purine and Pyrimidine bases – Biosynthesis of Purine and Pyrimidine, Biosynthesis of DNA and RNA.

Text Books:

1. Chatterjee, (2005) **Text book of medical biochemistry**, 6th edition, Jaypee brothers publication.
2. Devlin (1997) **Text book of Biochemistry**, 4th edition, John Wiley & sons, INC Publications.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: - Biochemistry by U.Satyanarayana- Page.no 119-127,120-130
Unit II: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 266-329
Unit III: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 336-394
Unit IV: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 402-459
Unit V: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 205-242

Reference books:

1. Donald Voet & Judith Voet (2004) Fundamentals of Biochemistry, 3rd edition, Wiley International.
2. Lehninger, Nelson AL Cox, (2003) Principles of Biochemistry, 4th edition, W.H. Freeman and company.
3. R.K. Murray, P.A. Mayes, D.K. Granner, and V.W. Rodwell (1990) Harper's Biochemistry, Lange Medical Book

Reference books:

4. Murray.K, Meyes.P.A, Rodwell.V.W, (2003) Harper's illustrated Biochemistry, 26th edition, International edition, McGraw - Hill companies.

Web site Links (E-learning resources) http://www.news-medical.net/life-sciences/What-is-Metabolism.aspx

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : Core Practical – II: Lab in Biochemical Analysis**	**Subject Code : 17 UBCCP2**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

- To discover about the fundamental approaches for experimentally investigating biochemical problems
- To learn the theoretical foundations and understand the applicability of the biochemical methods to realistic situations.

Analysis of Lipids:

1. Determination of Iodine number.
2. Determination of Saponification number.
3. Estimation of Total Cholesterol by Zak's method.

Analysis of Carbohydrates:

1. Estimation of glucose by Phenol sulphuric acid method.
2. Estimation of glucose by Anthrone method.
3. Estimation of glucose by Benedict's method.
4. Estimation of pentose by Bial's method.
5. Estimation of fructose by Seliwanoff method.
6. Estimation of Lactose in milk – by Benedict's method.
7. Estimation of Maltose by DNS method.

Analysis of Proteins:

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

Analysis of Vitamins:

1. Estimation of Ascorbic acid by Dye method.
2. Estimation of Niacin.

Analysis of Minerals:

1. Estimation of Phosphorous by Fiske-Subbarow method.
2. Estimation of Iron by Bathophenanthroline method.

Reference books:

1. Harold Varley, (1991) **Practical clinical biochemistry**, 5th edition, CBS Publishers.
2. J.Ochei and A. Kolhatkar, (2000) **Medical laboratory science**, Tata Mc graw Hill publication,
3. Carl A. Burtis & Co, Tietz (2006) Text book of Clinical chemistry and Molecular Diagnostics 4th edition, Elsevier Publication

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SBS	**Title : BIOSTATISTICS**	**Subject Code : 17 UBCS41**
Semester : IV	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

- To introduce the biostatistical methods and to understand the underlying principles, as well as practical guidelines
- To provide insight into both descriptive and inferential statistical techniques, with emphasis on selection of appropriate application and interpretation of results.

Unit I : Introduction: Basis of Statistics – Definition – statistical methods – kinds of Biological Data Collection, organization and Representation of Data:

1. Collection of Data – Types of data: primary data, secondary data – methods of collecting data.
2. Sampling and sampling designs – Meaning and definitions – Random and Non random sampling
3. Editing the data: Definition for editing, objectives of editing, problems of Accuracy, problems of approximation and errors.
4. Classification of data: Meaning, Definition, Objectives of Classification of data.

Unit II :Tabulation: Meaning and definition – of parts of tables – advantages.

Representation of data: Diagrammatic: simple bar diagram, rectangles, squares, circles or pie diagram – Graphic representation: Histogram, frequency – polygon frequency curve, cumulative frequency curve or O give curve.

Unit III: Measures of central Tendency: Explanation, Types of averages: 1. Arithmetic mean 2. Median 3. Mode. Explanation Problems related to: ungrouped data, Simple grouped data: continuous, discrete series.

Measures of dispersion: Explanation, Types of dispersion: 1. Range 2. Mean deviation 3.Standard deviation and Variance. Problems related to the above mentioned dispersion taking ungrouped data.**]**

Unit IV Probability: Definition and Explanation:

1. Theorem and probability: addition theorem and multiplication theorem.
2. Types of theoretical distribution: Binomial distribution (simple problems), Poisson distribution and Normal distribution (explanation problems not necessary).

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Unit V Correlation and Regression: Correlation Explanation

1. Types of correlation: Positive and negative correlation- Simple partial and multiple correlation- linear and non-linear correlation.
2. A method of studying correlation using Karl Pearson's co-efficient of correlation (simple problems related to correlation).

Regression analysis:

Explanation: Regression line- Regression equation: regression equation of X on Y, regression equation of Y on X.

Text Books:

1. S.P.Gupta (2003) **Statistical methods**
2. R.C.Kothari (2004) **Research methodology**

Reference book(s):

1. Biostatistics- A foundation for analysis in health science- Daniel

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Statistical methods- S.P.Gupta – pg.no.: E 1.1 – E 5.4
Unit II: Statistical methods- S.P.Gupta – pg.no.: E-5.18-E 8.51
Unit III: Statistical methods- S.P.Gupta – pg.no.: E 7.1-E 8.6
Unit IV: Statistical methods- S.P.Gupta – pg.no.: A 1.1-1.56, A 2.1-2.75
Unit V: Statistical methods- S.P.Gupta – pg.no.: E 10.1-10.61; E11.1-11.53.

Web site Links (E-learning resources)

- https://www.stat.ubc.ca/~rollin/teach/643.f02/notes/
  https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_extension_trainees/ln_biostat_hew.pdf
- https://www.scribd.com/doc/71132284/Graphical-Representation-of-Statistical-Data

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SYLLABUS

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PART - III ALLIED	**Title : Biodiversity and Conservation (Allied Biology Theory - II)**	**Subject Code : 17 UBCA41**
Semester : IV	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

- To describe the most important functions of the cell, its microscopic structure and the structure and function of the different cell organelles.
- To provide basic genetic terminology at a general level and describe the organisation and development of the genetic makeup on cellular, chromosomal and gene level and be able to explain the basic molecular genetic mechanisms in relation to the structure and function of the cells.

Unit I: Biodiversity – introduction, concept and scope of Biodiversity.Levels of Biodiversity – Genetic, species & Ecosystem diversity. Values of Biodiversity. Organizations associated with Biodiversity management – IUCN, UNEP, UNESCO and WWF.

Unit II: Measures of Biodiversity – alpha, beta and gamma diversity; species richness and evenness; Species Diversity indices – Simpson Index and Shannon Index.Sampling method-Quadrat method.

Unit III: Megadiversity centres & Hotspots (a brief account). Threats to Biodiversity – IUCN categories of threat. Role of CITES.

Unit IV: Conservation of Biodiversity - Need for conservation –Methods of conservation – *in situ* – conserved areas of India - National Parks, Sanctuaries, Biosphere reserves and Sacred Groves -*ex situ* conservation – Cryopreservation and Germplasm conservation.

Unit V: International Conventions on Conservation- Convention on Biological Diversity, Ramsar convention, TRIPS- Copyright and Patent, Trademarks, Industrial Designs, Geographical Indications & Layout design of integrated circuits, UPOV, IUPGR (a brief introduction). People's movements to conserve Biodiversity – Chipko movement & Silent valley movement (a brief account)

Text Books:

1. CPR **Manual of Biodiversity** (2003) – Environmental Education centre, Chennai
2. K.V. Krishnamurthy (2003) **An Advanced book on Biodiversity – Principles and Practice** – Oxford SIBH publishing co. pvt. Ltd., New Delhi.

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Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: .V. Krishnamurthy (2003) An Advanced book on Biodiversity —Pg.No: 1-7, 67-80
Unit II: V. Krishnamurthy (2003) An Advanced book on Biodiversity —Pg.No: 28-34
Unit III: CPR Manual of Biodiversity (2003) – Environmental Education centre - Pg.No: 13-16, 26-30
Unit IV: V. Krishnamurthy (2003) An Advanced book on Biodiversity —Pg.No: 106-138
Unit V: V. Krishnamurthy (2003) An Advanced book on Biodiversity —Pg.No: 138-142

Reference book(s):

1. D.K.Belsare (2007). Introduction to Biodiversity. APH Publishing Corporation, New Delhi.

Web site Links: (E-learning resources)

- http://study.com/academy/lesson/what-is-biodiversity-definition-and-relation-to-ecosystem-stability.html

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SYLLABUS

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PART - III ALLIED	**Title : Lab in Biology–Cell Biology and Genetics & Biodiversity and Conservation**	**Subject Code : 17 UBCAP2**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

- To obtain hands-on experience with experimental approaches used to solve problems in Cell Biology, Genetics and Biotechnology.
- To become familiar with some of the equipment and techniques commonly used to study the molecular basis of living systems and gain experience with the quantitative aspects of cellular and molecular biology research.
- To learn about biomes, biodiversity, and biological conservation and the difficulties associated with managing natural resources.

1. Study of Parts and functions of compound microscope
2. Study of Cell inclusions: Starch grains – smear of potato, banana or rice., Cystolith– Sections of *Ficus* leaves
3. Study of cell organelles using photomicrographs
4. Study of various stages of mitosis and meiosis using Allium *cepa* roots and *Rheo* flower buds.
5. Study of Survey of mendelian traits in man.
6. To work out simple genetic problems in monohybrid and dihybrid crosses.
7. Measuring Biodiversity – Species diversity index (Simpson's Index) of vegetation.
8. Analysis of the vegetation for frequency, density and abundance using quadrat method.
9. By using world and Indian map mark important Biodiversity regions.
10. Collection of endemic plants and animals photos with information by using websites, journals,newspapers

Reference books:

1. N. Arumugam (2010). Cell and Molecular Biology.Saras Publications
2. V.K. Agarwal (2000). Cell Biology. S. Chand & Co., New Delhi.
3. R.P.Meyyan(2012). Genetics. Saras Publications
4. B. Albert, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson (1983) Molecular biology of the cell, New York, Garland.
5. E.D.P. De Robertis, F.A. Saez and E.M.F. De Robertis (1990) Cell and Molecular Biology 3rd edition, McGraw – Hill Publications.
6. CPR Manual of Biodiversity (2003) – Environmental Education centre, Chennai.
7. K.V. Krishnamurthy (2003) An Advanced book on Biodiversity – Principles and Practice – Oxford SIBH publishing Co. Pvt. Ltd., New Delhi.

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : HERBAL MEDICINE**	**Subject Code : 17 UBCN41**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

- To gain awareness of the current basic scientific research on some of the important herbal agents used in Traditional Medicine.
- To acquire knowledge of popular herbal formulae and their general usage.

Unit I

Introduction: Scope- Alternative systems of medicine- advantages- human system- herbals for human system- definition.

Unit II

Secondary metabolites: Source- different types- action – medicinal plants- pharmacological action- toxicity.

Unit III

Herbal cultivation: Plant- types- Methodology- marketing- economic potential- pharmacological companies- manufacture- patency- GATT- TRIPS-WTO.

Unit IV

Herbal gardening: Types- methodologies- application- home gardens- types- methodologies- application- home made remedies- herbal formulations- herbal physiotherapy.

Unit V

Plant propagation: Definition- types- grafting- endangered plants- need for conservation – techniques- tissue culture- requirements-techniques-Micro propagation.

Text Books:

1. **Introduction to spices, plantation crops, Medicinal aromatic plants**- N.Kumar *et.al.,*
2. **Biotechnology of Secondary metabolites**- K.G.Ramawt, J.M.Muritton.

Reference books:

1. Indian medicinal plants Vol I to Vol V.
2. A compendium of 500 species- Orient Longman.

Web site Links: (E-learning resources)

- https://monographs.iarc.fr/ENG/Monographs/vol82/mono82-6A.pdf

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V SEMESTER

Sl. No	Subject Code	Nature	Subject Title	Hours /Week	Duration of exams	CA	SE	Tot	Crd
1	17UBCC51	Part-III Core	Molecular Biology	5	3	25	75	100	4
2	17UBCC52	Part-III Core	General Microbiology	5	3	25	75	100	4
3	17UBCC53	Part-III Core	Immunology & Immunotechnology	5	3	25	75	100	4
4	17UBCE51	Part-III Elective 1	Medical Diagnostics	5	3	25	75	100	5
5	17UBCE52	Part-III Elective 2	Bioinformatics	5	3	25	75	100	5
6	17UBCCP3	Part-III Core Lab	Lab in Microbiology & Immunology	5	3	40	60	100	4
7	16 USS S51	Self Study	Soft Skill	-	-	-	-	100	-
			TOTAL	**30**				**700**	**26**

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B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : MOLECULAR BIOLOGY**	**Subject Code : 17 UBCC51**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To explain and give examples of how ionic, hydrophobic, and hydrogen bonding interactions determine the structure of nucleic acids and proteins and modulate the specificity of binding between them.
- To distinguish between different molecular biology techniques that are used to isolate, separate, and probe for specific proteins, nucleic acids, and their interactions.
- To emphasize the molecular mechanisms of DNA replication, repair, transcription, protein synthesis, and gene regulation in different organisms.

UNIT I: Origin of Molecular biology and chemical basis of heredity: Prebiotic origin of Biomolecules, self replicating Biomolecules, chromatin structure and composition, structure of DNA and RNA.

UNIT II: Nucleic acid as the genetic material: classical experiments – Griffith experiment, Mc Avery and Claud, Methods of gene transfer – Transformation, Transduction – types and mechanism, conjugation.

UNIT III: Replication: Enzymology of DNA replication, models of replication – Sigma replication, (σ) Theta replication, DNA damage, DNA repair mechanism – Photo reactivation, Mismatch repair, Excision repair – Base excision, Nucleotide Excision.

UNIT IV: Transcription: initiation, elongation and termination of RNA transcription, post transcriptional modification, Regulation of transcription: concepts of operon – Lac operon – Inducers and repressors.

UNIT V: Introduction to Genetic code – Wobble Hypothesis, Translation – role of mRNA, rRNA, tRNA, initiation, elongation and termination of Protein synthesis, Post translational modification.

Text Books:

1. David friefielder (1990) **Molecular biology**, 2nd edition, Narosa Publishers.
2. Gardener EJ, Simmons MJ, Snustad DP (2006**). Principles of Genetics**, 8th edition, John Wiley and sons pvt. Ltd.

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Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Friefelder's essentials of Molecular biology - G.M.Malacinski - Pg.no: 17-76
Unit II: Friefelder's essentials of Molecular biology - G.M.Malacinski - Pg.no: 97-115
Unit III: Friefelder's essentials of Molecular biology - G.M.Malacinski - Pg.no: 118-143, 192 -214
Unit IV: Friefelder's essentials of Molecular biology - G.M.Malacinski - Pg.no: 146-163
Unit V: Friefelder's essentials of Molecular biology - G.M.Malacinski - Pg.no: 168-185

Reference books:

1. Benjamin Lewin (2003) Gene VIII, Benjamin Cummins publishers, United States edition.
2. Geoffrey M. Cooper, (2000) The cell A molecular approach, 4th edition, ASM Press.
3. Lodish *et al.,* (2003) Molecular cell biology, Scientific American press
4. Watson JD et al. (2004) Molecular biology of the gene, 5th edition, Pearson education.
5. Gerald Karp, (1996) Cell and Molecular Biology, 1st edition, John Wiley & sons.

Web site Links (E-learning resources)

- https://ocw.mit.edu/courses/biology/7-012-introduction-to-biology-fall-2004/video-lectures/lecture-10-molecular-biology-1/

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PART - III CORE	**Title : GENERAL MICROBIOLOGY**	**Subject Code : 17 UBCC52**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To explain relationships and apply appropriate terminology relating to the structure, metabolism, genetics, and ecology of prokaryotic microorganisms, eukaryotic microorganisms, and viruses.
- To explicate the interactions between opportunistic and pathogenic microorganisms and susceptible hosts in contacts that result in infection and/or disease and apply these interactions to disease symptoms.
- To elucidate the principles of physical and chemical methods used in the control of microorganisms and apply this understanding to the prevention and control of infectious diseases

UNIT I: Classification and organization: Introduction – History of Microbiology, Importance and applications of Microbiology. Outline classification of living organisms: Haeckel's, Whittaker and Carl Woese systems. Prokaryotes – General characteristics of bacteria, archaebacteria, rickettsias, mycoplasmas, cyanobacteria and actinomycetes. Ultrastructure of a bacterial cell: cell wall, cell membrane, ribosomes, nucleoid, Capsule, flagella, fimbriae, endospore and storage granules.

UNIT II: Nutrition, Growth and Reproduction: Microbial nutrition – nutritional requirements and uptake of nutrients by cells. Nutritional groups of microorganisms – autotrophs, heterotrophs. Bacterial growth – Growth curve, Factors influencing microbial growth. Reproduction – modes of reproduction – Binary fission, fragmentation, budding, conjugation, transformation, transduction and sporulation.

UNIT III: Microscopy: Principles and applications, resolving power, numerical aperture, types – dark field, bright field microscopy, phase contrast microscopy, fluorescent microscopy, electron microscopy, TEM and SEM.

UNIT IV: Applied microbiology: Food microbiology – spoilage, poisoning, food borne infections. Industrial microbiology – fermentation, use of microbes in industries, productions – organic acids (lactic acid and citric acid), antibiotics (penicillin and streptomycin). beer, wine. Microorganisms and milk – milk souring, alkali production, sweet curding. Fermented milk products – cheese, yoghurt, sauerkraut.

UNIT V: Agricultural and Medical microbiology: Plant growth – promoting microorganisms – mycorrhizae, rhizobia, Biofertilizers – *Rhizobium.* Plant diseases bacteria and viruses. Pathogenesis and prevention of air and water borne diseases – Typhoid, cholera, dysentery, Diarrhoea, hepatitis, amoebiosis, tuberculosis, pox diseases, diphtheria, poliomyelitis.

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Text Books:

1. Prescott, (2003) **Microbiology**, 6th edition, McGraw – Hill international.
2. Stainer, et al, (1993) **General Microbiology**, 5th edition, The Mac Milan press Ltd.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Microbiology- Prescott-6th edition pg.no: 1-14
Unit II: Microbiology- Prescott-6th edition pg.no: 94-102, 110-112 ,118-124
Unit III: Essentials of Microbiology- Dr S.Rajan Pg.no:79-92
Unit IV: Microbiology- Prescott-6th edition pg.no :937-958, 963-987
Unit V: Essentials of Microbiology- Dr S.Rajan Pg.no :531-570

References:

1. Davis et al, (1990) **Microbiology**, 4th edition J.B.Lippincott Company.
2. Pelczar, (1994) **Microbiology**, 5th edition, Tata Mc Graw Hill Publishing Company Ltd.

Web site Links: (E-learning resources)

- http://www.austincc.edu/rlewis3/docs/ch1_notes_intro.pdf
- http://faculty.fiu.edu/~gantarm/Ch.%207%20Nutrition.html
- http://mgkmicro.com/BIOL257/Lecture5.pdf
- https://www.hccfl.edu/media/572066/microscopy.pdf
- http://www.htskorea.com/tech/lightoptic/basic_microscopy.pdf
- www.mednotes.net/notes/microbiology/

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PART - III CORE	**Title : IMMUNOLOGY AND IMMUNOTECHNOLOGY**	**Subject Code : 17 UBCC53**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To learn about the structural features of the components of the immune system as well as their functions.
- To gain knowledge about the mechanisms involved in immune system development and responsiveness.
- To understand the principles and applications of various immune-assay to evaluate the immune-status**.**

Unit I: Definition: Immunity, host resistance, antigen, antibody, leucocytes, lymphocytes etc., principles of Innate and acquired immunity, memory specificity – self / non self diversity – introduction to cells – [lymphocytes, monocytes, macrophages and granulocytes] and organs of the immune system – [bone marrow, thymus, spleen, lymph nodes, MALT, GALT.]

Unit II: Types of immunoglobulins – IgM, IgG, IgA, IgD and IgE – structure of antibody molecule – IgG only. Nature of antigens – immunogen and hapten – T dependent and T independent antigens. Complement Components: Definition, explanation and functions of complement components.

Unit III: Antigen – antibody interaction – agglutination – precipitation – immunodiffusion – immuno electrophoresis – radioimmunoassay – immunofluorescence – complement fixation – ELISA – production of antis era.

Unit IV: Blood group antigen – Rhesus – incompatibility – major histocompatibility complex – [type I & II and functions] autoimmune diseases (Graves, RA, Myasthenia gravis, SLE) – vaccines (Brief note) – immunodiagnostics.

Unit V: Hypersensitivity – types – mechanism – transplantation – graft rejection, tissue typing, immuno suppression, tumour antigen, cancer immunotherapy. Production of monoclonal antibodies and its applications.

Text Books:

1. Eli Benjamini., Richard. C., and Geoffrey S., (2003) **Immunology**, V Ed. John wiley & Sons, Inc., Hoboken, New Jersey.
2. Kuby, J. (2004) **Immunology**, V Edition. W.H. Freeman and Company, NY.
3. Roitt, I M, (2005) **Essentials of Immunology**, ELBS, Blackwell Scientific Publication.

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Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Immunology – Kuby- Pg.no: 24-55
Unit II: Immunology – Kuby- Pg.no: 76-101,299-307
Unit III: Immunology – Kuby- Pg .no:137-158
Unit IV: Immunology – Kuby- Pg .no: 161-177,413-428,462-477
Unit V: Immunology – Kuby- Pg .no: 363-387,481-496,501-516

Reference books:

1. Ian R. Tizard, (1995) **Immunology**, 4th edition, SAUNDERS college publication.
2. Richard M.Hyde (1997) **Immunology**, 3rd edition, B.I. Waverly Pvt.Ltd.

Reference books:

3. Abul K.Abbas (1998) **Cellular and Molecular Immunology**, 3rd edition, Harcourt Brace & Company.

Web site Links (E-learning resources)

- jeeves.mmg.uci.edu/immunology/CoreNotes/CoreNotesAll_11d.pdf

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PART - III ELECTIVE	Title : MEDICAL DIAGNOSTICS	Subject Code : 17 UBCE51
Semester : V	HOURS : 5 hours / Week	CREDITS : 5

Objectives:

- To foster a better understanding of how the clinical sciences are applicable to the diagnosing of disease.
- To acquire knowledge about the pathophysiology of diseases in five major areas of study: Clinical Chemistry, Immunology, Immunohematology, Medical Microbiology, and Hematology.
- To provide a solid theoretical foundation for further study in the healthcare-related professions.

UNIT I: Tissue function test: Biochemical tests of liver, kidney and pancreas, Significance of tissue function test.

UNIT II: Clinical Hematology: Abnormal hemoglobins (Hb-S, Hb-M, Hb-C and Hb-D), hemoglobinopathies – different types of anaemias, thalassaemias, disturbance of blood clotting mechanism, Diagnostic techniques for microbial infection.

UNIT III: Disorders associated with Renal and Liver transport: Glycosuria – renal glycosuria, hyperglycemic glycosuria, cysteinuria, Fanconi syndrome, Crigglar – Najjar syndrome, Gilbert's disease, Dubin – Johnson disease.

UNIT IV: Diagnostic Enzymology: Liver marker enzymes – SGOT, SGPT, ALP, ACP, Heart marker enzymes – CPK, LDH.

UNIT V: Toxicology and Oncology: Toxicity of overdose of Drugs – Detoxification of poisons in Liver – phase I and phase II reactions, Estimation of poisons. Oncology – Carcinogenic substances, Formation and Diagonsis of Cancer, Malignant and Non – malignant tumors.

Text Books:

1. Chatterjee, (2005) **Text book of Medical biochemistry**, 6th edition, Jaypee brothers publication.
2. Lehninger, Nelson AL Cox, (2005) **Biochemistry**, 4th edition, W.H.Freeman and company, New York.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Text book of Medical biochemistry – Chatterjee . Pg.no: 572-593
Unit II: Medical laboratory Technology- Lanai L. Muherjee Pg.no: 491-500
Unit III: Text book of Medical biochemistry – Chatterjee . Pg.no: 468-481
Unit IV: Medical laboratory Technology- Lanai L. Muherjee Pg.no: 186-203
Unit V: Medical laboratory Technology- Lanai L. Muherjee Pg.no: 1094-1107

Reference books:

1. Devlin, (1997) **Text book of Biochemistry**, 4th edition, John Wiley and sons, INC Publications.
2. Donald Voet & Judith Voet, (2004) **Fundamentals of Biochemistry**, 3rd edition, Wiley International.
3. Lubert Stryer et al., (1999) **Biochemistry**, 4th edition, W.H.Freeman and company.
4. Murray.K, Meyes.P.A, Rodwell.V.W, (2003) **Harper's illustrated Biochemistry**, 26th edition, International edition, Mc Graw, Hill companies.

Web site Links: (E-learning resources): www.yourdiagnosis.com

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PART - III ELECTIVE	Title : BIOINFORMATICS	Subject Code : 17 UBCE52
Semester : V	HOURS : 5 hours / Week	CREDITS : 5

Objectives:

- To acquire knowledge about the fundamentals of evolution, molecular biology, molecular evolution and basic theory, application of programs used for database searching, protein and DNA sequence analysis, prediction of protein function, and building phylogenetic trees.
- To impart knowledge on basic techniques of Bioinformatics
- To emphasize the application of bioinformatics and biological databases to problem solving in real research problems.

UNIT I: Basics of internet, Computing and Information networks: Browsing, web, online journals – Pubmed. Brief account on database management system, HTTP, HTML and VRLS.

UNIT II: Introduction to Bioinformatics – Definitions and basic concepts, Genome projects, The role and applications of bioinformatics.

UNIT III: Biological databases: An introduction to NCBI, Sequence databases, sequence assembly, submission of sequence, Database browsers and search engines.

UNIT IV: Sequence Alignment: Pair wise Alignment – Dot matrix, dynamic programming algorithms, BLAST and FASTA, similarity searches, Multiple sequence Alignment.

UNIT V: Homology and diversity: Phylogeny – evolutionary basis of sequence alignment. Methods of Phylogeny analysis: Distance and character based methods.

Text Books:

1. David Mount.W, (2003) **Bioinformatics**, CBS Publishers & Distributors.
2. Attwood, T.K. and Parry – Smith .D.J, (2002) **Introduction to Bioinformatics**, Pearson Education private Ltd., Singapore.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Bioinformatics - David Mount.W- Pg.no: 2 -15
Unit II: Bioinformatics - David Mount.W- Pg.no: 20 -45
Unit III: Bioinformatics - David Mount.W- Pg.no:283-326
Unit IV: Bioinformatics - David Mount.W- Pg.no:53-192
Unit V: Bioinformatics - David Mount.W- Pg.no:238-278

Reference books:

1. Arthur M.Lesk, (2008) **Introduction to Bioinformatics**, Oxford University Press.
2. Howard parish.J, Richard M. Twyman, (2002) **Instant Notes in Bioinformatics**, Bios Scientific publishers Ltd.

Web site Links: (E-learning resources)

- bioinfo.mbb.yale.edu/mbb452a/intro https://www.ncbi.nlm.nih.gov/

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PART - III CORE	**Title : Core Practical – III Lab in Microbiology& Immunology**	**Subject Code : 17 UBCCP3**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To understand the basic concepts of microbiology with an emphasis on sterile technique, microscopy, isolation and cultivation of microorganisms.
- To provide an introduction to experimental design and basic techniques commonly used in immunology research laboratories.

1. Cleaning of glass wares.
2. Preparation of simple culture media.
3. Selection of suitable culture medium.
4. Gram's staining, motility – Hanging drop method.
5. Isolation of microbes from soil – serial dilution, plating techniques
6. Enumeration of *E.coli* in milk and ice cream.
7. Water quality analysis – presence of Coliform test.
8. RBC, WBC count.
9. Blood grouping.
10. Immunodiffusion

Demonstration:

1. ESR – Erythrocyte sedimentation rate.
2. Separation of proteins by SDS – PAGE.
3. Heamagglutination
4. Identification of nucleic acids by Agarose Gel Electrophoresis.
5. Separation of amino acids by Paper Chromatography, TLC

Reference books:

1. Gunasekaran.P, **Lab Manual in Microbiology**. New age International Pvt Ltd.
2. Harold J.Benson., **Microbiological Applications**, 7th Edition, WCB McGraw - Hill Publication.

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VI SEMESTER

S. No	Subject Code	Nature	Subject Title	Hours /Week	Duration of exams	C A	SE	Tot	Crd
1	17UBCC61	Part-III Core	Biotechnology & Genetic Engineering	5	3	25	75	100	4
2	17UBCC62	Part-III Core	Plant Biochemistry	5	3	25	75	100	4
3	17UBCC63	Part-III Core	Clinical Biochemistry	5	3	25	75	100	4
4	17UBCC64	Part-III Core	Food Processing Technology	5	3	25	75	100	4
5	17UBCE61	Part-III Elective 1	Endocrinology and hormonal regulations	5	3	25	75	100	5
6	17UBCCP4	Part-III Core Lab	Lab in Clinical Biochemistry	5	3	40	60	100	4
7	16UGKB61	Self Study	General Knowledge	-	-	-	-	100	-
			TOTAL	**30**				**700**	**25**

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PART - III CORE	**Title : BIOTECHNOLOGY & GENETIC ENGINEERING**	**Subject Code : 17 UBCC61**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To comprehend the basic molecular biological concepts and techniques used in the fields of biotechnology and genetic engineering.
- To provide a theoretical base to properties and applications of versatile DNA modifying enzymes, cloning strategies, vector types, host genotype specificities for selection and screening of recombinants and/or recombinant transformants.
- To acquire knowledge about main engines of implementation and transmission of a genetic material at molecular and cellular levels, and also methods of change of a genetic material and construction of transgenic organisms with the given properties.

UNIT I: Genetic engineering: Introduction to Gene manipulation – restriction enzymes and DNA ligases, Introduction to gene cloning, Types of cloning vectors – plasmid, phagemid, cosmid, lambda phage, M13 phage, BAC, YAC.

UNIT II: Plant biotechnology: Agrobacterium mediated gene transfer, transgenic plants and its applications, crop improvement.

UNIT III: Animal biotechnology: Introduction to cell culture and cell lines. Viral vector system – Baculo viral vector, Methods for producing transgenic animal – Microinjection, Electroporation, Gene gun method, Invitro fertilization and embryo transfer, Application of transgenic animals.

UNIT IV: Microbial biotechnology: Basic principles of microbial growth, types, design and operation of fermentors, Microbial degradation of oil spills, Biodegradable plastics - PHB production.

UNIT V: Production of recombinant proteins: Insulin, Interferon, and vaccines. Treatment of various human disorders – Gene therapy.

Text Books:

1. Dubey, (2005) **A Text Book of Biotechnology**, 1st edition, S .Chand & Company Ltd.
2. Das H.K., (2004) **Text book of Biotechnology**, 1st edition, Wiley Dreamtech India pvt. Ltd.
3. Santhya Mithra (2015) **Genetic Engineering**, McGraw-Hill Publications.

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Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Gene cloning and DNA analysis – T.A.Brown - Part – I – pg.no.3-147

Unit II: Principles of Gene manipulation - S.B. Primrose and R.M. Twyman- part-II – pg.no. 274-296

Unit III: Principles of Gene manipulation - S.B. Primrose and R.M. Twyman- part-II – pg.no. 218-245

Unit IV: Principles of Gene manipulation - S.B. Primrose and R.M. Twyman- part-IV – pg.no.508-532

Unit V: Principles of Gene manipulation - S.B. Primrose and R.M. Twyman- part-IV – pg.no. 540-545

Reference books:

1. Balasubramanian et.al., (2003) Concepts in Biotechnology, Revised edition, university Press.
2. Freifelder, D., (1982) Physical Biochemistry: Applications to biochemistry and molecular biology, 2nd edition, Narosa Publications.
3. Old R.W., and Primrose S.B., (2005) Principles of Gene manipulation, 5th edition Blackwell science.

Web site Links (E-learning resources)

- www.biologydiscussion.com › ... › Notes on Genetic Engineering

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PART - III CORE	**Title : PLANT BIOCHEMISTRY**	**Subject Code : 17 UBCC62**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To provide an insight about the biochemical processes that take place in plant such as plant metabolic processes, photosynthetic reactions, plant secondary metabolites and the metabolic pathways, plant hormones and the use of plant in traditional medicine.
- To acquire knowledge about the identification and uses of plant secondary metabolites like alkaloids, phenolic acids, flavonoids, tannins, saponins in the production of pharmaceuticals, food supplements and nutraceuticals.

UNIT I: Introduction: Occurrence, Classification, Structure and function of naturally occurring pigments – chlorophylls, carotenoids, flavones and flavonals.

UNIT II: Photosynthesis: Photosynthetic apparatus and Photosynthetic pigments, light reaction – photophosphorylation – cyclic and non-cyclic Phosphorylation, dark reaction – Calvin cycle, C4 and CAM plants, Photorespiration, Factors affecting Photosynthesis.

UNIT III: Plant nutrition: essential mineral nutrients – function, effects of toxicity and deficiency, nitrogen cycle, nitrogen fixation – symbiotic and asymbiotic nitrogen fixation, nitrogen assimilation, sulphate assimilation.

UNIT IV: Plant growth regulators: Natural growth hormones – Auxin, GA, cytokinins, Ethylene and ABA, Synthetic growth hormones – IAA, IBA, 2, 4-D.

UNIT V: Plant physiology and Reproduction: Brief account on biological membrane transport mechanisms and physiology of Germination, Dormancy, Photoperiodism, Vernalization, Plant tissue culture – Brief account on methodology and application.

Text Books:

1. Srivastava H.N., (2004) **Plant physiology**, 1st New millennium edition, Pradeep publications.
2. James Bonner & Joseph E. Varner, (1976) **Plant Biochemistry** 3rdedition, AP Publishers.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Modern Methods in Plant Physiology- G. C. Srivastava – Chapter –1 –Pg.no.1-11
Unit II: Modern Methods in Plant Physiology- G. C. Srivastava – Chapter –10–Pg.no.114-130
Unit III: Plant Physiology – S.N.Pandey & B.K.Sinha – Part-IV- Page.no.104-120
Unit IV: Plant Physiology – S.N.Pandey & B.K.Sinha – Part-IV- Page.no.392-429
Unit V: Plant Physiology – S.N.Pandey & B.K.Sinha – Part-IV- Page.no.430-442,447-454

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Reference books:

1. Hans – Walter Hedlt (2005) **Plant Biochemistry**, Academic press, third edition.
2. William G.Hopkins, (1999) **Introduction to Plant Physiology**, 2nd edition John wiley & sons.
3. Frank. B.Salisbury, & Cleon, W. Ross (1995) **Plant physiology**, 3rdedition, CBS Publishers & distributors.
4. Ray Noggle. G & George J. Eritz, (1991) **Introduction to Plant Physiology**, 2nd edition, Prenliee Hall of India Pvt Ltd.

Web site Links (E-learning resources)

- http://www.freebookcentre.net/biology-books-download/Lecture-Notes-on-PLANT-BIOCHEMISTRY-(PDF-116P).html

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PART - III CORE	**Title : CLINICAL BIOCHEMISTRY**	**Subject Code : 17 UBCC63**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To gain a sound knowledge of the clinical principles underlying the application of clinical biochemistry investigations in human disease.
- To comprehend the intermediates of metabolism, their reactions, the control mechanisms of metabolsim and the common disorders of metabolism.

UNIT I: Introduction: Scope, Development and Applications of Clinical Biochemistry, Laboratory investigation in Clinical Biochemistry – Evaluation of Laboratory test, Normal range, system of international units.

UNIT II: Disorders of Carbohydrates Metabolism: Glucose level in normal blood – Hypoglycemia, Hyperglycemia, glycosuria, Diabetes mellitus, obesity, galactocemia, glucose tolerance test, inborn errors of Carbohydrate metabolism – Lactose intolerance, Glycogen storage disease, Carbohydrates Metabolism in starvation.

UNIT III: Disorders of Lipid metabolism: Atherosclerosis, Fatty Liver, Inborn errors of lipid metabolism – Hypo Lipoproteinemias, Hyper Lipoproteinemias and Disorders associated with Cholesterol, triglycerides, phospholipids, lipid metabolism in starvation.

UNIT IV: Disorders of Amino acid and Protein Metabolism: Disorders of Plasma protein, urea – Uremia, Uric acid – Urecemia, Creatinine, Ammonia, Inborn errors of Amino acid metabolism – Phenylketonuria, alkaptonuria, Amino acid metabolism in starvation.

UNIT V: Disorders of Nucleic acid metabolism: Purine and pyrimidine metabolism – Gout – primary Gout and Secondary Gout, LNS, Orotic aciduria, Xanthinuria.

Text Books:

1. Chatterjee, (2005**) Text book of Medical Biochemistry**, 5th edition, JAYPEEE brothers publication.
2. Tietz (2003) **Fundamental of Clinical Biochemistry**, 5th edition, Saunders, Am imprint of Elsevier.
3. Vasudevan (2007) **Text Book of Biochemistry for Medical Students**, 5th Edition, Jaypee Publications.

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Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 512-516,561-565
Unit II: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 266-329
Unit III: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 380-395
Unit IV: Text book of Medical biochemistry-M.N.Chatterjee- Page.no 403-467
Unit V: Text book of biochemistry-D.M.Vasudevan&S.Sreekumari- Page.no 262-277

Reference books:

1. Guyton, (2008) Text book of Medical Physiology, 11th edition, Elsevier Publications.
2. Harold Varley (1991) Practical Clinical Biochemistry, 5th edition. CBS Publications.
3. Robert K.Murray et al., (2003) Harper's Biochemistry, 26th edition, Mc Graw Hill company.
4. Fauci et al, (1998) Horizons Principles of Internal Medicine, 14th edition, Mc Graw-Hill Health professions division.

Web site Links: (E-learning resources)

- https://leseprobe.buch.de/images-adb/b9/f4/b9f4d996-29df-4798-a013-52f871bf18e1.pdf

SOURASHTRA COLLEGE, MADURAI– 625004

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B.Sc. - BIO CHEMISTRY & BIOTECHNOLOGY

SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : FOOD PROCESSING TECHNOLOGY**	**Subject Code : 17 UBCC64**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To impart knowledge about food processing and various unit operations involved in it, packaging, storing and preservation, food poisoning, food related hazards and safety, and transportation.
- To understand of the advanced principles of food processing and how to choose a method of preservation in relation to food composition.

UNIT I:INTRODUCTION: Definition – function of food – food groups – Bio-fortification – Nutraceuticals – low cost nutrient supplement – Food fortification.

UNIT II:CEREALS AND PULSES: Grain characteristics and plant products – Wheat milling process – products of wheat – Rice processing. Pulses – processing – Fermentation and Germination.

UNIT III:FRUITS AND VEGETABLES: Structure, composition, physiological and biochemical changes during ripening, handling and storage – processing of vegetables – citrus juice, grape juice and raisins, squashes, jam, ketchups.

UNIT IV:MILK AND MILK PRODUCTS: Milk processing – Pasteurization, homogenization, packing – fortified milk, skim milk – cream, butter, cheese, ice-cream, paneer, yogurt.

UNIT V:MEAT, FISH AND EGGS: Aging, tenderizing, freezing – storage. Fish preservation and processing – dehydrated egg, powder, frozen egg – egg storage.

Text Books:

1. Sivasankar. B (2000) **Food processing and preservation**, 1st edition, PHI learning private limited.
2. Srilakshmi. B, (2011**) Food Science**, 5th edition, New age international Pvt ltd.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: http://www.preservearticles.com/201105156691/what-are-the-most-essential-functions-of-food.html
https://en.wikipedia.org/wiki/Food_group
https://en.wikipedia.org/wiki/Biofortification
https://en.wikipedia.org/wiki/Nutraceutical
https://en.wikipedia.org/wiki/Food_fortification

Unit II: Food processing and preservation – B.Sivasankar – Chapter -21 – pg. no. 284-295
Unit III: Food processing and preservation – B.Sivasankar – Chapter -20 – pg. no.267-283
Unit IV: Food processing and preservation – B.Sivasankar – Chapter -19 – pg. no.253-266
Unit V: Food processing and preservation – B.Sivasankar – Chapter -22 – pg. no.296-307

Reference books:

1. Swaminathan, M., (2010) **Advanced text Book on Food and Nutrition**, Volume I & II , The Bangalore printing and publishing co Ltd.

Web site Links: (E-learning resources)

- cdam.minam.gob.pe/multimedia/iiap/documentos/pdf/piba/pu/12.pdf

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SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : ENDOCRINOLOGY AND HORMONAL REGULATIONS**	**Subject Code : 17 UBCE61**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

- To explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
- To acquire knowledge related to the major hormones released from the hypothalamus, pituitary, and target gland/organ that are clinically important in regard to thyroid, adrenal, and reproductive function.
- To identify the physiology, principle of measurement, reference ranges and clinical correlations of chemical constituents of the blood.

Unit I Endocrine Systems and Hormones: Definition, classification, biosynthesis and degradation. Mechanism of hormone action, class I and II hormone receptors, steroids. Feedback regulation of hormones.

Unit II Hypothalamus and pituitary hormones: Hypothalamic releasing factors vasopressin, oxytocin. Biosynthesis, secretion, transport, regulation and biological effects of growth hormones, FSH, LH, TSH, ACTH and prolactin.

Unit III Thyroid hormones: biosynthesis, secretion, transport, regulation and biological actions. Hypo and hyper thyroidism, antithyroid agent's role of parathyroid hormones, calcitriol, calcium and phosphorous homeostasis. Hypo and hyperparathyroidism.

Unit IV Pancreatic hormones: Islets of Langerhans, cell types. Insulin and glucagon: biosynthesis, mechanism of action and biological effects. Hormonal action of somatostatin and pancreatic polypeptide.

Unit V Adrenal hormones: biosynthesis, secretion, transport, mechanism of action and excretion of glucocorticoids, mineralocorticoids, adrenal medullary hormones - epinephrine and nor epinephrine, steroid hormones - androgens and estrogens.

Text Books:

1. Harold Varley (1991) **Practical Clinical Biochemistry**, 5th edition. CBS Publications.
2. Murray RK, Granner AK, Mayes PA, Rodwell VW (2003). **Harper's Illustrated Biochemistry**, 26th edition, McGraw-Hill Book Company.

Chapters and sections (For UNIT-I, II, III, IV and V)

Unit I: Endocrinology – M.E.Hadley - Chapter: 2 – pg.no. 16-34
Unit II: Endocrinology – M.E.Hadley - Chapter: 6– pg.no. 112-131
Unit III: Endocrinology – M.E.Hadley - Chapter: 13 – pg.no. 312-325
Unit IV: Endocrinology – M.E.Hadley - Chapter: 11 – pg.no. 250-272
Unit V: Endocrinology – M.E.Hadley - Chapter: 15 – pg.no. 362-391

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Reference books:

1. White A, Handler P, Smith E, Stetten D.,Jr. (1964). Principles of Biochemistry, 3rd edition, McGraw-Hill Book Company.
2. Frisell WR (1982). Human Biochemistry, 1st edition, Macmillan Publishing Company.
3. Guyton, (2008) Text book of Medical Physiology, 11th edition, Elsevier Publications.
4. Wilson and Foster, Editors (1992). Williams Textbook of Endocrinology, 8th edition, WB Saunders.
5. Harrison (2011) Internal Medicine, 18th Edition, McGraw-Hill Publications.

Web site Links(E-learning resources)

- https://www.mrcpass.com/Notes/Endocrinology%20Notes.pdf

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SYLLABUS

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PART - III CORE	**Title : Core Practical – IV Lab in Clinical Biochemistry**	**Subject Code : 17 UBCCP4**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives:

- To acquire knowledge about biochemistry and pathophysiology associated with tests performed in a clinical biochemistry laboratory
- To identify and interpret common result patterns related to pathophysiology in relation to routine clinical biochemistry
- To comprehend the principles of the analytical instruments in use in the routine clinical laboratory

Blood Analysis:

1. Estimation of Glucose by Phenol-Sulphuric acid method
2. Estimation of urea by Dam's method
3. Estimation of Cholesterol by Zak's method
4. Estimation of Uric acid by Caraway's method
5. Estimation of protein by Lowry's method
6. Estimation of Creatinine by Alkaline picrate method

Urine Analysis:

1. Qualitative analysis of Normal urine and Abnormal urine (sugar, urea, creatinine, uricacid, ammonia, protein)

Estimation of Enzymes:

1. Alkaline phosphatase
2. SGOT
3. SGPT

Reference books:

1. Harold Varley, (1991) Practical clinical biochemistry, 5th edition, CBS Publications.
2. Carl A. Burtis & Co, Tietz (2006) Text book of Clinical chemistry and Molecular Diagnostics, 4th edition, Elsevier Publication
3. Ochei J., and A. Kolhatkar, (2000) Medical laboratory science, Tata Mc Graw Hill publication.

Passed in the BOS Meeting held on 15-3-2017

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