SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(*Affiliated to Bharathidasan University*)

(Accredited with "A" Grade by NAAC; An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI – 614016.

TAMILNADU, INDIA.

B.Sc., BIOCHEMISTRY

COURSE STRUCTURE WITH SYLLABUS UNDER CBCS

(*For the candidates admitted in the academic year 2020–2021*)

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B.Sc., BIOCHEMISTRY COURSE STRUCTURE UNDER CBCS

(For the candidates admitted in the academic year 2020–2021)

ELIGIBILITY: Those who have completed +2 examinations with Chemistry and Biology as two of the core subjects

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hour/ Week	Credit	Exam Hours	Marks		
								CIA	ESE	Total
I	I	Language Course (LC)-I-Tamil*/Other Languages ** #	20LC101	Ikkala Ilakkiyam	6	3	3	25	75	100
	II	English Language Course (ELC) – I	20ELC101	Language through Literature I (Prose and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC)-I	20BC101	Biomolecules	6	6	3	25	75	100
		Core Practical (CP) -I	20BC102P	Biomolecules Practical	3	2	3	40	60	100
		Allied Course (AC)-I	20ACH101	Chemistry I	4	3	3	25	75	100
		Allied Practical (AP)-I	20ACH102P	Chemistry I Practical	3	2	3	40	60	100
	IV	Value Education	18UGVED	Value Education	2	2	3	25	75	100
		TOTAL			**30**	**21**	**-**	**-**	**-**	**700**
II	I	Language Course (LC) –II-Tamil*/Other Languages ** #	20LC201	Idaikkala Ilakkiyamum Pudhinamum	6	3	3	25	75	100
	II	English Language Course (ELC) -II	20ELC201	Language through Literature II (Poetry and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC)-II	20BC203	Biochemical Techniques	6	6	3	25	75	100
		Core Practical (CP) -II	20BC204P	Biochemical Techniques Practical	3	2	3	40	60	100
		Allied Course (AC)-II	20ACH203	General Chemistry II	4	3	3	25	75	100
		Allied Practical (AP)-II	20ACH204P	Chemistry II Practical	3	2	3	40	60	100
	IV	Environmental Studies	-	Environmental Studies	2	2	3	25	75	100
		TOTAL			**30**	**21**	**-**	**-**	**-**	**700**
III	I	Language Course (LC) -III Tamil*/Other Languages ** #	20LC301	Kaapiyamum Naadakamum	6	3	3	25	75	100
	II	English Language Course(ELC)-III	20ELC301	Language through Literature III (Drama and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) -III	20BC305	Human Anatomy and Physiology	6	6	3	25	75	100
		Core Practical (CP)-III	20BC306P	Human Anatomy and Physiology Practical	3	2	3	40	60	100
		Allied Course (AC)-III	20ABC305	Biology	4	3	3	25	75	100
		Allied Practical (AP)-III	20ABC306P	Biology Practical	3	2	3	40	60	100
	IV	Non Major Elective I- for those who studied Tamil underPart-I a)Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 butopt for other languages in degree programme	-	Non Major Elective I- for those who studied Tamil under Part-I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	2	2	3	25	75	100
		TOTAL			**30**	**21**	**-**	**-**	**-**	**700**

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hour/ Week	Credit	Exam Hours	Marks		
								CIA	ESE	Total
IV	I	Language Course (LC) -IV Tamil*/Other Languages ** #	20LC401	Sanga Ilakkiyam	6	3	3	25	75	100
	II	English Language Course(ELC)-IV	20ELC401	Language through Literature IV (Short stories and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) -IV	20BC407	Enzymes	5	4	3	25	75	100
		Core Practical (CP)-IV	20BC408P	Enzymes Practical	3	2	3	40	60	100
		Allied Course (AC)-IV	20ABC407	Cell Biology	3	3	3	25	75	100
		Allied Practical (AP)-IV	20ABC308P	Cell Biology Practical	3	2	3	40	60	100
	IV	Non Major Elective II- for those who studied Tamil underPart-I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 butopt for other languages in degree programme	-	Non Major Elective II- for those who studied Tamil under Part-I a)Basic Tamilfor other language students b) Special Tamil for thosewho studied Tamil upto +2 but opt for other languages in degree	2	2	3	25	75	100
		Skill Based Elective (SBE) - I	-	-	2	2	3	25	75	100
		TOTAL			**30**	**21**	**-**	**-**	**-**	**800**
V	III	Core Course (CC) -V	20BC509	Metabolism	5	5	3	25	75	100
		Core Course (CC) -VI	20BC510	Molecular Biology	5	5	3	25	75	100
		Core Course (CC)-VII	20BC511	Microbial Biochemistry	5	5	3	25	75	100
		Core Practical (CP)-V	20BC512P	Nutritional Biochemistry Practical	4	3	3	40	60	100
		Major Based Elective (MBE)-I	20MBEBC1	Endocrinology	5	4	3	25	75	100
	IV	Skill Based Elective (SBE)- II	-	-	2	2	3	25	75	100
		Skill Based Elective (SBE)- III	-	-	2	2	3	25	75	100
		Soft Skills Development	-	Soft Skills Development	2	2	3	25	75	100
		TOTAL			**30**	**28**	**-**	**-**	**-**	**800**
VI	III	Core Course (CC)-VIII	20BC613	Immunology	6	6	3	25	75	100
		Core Course (CC)-IX	20BC614	Clinical Biochemistry	6	6	3	25	75	100
		Core Practical (CP)-VI	20BC615P	Clinical Biochemistry Practical	6	4	3	40	60	100
		Major Based Elective (MBE)-II	20MBEBC2	Pharmaceutical Biochemistry	5	4	3	25	75	100
		Core Course (CC)-X	20BCPW	Project	6	6	3	25	75	100
	V	Extension Activities.	-	**Extension Activities- Gender Studies	1	2	3	25	75	100
		Gender Studies	-	-						
		TOTAL			**30**	**28**	**-**	**-**	**-**	**600**
				G. TOTAL	**180**	**140**	**-**	**-**	**-**	**4300**

CURRICULUM DESIGN

LIST OF ALLIED COURSES

ALLIED COURSE I-CHEMISTRY **ALLIED COURSE II-BIOLOGY**

Subject	No. of Courses	Total Credits
Language Part – I	4	12
English Part –II	4	12
Core Course	9	49
Core Practical	6	15
Allied Course	4	12
Allied Practical	4	08
Non-Major Elective	2	04
Skill Based Elective	3	06
Major Based Elective	2	08
Project	1	06
Environmental Studies	1	02
Value Education	1	02
Soft Skill Development	1	02
Gender Studies	1	01
Extension Activities	-	01 (Credit only)
Total	**43**	**140**

* For those who studied Tamil upto 10^{th} +2 (Regular Stream);

\+ Syllabus for other Languages should be on par with Tamil at degree level;

those who studied Tamil upto 10^{th} +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV;

** Extension Activities shall be outside instruction hours.

Note:

	CIA	ESE
1. Theory	25	75
2. Practical	40	60
3. Project	25	75

Separate passing minimum is prescribed for CIA and ESE

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for ESE shall be 40% out of 75 marks [i.e.30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for ESE shall be 40% out of 60 marks [i.e. 24 marks]

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Nature of the Course	Course Code	Title of the Course
III	-	NME -I	20NMEBC31	Health and Diseases
IV	-	NME -II	20NMEBC42	Health and Management

SKILL BASED ELECTIVE (SBE) OFFERED BY THE DEPARTMENT (PHYTOMEDICINE)

Semester	Part	Nature of the Course	Course Code	Title of the Course
IV	-	SBE-I	20SBEBC1	Traditional Medicine
V	-	SBE-II	20SBEBC2	Phytotherapeutics
V		SBE-III	20SBEBC3	Herbal Cosmetics

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TAMILNADU, INDIA.

DEPARTMENT OF BIOCHEMSITRY

B.Sc., BIOCHEMISTRY

(For the candidates admitted in the academic year 2020–2021)

Question Paper Pattern- (Theory)

Max time: 3 Hours **Max Marks: 75**

Section – A (10 X 2 = 20)

Answer all the questions

Answer in One or Two sentences each

1.
2. } **Unit I**

3.
4. } **Unit II**

5.
6. } **Unit III**

7.
8. } **Unit IV**

9.
10. } **Unit V**

Section – B (5 X 5 = 25)

Answer all the questions

Each answer should not exceed 500 words

11. a. or
b. } **Unit I**

12. a. or
b. } **Unit II**

13. a. or
b. } **Unit III**

14. a. or
b. } **Unit IV**

15. a. or
b. } **Unit V**

Section – C (3 X 10= 30)

Answer any THREE questions in 1200 words

16. Unit I
17. Unit II
18. Unit III
19. Unit IV
20. Unit V

***

SEMESTER I

Semester: I-CC- I: Biomolecules

Ins. Hrs. /Week : 6 **Course Credit: 6** **Course Code :**

OBJECTIVES

- To expose the importance of biological macromolecules
- To study the influence and role of structure in reactivity of biomolecules
- To understand the role of biomolecules and their functions

UNIT I

Isomers, Anomers, Epimers. Weak and covalent bonds (Vander Waals, Electrostatic, Hydrogen, Hydrophobic and Disulfide). Carbohydrates- Definition, classification, structure, properties and functions of biologically important carbohydrates viz. monosaccharide (glucose, fructose and galactose), Disaccharides – (sucrose, lactose and maltose) and homo and hetero polysaccharides- starch, glycogen, inulin, cellulose, chitin, hyaluronic acid, chondroitin sulfate and heparin.

UNIT II

Definition, classification, structure, properties and functions of amino acids; Peptides and peptide bond. Proteins- Definition, classification, physical and chemical properties, Biological importance. Structure of proteins- primary structure, secondary, tertiary and quaternary structure; forces stabilizing the structure of proteins.

UNIT III

Fatty acids - Definition, nomenclature, classification, properties and biological significance. Lipids- Definition, classifications properties and biological functions. Simple lipids: oils and waxes. Compound lipids- Definition, properties, structure and functions- Phospholipids, sphingolipids and glycolipids. Lipoproteins – classification and composition. Derived lipids- Definition, properties, structure and functions of steroids.

UNIT IV

Definition, components of mono nucleotides- bases (pyrimidines, purines), nucleosides, nucleotides. nucleoside. Properties - hydrolysis of nucleic acids by acids, bases and enzymes. Polynucleotides-DNA- Definition, properties, composition, structure and biological importance. RNA- Definition, classifications (mRNA, tRNA and rRNA), structure, properties and biological importance.

UNIT V

Definition and classification, source, structure, properties, daily requirement, deficiency manifestation and biological role of the fat soluble vitamins (A, D, E and K) and water

soluble vitamins (C, B1, B2, B3, B5, B6, B9 and B12). Mineral requirements-essential macro minerals- sodium, potassium, calcium, phosphorus and micro minerals- zinc, chromium, iron, selenium- sources and functions.

COURSE OUTCOME

The students will be able to,

1. Explain the structure and properties of carbohydrates
2. Identify the structure of amino acids and classify proteins with functions.
3. Combine the structure and functions of lipids.
4. Describe the structure and functions of nucleic acids.
5. Discuss the role of vitamins and minerals

TEXT BOOK(S)

1. Textbook of Biochemistry-West & Todd.4th edition, Macmillan, 1966
2. Fundamentals of Biochemistry –.11th edition Agarwal O.P., Goel Publishing House, 2008.
3. Fundamentals of Biochemistry, J.L. Jain, 2005.

REFERENCE BOOK(S)

1.Principles of Biochemistry – 7th edition, Lehninger, Nelson Cox Macmillan worth Publishers, 2013.
2. Harper's Biochemistry 29th edition, McGraw Hill, 2012.
3. Essentials of Biochemistry –2nd edition A.I. Jain. S.Chand publications, 2004.
4. Chemistry of Biomolecules, S. P. Bhutani, 2010.
5. Introductory Experiments on Biomolecules and their Interactions-Robert K. 2015.
6. Fundamentals of Biochemistry- Berg.J.M, Tymoczko.J.L, Stryer, L., 3rd Edition – Voet & Voet –Wiley

E-RESOURCES

https://www.pdfdrive.com/biochemistry-books.html

Semester: I-CP- I: Biomolecules Practical

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

1. Weighing of reagents, Preparations of Normal and Molar solutions.
2. Handling of Microscope

QUALITATIVE ANALYSIS

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Galactose, Maltose, Sucrose, Lactose), Identification of both monosaccharides and disaccharides in mixtures.
2. Qualitative analysis of amino acids (Tryptophan, Tyrosine, Arginine, Proline, Phenyl alanine and Histidine)
3. Qualitative analysis of Lipids-Solubility, Emulsification test, Saponification test, Acrolein test for Unsaturation, Test for Cholesterol-Salkowski test and Lieberman-Burchard test

QUANTITATIVE ANALYSIS

1. Estimation of reducing sugar by Benedict's quantitative method.
2. Estimation of amino acid by formal titration
3. Estimation of ascorbic acid by titrimetric method using 2,6 - dichlorophenol indophenol.
4. Estimation of acid number of edible oil.
5. Determination of saponification number of edible oil.
6. Estimation of Iodine value of edible oil.

TEXT BOOK(S)

1. Manuals in Biochemistry – Dr. J. Jayaraman, New Age International Pub, Bangalore 2011.
2. Practical Biochemistry – Plummer, New Delhi: Tata McGraw Hill Publishing Company, 2000.
3. Introductory practical Biochemistry – S.K. Sawhney, Randhir Singh, 2nd ed, 2005.

REFERENCE BOOK(S)

1. Biochemical methods – S.Sadasivam, V.A Manickam 2 ed New Age international Publishers, 2006.
2. Biochemical Tests – Principles and Protocols. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha Viva Books Pvt Ltd, 2012.
3. Harold Varley, Practical Clinical Biochemistry, CBS. 6 edition, 2006.
4. Keith Wilson and John Walker. Principles and Techniques of Practical Biochemistry, 4th edition, Cambridge University press, Britain.1995

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(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF CHEMISTRY

(*For B.Sc. Biochemistry-Allied Course*)

Semester: I-AC-I: **Chemistry I**

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES

- To understand the various Preparation of drugs.
- To study the various concepts of resonance and halogen compounds.
- To study the properties of aromatic compounds and organic reactions.

UNIT I : INDUSTRIAL CHEMISTRY

Industrial Chemistry: Fuel gases – Water gas- producer gas- LPG gas- Gobar gas and natural gas. Fertilizers – NPK and mixed Fertilizers- soaps and detergents.

Cumene process for phenol manufacturing; Manufacturing of Paracetamol, Chloromphenicol- Prepration of Shampoo.

UNIT- II : ELECTRON DISPLACEMENT EFFECTS AND HALOGEN COMPOUNDS

Polar effects: Inductive effect – Relative Strength of Aliphatic monocarbocylic acid and aliphatic amines. Resonance – Condition for resonance. Consequences of resonance – resonance of energy. Basic property of aniline and acidic property of phenol. Hyperconjugation – Heat of hydrogenation - Bond length and dipole moment. Steric effect.

Halogen containing compounds: Important chloro hydrocarbons used as solvents. Pesticides – Dichloromethane -chloroform -carbon tetrachloride-DDT and BHC Types of solvents: Polar, Non polar.

UNIT- III : AROMATIC COMPOUNDS AND ORGANIC REACTIONS

Aromatic compounds: Structure, stability resonance and aromaticity of benzene. Substitution reaction: Nitration, Halogenations, Alkylation. Naphthalene – Isolation, properties and uses.

Organic reaction: Biuret, Decarboxylation, Benzoin, Perkin, Cannizaro, Claisen and Haloform reactions

Chemotherapy: Explanation with two examples each for analgesics, antibacterial, anti-inflammatory, antibiotics, antiseptic and disinfectant, anesthetics local and general (Structures not necessary)

UNIT IV: SOLID STATE, ENERGETICS AND PHASE RULE

Solid state: Typical crystal lattices - unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Miller indices, simple body centered and face centered lattices

Energetics: First law of thermodynamics – state and path function – need for the second law – carnots cycle and thermo-dynamic scale of temperature, spontaneous and Non – spontaneous processes – entropy – Gibbs free energy.

Phase rule: Phase, component, degree of Freedom, phase rule definitions - one component system– water system.

UNIT V: CHEMICAL EQUILIBRIUM AND CHEMICAL KINETICS

Chemical equilibrium: Criteria of homogeneous and heterogeneous equilibria, - decomposition of HI, N_2O_4, $CaCO_3$, PCl_5.

Chemical Kinetics: Order of reaction and their determinations - activation energy, effects of temperature on reaction rate.

COURSE OUTCOME

1. Study the preparation of some drugs.
2. Concepts of resonance and halogen compounds are known.
3. Aromatic compounds and organic reactions are learnt.
4. Cconcepts of solid state chemistry was understood.
5. Principles of kinetics was understood.

TEXT BOOK(S)

1. Biswas, A.K., Frontiers in Applied Chemistry, Narosa publishing house, 1989.
2. Textbook of Applied Chemistry, Thangamma Jacob, Macmillian India Ltd. Mumbai, 1990.
3. Fundamental Concepts of Applied Chemistry, Jayashree Ghosh S.Chand & Company Ltd., New Delhi, 2008.

REFERENCE BOOK(S)

1. Gopalan R, Text Book of Inorganic Chemistry, 2nd Edition, Hyderabad, Universities Press, (India), 2012.
2. Morrison R.T. and Boyd R.N., Bhattacharjee S. K. Organic Chemistry (7th edition), Pearson India, (2011)
3. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.

E- RESOURCES

1. www.facebookcentre.net
2. www.spriner.com
3. www.kobo.com

Semester: I-AP-I: Chemistry I Practical

Ins. Hrs. /Week :3 **Course Credit: 2** **Course Code :**

OBJECTIVES

- To learn the principles of volumetric analysis
- To determine the concentration of solution

VOLUMETRIC ANALYSIS

Volumetric Analysis

1. Acidimetry and alkalimetry

(a) Strong acid VS strong base (b) Weak acid VS strong base (c) Determination of hardness of water.

2. Permanganometry

(a) Estimation of ferrous sulphate (b) Estimation of oxalic acid

3. Iodometry

(a) Estimation of potassium dichromate (b) Estimation of potassium permanganate

Note: Scheme for Practical Evaluation.
Volumetric Estimation -55
Record - 5
Internal Assessment –40
Total :100

Volumetric Analysis : 55
Procedure 15 marks

Results
<2%- 40 marks

2-3%- 35 marks

3-4%- 30 marks

>4%- 20 marks

COURSE OUTCOME

1. Define primary standard and standard solutions
2. Evaluate the principle of redox chemistry in intercalation reactions
3. Apply knowledge of concentration of solution to every day example.

TEXT BOOK(S)

1. Practical Volumetric Analysis, Peter McPherson.

REFERENCE BOOK(S)

1. R. Gopalan, Elements of Analytical Chemistry, S. Chand, New Delhi, 2000.
2. N.S.Gnanapragasam and G. Ramamurthy, Organic Chemistry lab manual, S. Viswanathan and Co. Pvt. Ltd. Chennai-1998

E-RESOURSE

1. www.topfreebooks.org
2. www.ebooksread.com
3. www.worldcat.org

SEMESTER II

Semester: II- CC-II: Biochemical Techniques

Ins. Hrs. /Week : 6 **Course Credit: 6** **Course Code :**

OBJECTIVES

- To enable the students to have a deep knowledge on the techniques for measurement of biophysical factors in living organisms.
- To enable the students to get an insight on the usage of various techniques and their applications in industry and R&D.
- To develop competence in handling various chromatographic techniques and apply them in isolating and characterizing different biological molecules.

UNIT I

Colorimetry: Beer Lambert's Law, Light absorption and its transmittance, Absorption Spectroscopy - Principle, instrumentation and applications of colorimetry and UV-Vis spectrophotometer. Emission Spectroscopy – Spectrofluorimeter - Principle, instrumentation and applications.Flame photometry - principle and applications.

UNIT II

Chromatographic Techniques: Chromatography - Principle, method and applications of paper, thin layer, ion exchange, affinity chromatography, gel permeation chromatography and Gas liquid chromatography, Hydrophobic interaction chromatography, liquid chromatography, reverse phase chromatography, liquid chromatography, gel filtration chromatography, flash chromatography.

UNIT III

Centrifugation Techniques: Cell disruption and homogenization-Media for homogenization, methods of cell disruption. Centrifugation - principle- sedimentation coefficient, RCF. Types of centrifuges and rotors. Preparative centrifugation differential, density gradient centrifugation, and Analytical ultracentrifugation – instrumentation and applications - Determination of molecular weight.

UNIT IV

Electrophoretic techniques: Electrophoresis - Principles and applications of electrophoresis, Factors affecting electrophoretic mobility. Types of electrophoretic techniques – zonal, capillary, paper and agarose gel. PAGE- Native - PAGE and SDS PAGE. Staining method used in electrophoretic technique, Isoelectric focusing.

UNIT V

Radio isotopic techniques: Types of radioactive decay, rate of radioactive decay, decay constant, Units of radio activity, measurement of radioactivity based on ionization- GM counter and excitation- Scintillation counter. Autoradiography. Applications of radioisotopes in biology. Hazards of radioactivity, CT scan, MRI scan, Doppler.

COURSE OUTCOME

The students will be able to,

1. Acquire practical training to handle the instruments like colorimeter, spectrophotometer and to use them for biochemical determinations.
2. Acquire practical skill to separate proteins by gel filtration and PAGE. Using the techniques of paper/thin layer chromatography, students will be able to separate amino acids, sugars.
3. Learn about the principle and applications of spectrophotometry, different chromatographic techniques like gel filtration, Ion exchange, thin layer, etc.
4. Students will also learn about various electrophoretic techniques such as cellulose acetate, gel, PAGE, etc. and their applications in analyzing proteins and nucleic acids.
5. Students will learn the basic principles of centrifugation, various types of centrifuges, rotors and methods for subcellular fractionation

TEXT BOOK(S)

1. Textbook of Biochemistry, West, E.S. and Todd, W.R., MacMillan, Germany, 1985.
2. Biophysical Chemistry (Principles and Techniques) 4th Edition, Avinash Upadhyay, Kakoli Upadhyay and Nirmalendu Nath, Himalaya Publishing House, India,2014.
3. Principles and Techniques of Practical Biochemistry, Keith Wilson & John Walker, Cambridge University Press, India.2005.

REFERENCE BOOK(S)

1. Bioanalytical Techniques, Abhilasha Shourie and Shilpa S Chapadgaonkar, The Energy and Resources Institute, TERI, India, 2015.
2. Research Methodology, Methods and Techniques, 2nd ed, C.R. Kothari, New Age International Publishers. India, 2004.
3. Introduction to Instrumental Analysis, Braun, R.P. Tata McGraw Hill, India, 1987.
4. Research Methodology, Methods and Techniques 2nd Edition, C.R. Kothari, New Age International Publishers. New Delhi, 2004.
5. Fundamentals of Bio Analytical Techniques and Instrumentation, Ghosal Sabari and Srivastava A. K., PHI Learning Pvt. Ltd. India,2009.
6. Introduction to Spectroscopy. 3rdEdition. Pavia *et al*, Brooks/Cole Pub Co., New Delhi, India,2000.
7. Basic Instrumentation, K. K. Machve, Neha Publishers & Distributors, India 2010.

E-RESOURCES

https://www.pdfdrive.com/biochemistry-books.html

Semester: II- CP-II: Biochemical Techniques Practical

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

1. Preparation of Buffers and measurement of pH.
2. Titrable acidity of Aminoacids
3. Measurement of Blood pressure
4. Calculate Body Mass Index (BMI)
5. Handling of Colorimeter and Spectrophotometer
6. Estimation of RNA by Orcinol method.
7. Estimation of DNA by Diphenylamine method.

DEMONSTRATION

1. Paper Chromatography for separations and detections of simple Sugars and Aminoacids.
2. Separation of plant pigments by Column Chromatography.
3. Thin Layer Chromatography of Aminoacids.
4. ECG
5. EEG
6. Doppler
7. CT-SCAN
8. MRI-SCAN

TEXT BOOK(S)

1. A Textbook of Practical Biochemistry by David Plummer. Tata McGraw- Hill Education, 1988.

REFERENCE BOOK(S)

1. Methods in Enzymology Vol. I and II by S.P. Colowick and N.O. Kaplan eds. New York: Academia Press, 1955.
2. Laboratory Manual in Biochemistry by J. Jayaraman. New Age International Publishers. 2nd Edn.1981.
3. Varley's Practical Clinical Biochemistry by Alan H Gowenlock, published by CBS Publishers and distributors, India Sixth Edition,1988.

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(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF CHEMISTRY

(For B.Sc. Biochemistry-Allied Course)

Semester: II-AC-II: General Chemistry II

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES

- To learn the basics of nuclear chemistry**.**
- To understand the properties and applications of carbohydrates, amino acids and proteins.
- To study the basic concepts of polymers, heterocyclic compounds.

UNIT I: NUCLEAR CHEMISTRY

Nuclear Chemistry : Fundamental particles of nucleus- isotopes, isobars, isotones and isomers – differences between chemical reactions and nuclear reactions, nuclear fusion and fission- radioactive series. Nuclear chain reactions- Breeder reaction-Nuclear power plant

UNIT II: CARBOHYDRATES, AMINOACIDS AND PROTEINS

Carbohydrates: classification – glucose and fructose – preparation and properties –structure of glucose Fischer and Haworth cyclic structures.

Amino acids and proteins : Amino acids – Classification based on structure. Essential and non – essentials amino acids – preparation, properties and uses – peptides (elementary treatment only) – proteins – Classification based on physical properties and biological functions. Structure of proteins – primary and secondary (elementary treatment).

UNIT III: HETEROCYCLIC COMPOUND , VITAMINS AND DRUGS

Heterocyclic compounds: Furan, pyrrole and pyridine – preparation, properties and uses – basic properties of pyridine and pyrrole.

Vitamins: Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K - Hormones - Functions of insulin and adrenaline. Drugs- Sulpha Drugs - Uses and Mode of action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicaol, streptomycin.

UNIT IV: SURFACE AND PHOTO CHEMISTRY

Surface Chemistry: Introduction to surface chemistry absorption, adsorption physisorption-chemisorptions .Emulsions, gels – preparation, properties - Electrophoresis and applications.

Photochemistry : Laws of photochemistry - Lambert and Beer's law,Grothus Drapper law and Stark Einstein law of photochemical equivalance its and applications.

UNIT 5: CHROMOTAGRAPHIC TECHNIQUES

Introduction to Qualitative and Quantitative Analysis –Error Analysis- Mean, Median, Mode, Standard Deviation (Only Definition) Chromatographic separations - Principles and application of column, paper, thin layer chromatography.

COURSE OUTCOME

1. Upon completion of the course, the students will be able to Know the applications of physical, inorganic and organic chemistry towards biological systems

2. Recognize and predict the structure and reactivity of biologically important organic molecules
3. Carbohydrates, Amino acids, Proteins, Nucleic acids, Lipids, Enzymes and Vitamins - Explain the synthesis of biologically important organic molecules and their role in metabolic pathways
4. Understand the Building blocks of both DNA and RNA, secondary structures, tertiary structures
5. Heterocyclic compounds and seperation techniques are understood

TEXT BOOK(S)

1. Essential of Bio-Chemistry U.Sathyanarayana, 3rd edition, Books & Allied Pvt. Ltd., 2019.
2. 2. Elementary Bio-Chemistry J.L.Jain, 2nd revised edition, S. Chand & Company, 2007.

REFERENCE BOOK(S)

1. B.R. Puri, L.R. Sharma, K.C. Kalia, 'Principles of Inorganic Chemistry', 21st edition, Vallabh Publications, 2004-2005.
2. Bahl, B.S. and Bahl, A., Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010)
3. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.
4. Dr. Veeraiyan V. Text book of Ancillary Chemistry, Highmount Publishing house, Chennai-14. Edition - 2006. (Both in Tamil and English)
5. Vaithyanathan S. and Others, Textbook of Ancillary Chemistry, Priya Publications, Karur-2. Edition - 2006.

E-RESOURCES

1. www.kopikitab.com
2. www.sdnbvc.edu.in
3. www.facebook.centre.in
4. www.spriner.com
5. www.pdf.com

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS),
SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF CHEMISTRY

(For B.Sc. Biochemistry-Allied Course)

Semester: II-AP-II: Chemistry II Practical

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

OBJECTIVES

- The course is to give an introduction of fundamental methods and procedures used in the synthesis of organic compounds at micro and semi-micro scale.
- Experimental laboratory work with modern synthetic reactions will illustrate the importance of organic chemistry for our society.

ORGANIC QUALITATIVE ANALYSIS

Organic Analysis

Analyze the following organic Compounds.

1. Carbohydrate, 2. Amide, 3.Aldehyde, 4.Ketone, 5.Acid & 6. Amine

The students may be trained to perform the specific reactions like tests for elements (nitrogen only), aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

COURSE OUTCOME

1. The fundamental practical knowledge in the synthesis of organic compounds on lab scale
2. Got the practical knowledge in isolating and purifying synthetic organic compounds
3. Students got the knowledge on the characterization of organic compounds by the use of infrared spectroscopy.

Note: Scheme for Practical Evaluation.
Organic Qualitative Analysis - 55
Record - 5
Internal Assessment –40
Total :100

Organic Qualitative Analysis: 50
Identification of Nitrogen - 5 marks
Saturated and unsaturated - 5 marks
Aliphatic or Aromatic - 5 marks
Preliminary reactions with
Procedure - 15 marks
Functional group identified
Correctly - 10 marks
Confirmative test-10
Total: 50

TEXT BOOK(S)

1. A text book of Practical Organic chemistry, J.W. COOK, published 1948.

REFERENCE BOOK(S)

1. R. Gopalan, Elements of analytical chemistry, S. Chand, New Delhi, 2000.
2. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry lab manual, S. Viswanathan and Co. Pvt. Ltd. Chennai-1998

E-RESOURCE

1. www.springers.com
2. Pubs.acs.org

SEMESTER III

Semester: III-CC-III: Human Anatomy and Physiology

Ins. Hrs./Week: 6 **Course Credit**: 6 **Course Code**:

OBJECTIVES

- To explain the basic knowledge of human anatomy and physiology
- To introduce the physiological concepts of homeostasis and central mechanism
- To understand fundamental mechanisms underlying normal function of cells, tissues, organs, and organ systems of the human body

UNIT-I: Body fluids **(19 Hours)**

Extracellular fluid-plasma Intracellular fluid: Lymph & Blood-composition and functions. Osmolarity of the body fluids, ionic composition, electrolytes, body buffers. Blood cells-Types, Morphology and functions, haemoglobin, haemopoiesis, blood coagulation and blood groups.

UNIT-II: Circulation and Respiration **(18 Hours)**

Circulation: Structure and functions of Heart and blood vessels. Origin and conduction of heart beat, cardiac cycles, cardiac factors controlling blood pressure, electrocardiogram.
Respiration: Anatomy and physiology of respiration, exchange of gases between lung and blood and between blood and tissues. Role of lungs in acid-base balance.

UNIT-III: Digestive system **(19 Hours)**

Anatomy of the digestive system, Salivary, Gastric, Biliary, pancreatic and intestinal Secretions- composition and functions. Movements in Gastro intestinal tract, Digestion and absorption in the small intestine. Absorption in the large intestine; Digestion and absorption of carbohydrates, lipids and proteins.

UNIT-IV: Excretory system and Muscle **(17 Hours)**

Excretory system: Structure and functions of kidney and Nephron. Urine- composition and formation. Renal regulation of acid-base balance. **Muscle:** Kinds of muscle, Ultra structure and chemical composition of skeletal muscle, Sliding filament theory, Physicochemical changes during muscle contraction.

UNIT-V: Central nervous system **(17 Hours)**

Brief outline of nervous system-Brain, spinal cord, nerve fibre, synapse. Structure and types of neuron. Resting and action potential-conduction of nerve impulse. Synaptic transmission. neurotransmitters. Brain-chemical composition, metabolism, Biochemical aspects of learning and memory.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to,

1. Learn the distribution and composition of body fluids.
2. Understand the basics of anatomy and physiology of Heart and Lungs.

3. Acquire knowledge on the main structures and functions composing Digestive system.
4. Understand the functions of important physiological systems including the excretory system and Muscles.
5. Understand the structure and functions of nervous system.

TEXT BOOK(S)

1. Jain AK. 2019. Textbook of Physiology with Free QA Physiology (2 Volume Set), 8th edition, Arya Medical (APC) Publishers, New Delhi.
2. Martini FH and Nath JL. 2009. Fundamentals of Anatomy & Physiology. 11th edition, Pearson Benjamin Cummings. USA.
3. Nitin Ashok John, 2019. CC Chatterjee's Human Physiology Volume – 1 & II, 13th edition, Kalyani Mukerjee Publications, Kolkata, India.
4. Pal GK. 2019. Comprehensive Textbook of Medical Physiology (2 Volume Set), 2nd edition, Jaypee Medical Publishers, India.
5. Sarda Subramaniam, Madhavan Kutty K and Singh HD. 2006. Text Book of Human Physiology. 6th edition, S.Chand and Company Publishers, New Delhi.

REFERENCE BOOK(S)

1. Guyton AC and Hall JE. 2006. Textbook of Medical Physiology. 11th edition. Saunders, Philadelphia. USA.
2. Shalya Subhash, 2000 . Human Physiology: Systemic & Applied , 1st edition, CBS Publishers, New Delhi.
3. Silverthorn DU. 2016**.** Human Physiology: An Integrated Approach, 6th edition, Pearson Publishers, Austin.
4. Stuart H. Ralston, Ian D. Penman, Mark W. J. Strachan and Richard P. Hobson, 2018. Davidson's Principles and Practice of Medicine. 23rd edition, Elsevier Publishers, USA.
5. West ES, Todd WR, Mason HS and JTV. 2011. Textbook of Biochemistry, 4th edition, Bruggen Oxford IBH Publishers, New Delhi.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.pdfdrive.com/biochemistrystrayer-e25312085.html
3. https://www.pdfdrive.com/essentials-human-physiology-e1543905.html
4. https://www.pdfdrive.com/human-physiology-from-cells-to-systems-168189400.html
5. https://www.pdfdrive.com/human-anatomy-physiology-e51197.html
6. https://www.pdfdrive.com/essentials-of-medical-physiology-6th-edition-e32299678.html

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Semester: III-CP-III: Human Anatomy and Physiology Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**:

1. Histology of Tissues – Columnar, cubical, ciliated, squamous, stratified squamous.
2. Microscopic structure of organs – lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
3. Histology of muscles – cardiac, striated, non – striated
4. Determination of bleeding time
5. Determination of clotting time
6. Estimation of haemoglobin content
7. Determination of heart rate and pulse rate
8. Determination of Blood group
9. Determination of Rh factor
10. Determination of erythrocyte sedimentation rate (ESR)
11. Recording of basal mass index
12. Enumeration of Red blood cells (RBC) – Demonstration
13. Enumeration of White blood cells (WBC) – Demonstration
14. Differential Leucocyte count – Demonstration

COURSE OUTCOME

- Students practically learn the histology of tissues & muscles and able to determine various parameters of blood.

TEXT BOOK(S)

1. Ghai CL. 2013.Textbook of Practical Physiology, 8th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
2. Inderbir Singh. 2011. Textbook of Human Histology, 6th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
3. Kishore J. 2019. National Health Programs of India National Policies and Legislations Related to Health, 13th edition, Peepee Publishers, New Delhi.
4. Pal GK. 2019. Comprehensive Textbook of Medical Physiology (2 Volume Set), 2nd edition, Jaypee Medical Publishers, Chennai, Tamil Nadu.
5. Praful B Godkar, Bijal Dave & Laveena Muley. 2017. Textbook of Medical Microbiology and Parasitology, 1st edition, Bhalani Publisher, New Delhi.
6. Srinageswari K and Rajeev Sharma. 2018. Practical workbook of Human Physiology, 2nd edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

REFERENCE BOOK(S)

1. Arthur C. Guyton. 2011. Guyton & Hall Textbook of Medical Physiology, 12th edition, Elsevier Health Science; 3rd edition Saunders, an imprint of Elsevier Inc., USA.
2. Chatterjees CC. 2020. Human Physiology (vol 1 and 2), 13th edition, CBS Publishing Distribution Pvt. Ltd., India.

3. Nitin Ashok John. 2019. CC Chatterjee's Human Physiology Volume – 1 & II, 13th edition, CBS Publishers, New Delhi.
4. Shalya Subhash. 2000 . Human Physiology: Systemic & Applied,1st edition, CBS Publishers, New Delhi.
5. West ES., WR. Todd, HS. Mason and JTV. 2011. Textbook of Biochemistry, 4th edition, Bruggen Oxford IBH Publishers, New Delhi.

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2. http://ndl.iitkgp.ac.in/document/c25OeVJkSkdsa3cyUGpVN2xwU1RQQ3g1WWdHcStDZDNJRWxYNGQ0WUp2az0
3. https://ia801901.us.archive.org/26/items/KSembulingamEssentialsOfMedicalPhysiology6thEdition/K%20Sembulingam%20%20Essentials%20of%20Medical%20Physiology%2C%206th%20Edition.pdf
4. https://ia802205.us.archive.org/1/items/pdfy5vClyqSbVzIGpuT2/DM%20Vasudevan%20%20Textbook%20of%20Biochemistry%20For%20Medical%20Students,%206th%20Edition.pdf
5. http://yengage.yenepoya.edu.in/idata/YenepoyaUniversity/ilFile/3/86/file_38672/001/CL%20Ghai%20%20A%20Textbook%20of%20Practical%20Physiology,%208th%20Edition.pdf
6. https://www.academia.edu/21912072/IB_Singh_Textbook_of_Human_Histology_6th_Edition
7. https://bujhansi.ac.in/econtent/pages/shortcodes/biomedical/Guyton-and-Hall-Textbook-of-Medical-Physiology-12th-Ed.pdf

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Semester: III-AC-III: Biology

Ins. Hrs./Week: 4 **Course Credit**: 3 **Course Code**:

OBJECTIVES

- To define basic biological concepts and processes.
- To describe levels of organization and related functions in plants and animals.
- To identify the characteristics and basic needs of living organisms.

UNIT–I: Inheritance Biology (11 Hours)

Taxonomy, Types of taxonomy. Plants systematics: Taxonomy Vs Systematics. Principles and methods of taxonomy: concept of species of hierarchical taxa. Biological nomenclature (International code of Botanical nomenclature). Classical and quantitative methods of taxonomy. Classification of plants, animals and microorganisms.

UNIT-II: Taxonomy (13 Hours)

Inheritance biology – Mendalian principle, Chromosome theory of inheritance, allele, multiple allele, poly gene inheritance, pleiotropy, Linkage: Types, arrangement and theory. Crossing over:Mechanism,theory, sex linkage, sex limited and sex influenced characters, Mechanism of sex determination.. Inheritance of mitochondrial and chloroplast genes, maternal inheritance.

UNIT- III: Plant Physiology (13 Hours)

Plant physiology- Photosynthesis, C3, C4 pathway, photo respiration, nitrate and ammonia assimilation, Plant pigment: Chlorophylls, Carotenoids. Plant hormone: Auxins, Gibberelins, Cytokinins, Ethylene, Traumatic acid, phytochemicals, alkaloids, flavonoids, saponins, quinines, terpenes, phenols, Nitrogenous compounds-functions.

UNIT- IV: Environmental Biology (11 Hours)

Environmental Biology –Physical environment, biotic and abiotic, concept of habitat and niche, Resource partitioning: character displacement Concept, structure and functions of an ecosystem. Ecological succession. Energy flow and mineral cycling in ecosystem. Terrestrial and aquatic ecosystem.

Unit –V: Evolutionary Biology (12 Hours)

Historical review of Evolutionary concept: concept of evolution, origin of life, theories of evolution. Evidences of evolution: Analogy and Homology, Embryological evidences. Paleontological evidences, molecular phylogeny. Variations and mutations. Population genetics: Hardy-Weinberg law, Types of natural selection. Evolutionary synthesis.

Total Lecture Hours- 60

COURSE OUTCOME

The students will be able to,

1. Understand the Mendelian and molecular genetics, cell structure, cell physiology, and molecular processes of cells.

2. Learn organismal form, function, and diversity.
3. Acquire knowledge on the principles and theory of evolution, and concepts of ecology.
4. Explain the processes of growth and development in individuals and populations.
5. Correlate the relationships between organisms and their environment.

TEXT BOOK(S)

1. Irablei and George Odian, 2006, General, organic and Biochemistry, 2nd edition, W.H. Freeman company, New York.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter, 2002, Molecular biology of the cell-4rd ed. ; Garland Science; New York.
3. Powar, C.B. 2010, Cell Biology, Himalaya publishing House, Hyderabad.
4. Sobti, R.C., Sharma, V.L. 2009, Essentials of Modern Biology, Ane Books, India.
5. Verma, P.S. and Agarwal, V.K. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S.Chand & Company Ltd, New Delhi,

REFERENCE BOOK(S)

1. Hans –Walter Heldt, 2010, Plant Biochemistry, 4th ed, Academic Press, Elsevier Publications, Netherland.
2. Pandey, S.N, Sinha, B.K. 2009, Plant physiology- 4th ed, Vikas Publishing House, New Delhi.
3. Verma, P.S. and Agarwal, V.K. 2012. Environmental Biology (Principles of Ecology) S.Chand & Company Ltd, New Delhi.
4. Sundara Rajan, S. 2008, Introductory Modern Biology, Anmol publications Pvt Ltd, New Delhi.
5. Verma, V. 2006. Text Book of Plant Physiology, Ane Books Pvt Ltd, New Delhi.

E-RESOURCES

1. https://www.sciencelearn.org.nz/resources/2000-mendel-s-principles-of-inheritance
2. https://library.viu.ca/c.php?g=188912&p=1247781
3. https://www.khanacademy.org/science/ap-biology/natural-selection/natural-selection-ap/a/darwin-evolution-natural-selection
4. https://www.biologydiscussion.com/ecosystem/ecosystem-its-structure-and-functions-with-diagram/6666
5. https://www.intechopen.com/books/herbal-medicine/plants-secondary-metabolites-the-key-drivers-of-the-pharmacological-actions-of-medicinal-plants

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Semester: III-AP-III: Biology Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**:

1. To learn use of microscope, principle of fixation and staining.
2. Study of various plant cell types
3. To carryout gram staining for identifying bacteria.
4. To prepare squash mounts of onion root tips to study mitosis.
5. To study meiosis through permanent slides
6. Separation of chloroplast pigments by Paper Chromatography.
7. To study the cytochemical distribution of nucleic acids and muco polysaccharides within cells / tissues from permanent slides.
8. To raise the culture of E.coli and estimate the culture density by turbidity method. Draw a growth curve from the data.
9. Observation of various stages of chick embryo
10. Measurement of Physico - Chemical parameters in aquatic environment.
    - Dissolved Oxygen
    - Salinity
    - pH (Using pH paper (or) pH meter or Lovid bond Comparator).
    - Free Carbon -di-oxide
    - Carbonates and Bicarbonates

COURSE OUTCOME

The students are able to,

1. Learn microscope, microcopy, and cytochemical techniques
2. Learn the skill of determining the water parameters using the laboratory equipments and also learn the art of handling the equipments

TEXT BOOK(S)

1. Raven and Hetal, P. 2006, Biology 7th edition, Tata McGraw Hill Publications, New Delhi.
2. Powar, C.B. 2010. Cell Biology, Himalaya publishing House, Hyderabad.
3. Sobti, R.C. and Sharma, V.L. 2009. Essentials of Modern Biology, Ane Books, India
4. Sundara Rajan, S. 2008. Introductory Modern Biology, Anmol publications Pvt Ltd, New Delhi.
5. Verma, V. 2006. Text Book of Plant Physiology, Ane Books Pvt Ltd, New Delhi.

REFERENCE BOOK(S)

1. Griffiths, A.J.F, 2008, Introduction to Genetic Analysis, 9th edition, W.H. Freeman & Co. Narway.
2. Ross, F.C.1986. Introductory Microbiology, Bell and Howell Co, London.
3. Taylor, R.G.W. 2005. Practical Cytology, Academic Press, London.
4. Verma, P.S. and Agarwal,V.K. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Company Ltd, New Delhi.

5. Pandey, S.N. and Sinha, B.K. 2009. Plant physiology- 4th ed, Vikas Publishing House, New Delhi.

E-RESOURCES

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2. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
3. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-genetic-diversity/a/phases-of-meiosis
4. https://www.ysi.com/parameters/biochemical-oxygen-demand-bod
5. https://www.merckmillipore.com/IN/en/water-purification/learning-centers/applications/environment-water-analysis/cod/CLqb.qB.BIMAAAFAZws QWTdi,nav?ReferrerURL=https%3A%2F%2Fwww.google.com%2F&bd=1

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SEMESTER IV

Semester: IV-CC-IV: Enzymes

Ins. Hrs./Week: 5 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To study the Classification and Nomenclature of enzymes and, specificity of enzyme
- To make them learn the enzyme kinetics, mechanism of enzyme action and factors affecting enzyme activity
- To make them understand the technique of immobilization.

UNIT –I: History & Terminology **(14 Hours)**

Classification &nomenclature of enzymes, specificity of enzyme action (Lock & Key model and Induced fit model). Enzymes catalysis: proximity and orientation effect, covalent catalysis, metal ion catalysis. Regulatory enzymes-Allosteric (ATCase) & Covalently modulated (Glycogen phosphorylase) enzymes.

UNIT –II: Mechanism of Enzymes **(15 Hours)**

Mechanism of action of chymotrypsin and Ribonuclease. Role of vitamins as coenzyme precursors (Riboflavin, Niacin, pyridoxine, Biotin and Thiamine). Effect of enzymes concentrations, upward and downward curvatures with examples. Effect of temperature on enzyme activity and temperature quotient.

UNIT –III: Enzyme kinetics **(18 Hours)**

Importance of measuring initial velocities, Derivation of Michaelis -Menten equation, single and double reciprocal plots Graphical representation of various inhibitors (Competitive, Noncompetitive and Uncompetitive) on Line weaver- Burke plots. Importance of Kcal/Km. Bisubstrate reactions- introduction to sequential and Ping-Pong mechanisms with example.

UNIT –IV: Factors affecting enzyme activity **(14 Hours)**

General P^H profile diagram with exceptions, concept of enzymes assay and its importance, Enzymes activity units (Katal and specific activity), Enzymes isolation and purification – Enzymes solubilization, Brief idea of various fractionation procedures, criteria for enzymes purity and homogeneity.

UNIT –V: Immobilization of Enzymes **(14 Hours)**

Immobilization of an enzymes. Principles and various methods of immobilization - Ionic bonding, adsorption, covalent bonding (based on R groups of amino acids), microencapsulation and gel entrapment. Applications of immobilized enzymes. Applications of enzymes in Industry. Clinical importance of an enzyme.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to,

1. Understand the classification and nomenclature of enzymes, specificity of enzyme Catalysis and regulatory enzymes.

2. Learn the mechanism of enzymes action and the role of vitamins as coenzyme precursors.
3. Acquire knowledge on the Michaelis - Menten equation, single and double reciprocal plots, and graphical representation of various inhibitors
4. Understand the factors affecting enzyme activity and the techniques ofenzyme isolation & purification.
5. Learn the principles and methods of enzyme immobilization.

TEXT BOOK(S)

1. Price and Stevens 1989, Fundamentals of Enzymology, Oxford Bioscience publications 2nd edition, New york
2. Palmer, T. and Bonner, P. 2007. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry, 2nd edition, Horwood Publishers, United Kingdom.
3. Weisman, Hand book of Enzyme technology, 3rd edition, Printice Hall Publishers, United Kingdom.
4. Satyanarayana, U. 2019. Fundamentals of Biochemistry, Allied & Books Pvt Ltd, Calcutta.
5. Jain, J.L. 2005. Fundamentals of Biochemistry, 6th edition, S.Chand Publishers, New Delhi.

REFERENCE BOOK(S)

1. Nelson, D.L., Michael M. Cox. 2004. Lehninger Principles of Biochemistry: International Edition, CBS Publishers , 4th edition, London.
2. Stryer, W.H.1995. Biochemistry, Freeman & Co., Scientific Research an Academic Publisher, New York.4th Ed.1995
3. Voet, D. and Voet, J.G. 1990. Biochemistry, 4th edition, John Wiley & Sons Inc., Publishers, New York
4. White, A. 1959. Principles of Biochemistry, 3rd edition, McGraw Hill Book Co., Publishers, New York.
5. Price and Stevens, 1999. Fundamentals of Enzymology, 3rd edition, Oxford University Press, New York.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.chem.purdue.edu/courses/chm333/Spring%202013/Lectures/Spring%202013%20Lecture%2013-14.pdf
3. https://www.chem.purdue.edu/courses/chm333/Spring%202013/Lectures/Spring%202013%20Lecture%2015.pdf
4. https://www.chem.purdue.edu/courses/chm333/Spring%202013/Lectures/Spring%202013%20Lecture%2016-%2017.pdf
5. https://www.rgpv.ac.in/campus/PY/enzymes_ppt.pdf

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Semester: IV-CP-IV: Enzymes Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**:

1. Partial purification of an enzyme using bulk methods or Chromatography.
2. Assay to determine enzyme activity and specific activity.
3. Progress curve plot for an enzyme
4. Effect of P^H /temperature on enzyme activity.
5. Determination of KM and Vmax using Line weaver-Burk plot.
6. Calculation of inhibitory constant (Ki) for an enzyme
7. Continuous assay of an enzyme.

COURSE OUTCOME

The students will be able to

- They are isolate and purify enzymes
- They are able to determine the enzyme activity and kinetics
- They also learn the enzyme assay technique

TEXT BOOK(S)

1. Price and Stevens 1989, Fundamentals of Enzymology, Oxford Bioscience publications 2nd Ed, New york.
2. Satyanarayana, U. 2019. Fundamentals of Biochemistry, Allied & Books Pvt Ltd, Calcutta.
3. Jain, J.L. 2005. Fundamentals of Biochemistry, 6th Edition, S.Chand Publishers, New Delhi.
4. Voet, D. and Voet, J.G. 1990. Biochemistry, 4th edition, John Wiley & Sons Inc., Publishers, New York
5. White, A. 1959. Principles of Biochemistry, 3rd edition, McGraw Hill Book Co., Publishers, New York.

REFERENCE BOOK(S)

1. Lehninger Principles of Biochemistry: D.L.Nelson, Michael M.Cox, International Edition ,CBS Publishers, 4th Ed , 2004.
2. Stryer,W.H. 1995. Biochemistry Freeman & Co., Scientific Research an academic Publisher, 4th Ed., New York.
3. Marangoni. 2002. Enzyme kinetics. A modern approach, 1st edition, John Wiley Publishers, United Kingdom.
4. Dixon, M. and Webb, J.F. 1979. Enzymes, 2nd edition, Longman Publishers, London.
5. Stryer, I. 1988. Biochemistry, 2nd edition, W.H. Freeman & Co., Publishers, New York.

E-RESOURCES

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2. http://amrita.olabs.edu.in/?sub=73&brch=8&sim=133&cnt=2
3. https://courses.lumenlearning.com/biolabs1/chapter/enzymes/

4. https://practicalbiology.org/bio-molecules/factors-affecting-enzyme-activity/investigating-the-effect-of-ph-on-amylase-activity
5. https://www.easybiologyclass.com/properties-of-enzymes-biochemistry-lecture-notes/

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Semester: IV-AC-IV: Cell Biology

Ins. Hrs./Week: 3 **Course Credit**: 3 **Course Code**:

OBJECTIVES

- To understand the basics and fundamentals of cell biology and biogenesis of cell organelles.
- To study the cellular processes and mechanisms that lead to physiological functions in normal as well as in pathological state.
- To make them understand the organization of cells and cell cycle.

UNIT- I: Basics of Cell Biology **(08 Hours)**

Discovery of cell and cell theory, chemical components of a cell.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: Biogenesis of cellular organelles **(10 Hours)**

Structure and functions of cell organelles: cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum (rough and smooth), microbodies, glyoxysome, peroxisome, vacuoles, plastids, chloroplast, chromatin, ribosomes, centrioles. Catalysis and use of energy by cells. Chromosomes (structure, types and function).

UNIT –III: Cell membrane **(08 Hours)**

Chemical composition, structure, models, functions and specialization of plasma membrane. Lipid bilayer. Membrane pump (sodium – potassium Pump), solute transport by simple diffusion, facilitated diffusion and active transport (mechanism, types of active transport), osmosis. Electrical properties of membrane.

UNIT –IV: Cytoskeleton and extracellular matrix **(10 Hours)**

Organization of cells into tissue. Types of tissue. Composition and Organization of microtubules, microfilaments, cadherins, integrins, focal adhesions, tight junctions, selectins, gap junctions, intermediate filaments, desmosome and hemidesmosome - cell adhesion, cell matrix adhesion components and their biological role.

UNIT- V: Cell Cycle **(09 Hours)**

Cell division, mitosis, meiosis, cytokinesis and their significant. Cell cycle: phases of cell cycle, Functional importance of each phase, Even during cell cycle. Checkpoints. Methods to study cell cycle - labelled mitotic curve, flow cytometry. Aging (senescence): symptoms, causes and theory. Cell death: Necrosis and apoptosis.

Total Lecture Hours- 45

COURSE OUTCOME

The students will be able to,

1. Understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
2. Understand as to how these cellular components are used to generate and utilize energy in cells.
3. Understand the cellular components underlying mitotic cell division.
4. Apply their knowledge of cell biology to selected examples of changes or losses in cell function.
5. Apply their knowledge can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

TEXT BOOK(S)

1. Cooper, G.M. and Hausman, R.E. 2009. The Cell. A Molecular Approach. (5^{th} ed) Sunderland
2. Krebs, J. E., Kilpatrick, S.T. and Goldstein, E.S. 2013. Lewin GENES XI, JONES & Bartlett Learning, Burlington, Massachusetts.
3. Lodish, H.A., Berk,C.A., Kaiser,M., Krieger,M.P., Scott,A., Bretscher, H., Matsudaira, P. 2007. Molecular Cell Biology, 6^{th} Edition, WH. Freeman Publishers, New York, USA.
4. Verma, P.S. and Agarwal, V.K. 2004. Cell Biology, Genetics, Molecular Biology Evolution and Ecology, 14 edition, S.Chand and Company Ltd.
5. Watson, J.D., Basker, T.A., and Bell, S. 2008. Molecular Biology of the Gene, 5^{th} Edition. Dorling Kindersley Pvt., Ltd., New Delhi.

REFERENCE BOOK(S)

1. Bruce Alberts and Dennis Bray. 2013. Essential Cell Biology. 4^{th} edition, Garland Science, New york.
2. De Robertis and De Robertis, E.M.F. 2010. Cell and Molecular Biology, 8^{th} edition, Lippincott Williams and Wilkins, Philadelphia.
3. Geoffrey M. Cooper and Robert. E. Hausman, 2009 The Cell: A Molecular Approach:, Sinauer Associates, 5^{th}Ed, USA.
4. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiment, 6th edition, John Wiley & Sons, Inc, United Kingdom.
5. Wayne M. Baker. 2008.The World of the Cell. 7th edition, Pearson Benjamin Cummings Publishing, San Francisco.

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4. https://www.freebookcentre.net/biology-books-download/Basis-ofmolecular-cell-biology-(PDF-36P).html.
5. https://agrilif.org/gold/files/2012/09/Lecture-26.pdf

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Semester: IV-AP-IV: Cell Biology Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**:

1. Study a representative Plant and Animal cell by Microscopy
2. Study of the structure of cell organelles through Electron Micrographs
3. Cytochemical staining of DNA Feulgen
4. Study of polyploidy in Onion root tip by colchicine treatment.
5. Identification and study of cancer cells by Photomicrographs.
6. Study of different stages of Mitosis
7. Study of different stages of Meiosis

COURSE OUTCOME

Students are able to,

- Study practically the plant and animal cells, the cell organelles and components with the help of microscope and staining techniques

TEXT BOOK(S)

1. Bruce Alberts and Dennis Bray.2013. Essential Cell Biology. 4 edition, Garland Science.
2. Cooper, G.M. and Hausman, RE. 2009. The Cell .A Molecular Approach. (5" ed) Sunderland.
3. Ganesh M. K. and Shivashankara A. R. 2012, Laboratory Manual for Practical Biochemistry Jaypee publications, 2nd edition.
4. Lodish, H.A., Berk, C.A., Kaiser, M., Krieger, M.P., Scott, A. Bretscher, H., and Matsudaira, P. 2007. Molecular Cell Biology, 6th edition, WH. Freeman Publishers, New York, USA.
5. Watson, J.D., Basker, T.A. and Bell, S.P. 2008. Molecular Biology of the Gene, 5th edition. Dorling Kindersley Pvt., Ltd., New Delhi.

REFERENCE BOOK(S)

1. Bruce Alberts, 2008, Molecular Biology of the cell: Garland Publishing, 5th Ed.
2. Cooper, G.M. and Hausman, RE. 2009. The Cell .A Molecular Approach. (5" ed) Sunderland
3. Geoffrey M. Cooper and Robert. E. Hausman, 2009 The Cell: A Molecular Approach:, Sinauer Associates, 5thEd, USA
4. Lodish.H,.A , Berk.C.A, Kaiser.M, Krieger.MP, Scott.A Bretscher.H, Ploegh and p. Matsudaira, 2007, Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.
5. Watson. JD, TA.Basker and Sp.Bell, 2008 , Molecular Biology of the Gene, 5th Edition. Dorling Kindersley Pvt., Ltd., New Delhi.

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1. http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles.

2. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
3. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-genetic-diversity/a/phases-of-meiosis
4. https://www.microscopemaster.com/organelles.html
5. https://www.pdfdrive.com/biochemistry-books.html

Semester: IV-SBE-I: Traditional Medicine

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To impart knowledge of Herbal medicine as the basic objective of Education
- To develop a scientific attitude to make students open minded, critical and curious
- To make them able to identify medicinal plants (family/genus-level)

UNIT-I: Introduction (05 Hours)

Definition of Herbal drug, Importance of Herbal therapies, Herbal verses conventional drugs, Safety in herbal drugs. Toxicity in Herbal drugs and their interactions, General methods of extraction, isolation and purification of phyto-constituents

UNIT-II: Phytoconstituents (07 Hours)

Herbs used as nutraceuticals and healing agents;. Isolation, identification tests and estimation methods for the following phytoconstituents with special emphasis on HPLC, HPTLC and other advancd techniques Aloin from *Aloes Vasicine* from *Adhatoda vasica,* Andrographolides from *Andrographis paniculata* Curcumin from *Curcuma longa* Piperine from *Piper longum.*

UNIT-III: Application of Herbal Medicines (05 Hours)

Making and using herbal medicines for common ailments like cold, skin infections and Diarrhea; Analytical Profiles of selected herbs – *Brahmi, Anadrographis paniculata Aegle marmelos* and *Gymnema sylvestre*.

UNIT-IV: Quality Control of Herbal Medicines (07 Hours)

Quality Control and Quality Assurance of Herbal ingredients as per W.H.O.Guidelines, Determination of tannins, Ash value, Extractable matter and Pesticide residues. Herbal product development Lipid orals, tablets, capsules, dermatologic and herbal cosmetics

UNIT-V: Evaluation of Herbal Extracts & Herbal Drug Processing (06 Hours)

Qualitative and Quantitative estimation of active principles from standardized extracts by HPTLC, Biological standardization -Pharmacological screening of herbal extracts and Microbiological evaluation of herbal extracts Toxicity studies of herbal extracts.

Total Lecture Hours- 30

COURSE OUTCOME

The students will be able to,

1. Develop skill in practical work, experiments, equipment's and laboratory use along with collection and interpretation of herbal products and their utilization.
2. Make aware of natural resources and environment and the importance of conserving the same.
3. Demonstrate understanding of the importance of medicinal plants among different cultures through clear, logical writing.

4. Demonstrate as to how different cultures approach plant use in different ways and how plants and people interact.
5. Apply basic ethnobotanical techniques to the study of a specific cultural use of medicinal plants.

TEXT BOOK(S)

1. Kokate CK and Purohit DP. Textbook of Pharmacognosy, Nirali Prakashan, Pune
2. Staba EJ. Plant Tissue Culture as a source of Bio-Medicinals
3. Trease GE. and Evans WE., Pharmacognosy Baillere Tindall, Eastbourne
4. Tyler VE, Brady LR and Robbers JE. Pharmacognosy Len & Febiger, Philadelphia
5. Wallis TE. Pharmacognosy, CBS Publisher, New Delhi

REFERENCE BOOK(S)

1. William C. Evans, 2009. Pharmacognosy. 16th edition. Saunders Limited, USA.
2. Indian Herbal Pharmacopeia, 2002. Indian Drug Manufacturers Association, India
3. Quality Control methods for medicinal plant material, 1998. WHO, Geneva
4. Pulak Km Mukherjee, 2019. Quality control of herbal drugs. 1st edition, Elsevier, USA.
5. Michael Meguffin, Christopher Hobbs, 1997. Botanical safety handbook. Herbal products association, USA.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.ncbi.nlm.nih.gov/books/NBK92773/
3. https://depts.washington.edu/pse406/notes.htm
4. https://www.intechopen.com/books/herbal-medicine/introductory-chapter-introduction-to-herbal-medicine
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6806606/

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SEMESTER V

Semester: V-CC-V: Metabolism

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To make the students learn Bioenergetics with reference to as to how the living cells harness energy and channel it to biological work and to Metabolism, and as to how the cells extract and utilize energy through numerous enzyme-catalyzed reactions.
- To understand the major catabolic and anabolic pathways in metabolism of carbohydrates, lipids, amino acids and nucleotides.
- To make them l the key regulatory aspects in metabolic pathways

UNIT –I: Bioenergetics (15 Hours)

Energy transformation, Laws of thermodynamics; Biological oxidations/reductions and energy transducing membranes; Gibbs energy, free energy changes, redox potentials, phosphate, electrochemical and ion potentials, membrane structure, ion transport across membrane and membrane potentials, membrane transport mechanisms.

UNIT –II: Carbohydrate metabolism (16 Hours)

Glycolysis, citric acid cycle and their regulation; Order, organization and function of electron carriers in mitochondrial respiratory chain (electron transport), chemo-osmotic theory, oxidative and photosynthetic phosphorylation, pentose phosphate pathway and its regulation; Gluconeogenesis. Glycogenesis and glycogenolysis- Biosynthesis and regulation.

UNIT- III: Lipid metabolism (15 Hours)

Fatty acid biosynthesis: fatty acid synthase complex; α, β and ω oxidation of fatty acids; Biosynthesis of triacylglycerols, phosphoglycerides and sphingolipids; Biosynthetic pathways for Ketone bodies; Metabolism of chylomicrons, LDL, HDL and VLDL; Free fatty acids, Lipid levels in pathological conditions.

UNIT –IV: Amino acid metabolism (15 Hours)

Protein turnover, aminoacids pool. Biosynthesis of essential and non-essential amino acids. Degradation of essential and non-essential amino acids and their regulation. Transamination, oxidative deamination, ammonia intoxication, sources and fate of urea, Urea cycle and its regulation; In-born errors of amino acid metabolism.

UNIT-V: Nucleic acid metabolism (14 Hours)

De novo synthesis of purines and pyrimidines nucleotide and salvage pathway of purines nucleotide synthesis. Degradation of purines and pyrimidines nucleotide. Regulatory Control of biosynthesis and degradation of nucleotide; inhibitors of nucleic acid biosynthesis. Disorder of nucleicacids metabolism.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to,

1. Comprehend biochemistry of metabolism in living cells in relation to thermodynamic laws and principles.
2. Correlate as to how the living organisms exchange energy and matter with the surroundings for their survival, and store free energy in the form of energy-rich compounds
3. Recognize as to how the catabolic breakdown of the substances is associated with release of free energy; and the utilization of, free energy during synthesis of biomolecules i.e., anabolic pathways
4. Assess the crucial role of some hormones with regard to the integration of metabolic pathways.
5. Apply the knowledge of metabolic pathways to biotechnological and biochemical research.

TEXT BOOK(S)

1. Denise R Ferrier. 2013. Biochemistry (Lippincott's Illustrated Reviews), 6th edition, Lippincott Williams and Wilkins Publishers, Philadelphia.
2. Keith N Frayn and Rhys D. Evans. 2019. Human Metabolism A Regulatory Perspective, 4th edition, John Wiley Publishers, New Jersey.
3. Reginald H. Garrett, Charles M. Grisham. 2010. Biochemistry, 4th edition, Mary Finch Publishers, Massachusetts, United States.
4. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, and Victor W. Rodwell. 2012. Harper's Illustrated Biochemistry, 29th edition, McGraw-Hill Medical Publishers, Canada.
5. Voet.D and Voet. J.G. 2010. Biochemistry, 4th edition, John Wiley & Sons Inc Publishers, New Jersy.

REFERENCE BOOK(S)

1. Berg JM, JL. Tymoczko, and L. Stryer W.H. 2012. Biochemistry, 7th edition, Freeman Publishers, New York.
2. David A Bender, Shauna M C Cunningham. 2021. Introduction to Nutrition and Metabolism, 6th edition, CRC Press Publishers, Florida.
3. David Nelson L and Michael Cox. 2021. Lehninger Principles of Biochemistry, 8th edition, W.H.Freeman & Co Ltd Publishers , New York.
4. Sareen S Gropper, Jack L Smith, & Timothy P Carr. 2018. Advanced Nutrition and Human Metabolism, 7th edition, Cenage Learning Publishers.
5. Victor Rodwell and David Bender. 2018. Harper's Illustrated Biochemistry, 31st edition Paperback – Illustrated, McGraw-Hill Education, New York.

E-RESOURCES

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3. https://pubmed.ncbi.nlm.nih.gov/23680095/
4. https://www.ncbi.nlm.nih.gov/books/NBK556047/
5. https://www.khanacademy.org/test-prep/mcat/biomolecules/fat-and-protein-metabolism/v/overview-of-fatty-acid-oxidation

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Semester: V-CC-VI: Molecular Biology
Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To learn about the basic principles of inheritance and the significance of the organization of genome mechanisms in the expression of genetic material and its regulation.
- To understand Molecular biology with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development.
- To emphasize the molecular mechanisms of DNA replication, repair and protein synthesis.

UNIT-I: Structure and Functions of Nucleic Acids (14 Hours)

The beginning of Molecular Biology; DNA: A carrier of genetic information, Chemical structure of DNA and Base composition, biologically important nuleotides,Watson-Crick model, Supercoiled DNA, structure of different types of nucleic acids, hydrolysis of nucleic acids. Conformation of nucleic acids: A-, B-, Z-, DNA, t-RNA, micro-RNA. Stability of nucleic acid structure

UNIT-II: Replication of DNA (16 Hours)

Models of DNA Replication, Origin and direction of replication, discontinuous replication, DNA polymerases of prokaryotes and their mechanism of action; Primase, Ligase, Single strand DNA binding protein, Helicase, Topoisomerases Replication strategies for replicating circular DNA: φ mode replication,σ mode or rolling circle replication and D-loop replication. Eucaryotic DNA polymerases, Reverse transcriptase, Strategies for replicating linear DNA, Fidelity and processivity of replication, Inhibitors of replication.

UNIT-III: Transcription (16 Hours)

RNA synthesis and processing: Structure and function of RNA polymerases. Transportation in prokaryotes Transcription factors and machinery, formation of initiation complex, transcription activators and repressors, RNA polymerases, capping, elongation and termination, RNA processing, RNA editing, splicing, polyadenylation, structure and function of different types of RNA, RNA transport.

UNIT-IV: Translation (14 Hours)

Protein synthesis and processing: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, translational proofreading, translational inhibitors, post- translational modification of proteins.

UNIT-V: Genetic Mutations and Gene Regulation (15 Hours)

Introduction and Types of Gene mutations – Base substitution, Frame shift mutation-insertion, deletion, missense, nonsense mutation. Mutagens-Physical and chemical. Reverse mutation in bacteria. DNA repair mechanism-Mismatch repair photoreactivation, excision

and SOS repair. Beneficial and harmful effects of mutations. Regulation of Gene expression: Inducible operons – Galactose, Repressible operon – Tryptophan.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to,

1. Understand and apply the principles and techniques of molecular biology.
2. Learn the most significant discoveries and theories through the historical progress of biological scientific discoveries, and their impacts on the development of molecular biology.
3. Acquire knowledge on the principles and laws of inheritance at the cell, individual and population levels.
4. Understand the concepts such as gene structure and function, gene regulation, microbial genetics, mutation and DNA repair, PCR and sequencing, cancer genetics and evolution.
5. Learn as to how gene expression is regulated at different levels, and as to how tissue-specific expression is achieved and can be manipulated and studied experimentally.

TEXT BOOK(S)

1. Bruce Alberts, Alexander D. Johnson and Julian Lewis. 2014. Molecular Biology of the Cell, 6th edition, WW. Norton & Company Publishers, New York, USA.
2. Cooper GM. And RE. Hausman. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington Publishers, Augusta, Georgia.
3. Geoffrey Cooper and Robert E Harsman. 2004. The Cell-A Molecular Approach, 3rd edition. ASM Press Publishers, Washington, United States.
4. James D. Watson, A. Baker Tania, P. Bell Stephen, Gann Alexander, Levine Michael and Losick Richard. 2017. Molecular Biology of the Gene, 7th edition, Pearson Education Publishers, New York, USA.
5. Rastogi SC. 2011. Cell and Molecular Biology, 3rd edition, New age International publisher, New Delhi, India.
6. David Freifelder. 2008. Molecular Biology, 2nd edition, Narosa publishing house Publishers, India.

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1. Alberts B., Johnson A., Lewis J., Mofgan D., Raff M., Roberts K and Walter P. (2014). Molecular Biology of the Cell. 6th edition. Garland Science, New York, USA.
2. Allison A. Lizabeth. 2012. Fundamental Molecular Biology, 2nd edition. J Willey and Sons, Hoboken, New Jersey.
3. Berg JM, Tymoczko JL, Gatto GJ and Stryer L. 2015. Biochemistry, 8th edition, WH Freeman & Co., New York, USA.
4. David Nelson L. and Michael Cox. 2021. Lehninger Principles of Biochemistry. 8th edition, WH. Freeman & Co Ltd Publishers, New York, USA.
5. Freifelder D and Malacinski GM. 2010. Essentials of Molecular Biology, 4th edition, John and Bartlett Publishing, UK.
6. George M Malanciski. 2008. Freifelder's Essentials of Molecular Biology, 4th edition. Narosa Publishing House, India.
7. Gerald Karp. 2008. Cell and Molecular Biology, 5th edition, John Wiley and Sons Publishers, Hoboken, New Jersey.
8. Krebs JE., Kilpatrick ST. and Goldstein ES. 2013. Lewin' GENES XI, Jones & Bartlett Learning. Burlington, Massachusetts.
9. Lodish H., A. Berk, CA. Kaiser, M. Krieger, MP. Scott, A.Bretscher, H. Ploegh and P. Matsudaira. 2007. Molecular Cell Biology. 6th edition, WH. Freeman Publishers, New York, USA.

10. Watson JD, TA. Baker and SP. Bell. 2008. Molecular Biology of the Gene. 5th edition, Dorling Kindersley (India) Pvt. Ltd., Publishers, New Delhi.

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2. https://static1.squarespace.com/static/6019d0bc7dff866728d961d3/t/601a68429c231608a9b8f2a0/1612343363359/biochemistry_satyanarayana_ebook_free.pdf
3. https://drive.google.com/file/d/1tghNWPyuqPiqK1Rl11ZzUrFwcoMiuoMa/
4. http://www.freebookcentre.net/biology-books-download/BASICS-ON-MOLECULAR-BIOLOGY-(PDF-52P).html
5. http://www.freebookcentre.net/biology-books-download/Basics-of-molecular-cell-biology-(PDF-36P).html

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V-CC-VII: Microbial Biochemistry

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To make the students to understand the growth, enzymology and physiological processes of microbes
- To make the students to learn about the structure, classification, morphology, pathological importance of viruses and viral diseases.
- To impart the knowledge on important human diseases with respect to their causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention and treatment.

UNIT-I: Introduction to Microbiology (13 Hours)

Scope and history of Microbiology, Morphology and classification, Principles of classification of microbes. A brief introduction to major group of microorganisms- Bacteria, viruses, fungi, Protozoa, algae. Ultra structure of bacteria, Chemical composition of cell wall, Types of microscopy. Staining techniques-simple, differential and special staining techniques and negative staining-principle and procedure.

UNIT-II: Microbial Growth and Nutrition (16 Hours)

Nutritional types of microorganisms, nutritional requirements. Principles of microbial nutrition-chemoautotrophs, chemo-heterotrophs, photoautotrophs and photo-heterotrophs. Factors influencing the growth of microorganisms – temperature, pH, Osmotic pressure, moisture, radiations and different chemicals, Physiology of growth – Significance of various phases of growth. Growth measurements – batch, continuous and synchronous.

UNIT-III: Microbial Pathogens (16 Hours)

A brief account of medically important bacteria. Retroviruses, Viroids, Prions and emerging viruses such as HIV, Avian and swine flu viruses. Medically important fungi and protozoans. Beneficial applications of microbes: Human Microflora, Pre and Probiotics, Industrially important microbes. Microbes and Health: Gut microbiota and diseases, approaches for engineering gut microbiota, therapeutic uses of gut microbiota, Bacteriophages in control of bacteria.

UNIT-IV: Medical Microbiology (15 Hours)

Diseases of various organ systems: Causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention and treatment of the following viral diseases (a) Respiratory diseases: common cold, influenza, measles. (b) Neurological diseases: Dengue, Rabies (c) Liver diseases: Viral hepatitis, Immunodeficiency disease: - AIDS. A brief account on Prion diseases.

UNIT-V: Microbial Production of Enzymes and Antimicrobials (15 Hours)

Microbial production of penicillin, Tetracycline and peptide antibiotics; Acetic acid; Lactic acid; Gluconic acid, vaccines. Microbial production and commercial applications of Amylases, Proteases, Lipases. Antimicrobials- Control of Microorganism by physical and chemical agents. Narrow and broad spectrum antibiotics, Mode of action of Antimicrobial agents. Antibiotic resistance mechanisms.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to,

1. Acquire knowledge on basics in microscopy, culture methods and staining techniques
2. Study the Microbial growth and nutrition of micoorganisms
3. Understand the pathogenesis of microbes and beneficial applications of microbes
4. learn the viral diseases of various organ systems
5. Gain knowledge about microbial production of enzymes and antimicrobials**.** The interdisciplinary approach helps to apply the acquired knowledge in various fields**.**

TEXT BOOK(S)

1. Chakroborty P. 2003. A Text book of Microbiology, 2nd edition, New Central Book Agency (P) Ltd Publishers, New Delhi.
2. Kanika Sharma. 2011. Textbook of Microbiology – Tools and Techniques. 1st edition, Ane Books Pvt. Ltd Publishers, New Delhi.
3. Madigan MT. and JM Martinko. 2006. Brock's Biology of Microorganisms, 11th edition, Pearson Education Inc Publishers, London.
4. Rajan S. 2007. Medical Microbiology, 1st edition, MJP Publishers, Chennai.
5. Rajan S. 2007. Parasitology, 1st edition, SRS Publications, Chennai.

REFERENCE BOOK(S)

1. Alan J Cann. 2015. Principles of Molecular Virology. 6th edition, Academic press, California.
2. Ann Giudici Fettner. 1990. The science of viruses. 2nd edition, Quill, William Marrow, New York.
3. Ananthanarayanan, R. and Jeyaram Paniker, C.K. 2013. Textbook of Microbiology. 9th edition, University Press, Oxford, England.
4. Black, J.G. 2013. Microbiology: Principles and Explorations, 6th edition, John Wiley and Sons, Inc Publishers, Hoboken, New Jersey.
5. David Greenwood, Mike Barer, Richard Slack and Will Irving. 2012. Medical Microbiology. A Guide to Microbial Infections: Pathogenesis, immunity, Laboratory investigation and Control, 18th edition, Churchill Livingstone, London.
6. David Greenwood, Richard CB Slack and John F Peutherer.1992. Medical Microbiology, 14th edition, Celebs with Churchill Livingstone, London.
7. Dimmock NJ and Primerose SB. 2007. Introduction to modern virology. 6th edition. Blackwell Scientific Publication, Oxford, London.
8. Ingraham JL. and CA. Ingraham. 2004. Introduction to Microbiology: A case history approach, 3rd edition, Thomson Brooks/Cole Publishers, California.
9. Lansing M. Prescott JP, Harley and Donald A Klein. 2003. Microbiology, 5th edition, McGraw-Hill Company, New York.
10. Lansing M. Prescott, John P. Harley and Donald A. Klein. 2005. Microbiology, 6th edition, Tata Mc Graw – Hill Companies Publishers, New York.
11. Madigan, M.T., Martinko, J.M., Bender, K., and Buckley, D. 2011. Brock Biology of Microorganisms, 13th edition, Pearson Education, USA.

12. Prescott LM., JP. Harley and DA. Klein. 2006. Microbiology, 6th edition, McGraw Hill Higher Education Publishers, New York.
13. Salle AJ. 1996. Fundamental principles of Bacteriology, 7th edition, Tata McGraw-Hill publishing company limited, New Delhi.
14. Tortora GJ., BR Funke and CL Case. 2006. Microbiology: An Introduction, 8th edition, Pearson Education Inc Publishers, London.
15. Willey, J.M., Sherwood, L., and Woolverton, C. (2013) Prescott's Microbiology, 9th Revised edition, McGraw Hill Higher Education, New York.

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2. https://www.slideshare.net/shiningpearl18/haematoxylin-and-its-typesppt?next_slideshow=1
3. http://www.freebookcentre.net/medical_books_download/Medical-Microbiology.html
4. http://www.freebookcentre.net/medical_books_download/Medical-Microbiology-for-Graduate-Students.html
5. https://www.freebookcentre.net/medical_books_download/Microbiology-by-Angela-Echeverri.html
6. https://www.freebookcentre.net/medical_books_download/The-History-and-Scope-of-Microbiology.html

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Semester: V-CP-V: Nutritional Biochemistry Practical
Ins. Hrs./Week: 4 **Course Credit**: 3 **Course Code**:

1. Determination of ash content of food sample
2. Determination of moisture content of food sample
3. Determination of carbohydrate by Anthrone method
4. Determination of protein by Lowry method
5. Determination of lipid from plant source
6. Estimation of amino acids by Ninhydrin method
7. Estimation of inorganic phosphorous
8. Determination of iron content from dates
9. Estimation of Vitamin A from plant source
10. Estimation of Vitamin E from plant source
11. Estimation of Vitamin C from plant source
12. Estimation of nucleic acids-DNA/ RNA

COURSE OUTCOME

Students become capable of analyzing nutrient content of the given food sample.

TEXT BOOK(S)

1. Kusum Gupta. 2003. Food and Nutrition Facts and Figures, 5th edition Jaypee brothers Medical publications (P) Ltd Publishers.
2. Shubhangi Joshi. 2002. Nutrition and Dietetics, 2nd edition, Tata McGraw – Hill Limited Publishers.
3. Swaminathan M. 2004. Handbook of Food and Nutrition. 2nd edition, The Banglore printing and publishing Co. Ltd. (Banglore press) Publishers.

REFERENCE BOOK(S)

1. Bowman and Robert M. 2006. Present Knowledge in Nutrition. 9th edition, International Life Sciences Publishers.
2. Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
3. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition. 3rd edition. Chand Publishers.

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2. http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y

Semester: V-MBE-I: Endocrinology

Ins. Hrs./Week: 5 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To learn the glands, organs, tissues and cells those synthesize and secrete hormones, hormone precursors and associated compounds
- To understand the roles of hormone receptors in hormone action including their location, types and signaling pathways
- To acquire knowledge on the roles of the endocrine system in maintaining homeostasis, integrating growth and development

UNIT-I: Hormones and Receptors (14 Hours)

Hormones- Definition, Classification, Biosynthesis and Circulation in blood. Hormone-Receptors: Group I-Intracellular receptors - cytoplasmic and nuclear receptors and Group II hormones-Plasma membrane receptors - Second messengers – cyclic nucleotides (cAMP, cGMP), lipids (phosphatidyl inositol diphosphate and DAG), calcium ions, Calmodulin and NO.

UNIT-II: Thyroid and Parathyroid hormones (15 Hours)

Hormones of the thyroid: Biosynthesis, regulation, transport and biological actions of thyroid hormones Hyperthyroidism and hypothyroidism. Antithyroid agents. Parathyroid hormone-Biosynthesis and biological actions. Hyperparathyroidism and hypoparathyroidism. Calcitonin and Calcitriol- Biosynthesis and functions. Role of Hormones in regulation of calcium and phosphorous metabolism. Hyper and hypocalcemia. Paget's disease. Ricket's and osteomalacia.

UNIT-III: Hypothalamus and Pituitary hormones (16 Hours)

Hypothalamic releasing factors. Anterior pituitary hormones-actions-Growth promoting and lactogenic hormones. Glycoprotein hormones-TSH and Gonadotrophins, the POMC family-ACTH, Endorphins and MSH. Posterior pituitary hormones-Vasopressin and oxytocin-synthesis and biological effects. Pituitary diseases-Gigantism, Acromegaly, Dwarfism and Diabetes insipidus.

UNIT-IV: Pancreatic hormones (14 Hours)

Insulin- Biosynthesis, regulation of secretion and biological actions. Mechanism of action of insulin. Glucagon- Biosynthesis, regulation of secretion and biological actions. Somatostatin, pancreatic polypeptide and Insulin like growth factors.

UNIT V: Adrenal and Gonadal hormones (16 Hours)

Adrenal hormones- Glucocorticoids, Mineralocorticoids- synthesis and biological effects. Catecholamines: biosynthesis and biological effects. Gonadal hormones-Androgens and estrogens. Ovarian cycle. Abnormal secretion of adrenal hormones-Addison's disease. Cushing's syndrome, congenital adrenal hyperplasia, phaeochromocytoma.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

1. Understand the classification, synthesis and circulation of hormones and receptors.
2. Learn the synthesis and modes of secretion of hormones from thyroid and parathyroid glands.
3. Acquire knowledge about pituitary and hypothalamic hormones.
4. Understand the role of the pancreatic endocrine cells in the regulation of blood glucose.
5. Identify the hormones released by the adrenal and gonads origin, their biological actions and disorders.

TEXT BOOK(S)

1. Mac E. Hadley, Jon E. Levine, Jonathan Levine, 2009, Endocrinology, 6th edition. Benjamin Cummings Publishers, USA.
2. Nagini S. 2007. Text Book of Biochemistry, 2nd edition, Scitech publishers, India.
3. Norman Levin, 2019. Manual of Endocrinology and Metabolism, 5th edition, Wolters Kluwer Publishers, New York.
4. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell. 2003. Harper's Illustrated Biochemistry, 26th edition, McGraw-Hill Medical Publishers, New York.
5. Smith EL, Hill RL, Robert LI. Lefkowitz RJ, Philip H, and Abraham W. 1983. Principles of Biochemistry: Mammalian Biochemistry, 7th edition, McGraw-Hill Education Publishers, New York.

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1. Arthur C. Guyton and Hall, 2006. Text Book of Medical Physiology, 11th edition, Elsevier India pvt. Ltd., New Delhi.
2. Bernhard K and Winfried B. 2016. Hormones and the Endocrine System: A text Book of Endocrinology, 1st edition, Springer Nature Publishers, Switzerland.
3. De Robertis and De Robertis, 2001. Cell and Molecular Biology, 8th edition, Wolters Kluwer Publishers, India.
4. Lary Jameson J. 2017. Harrison's Endocrinology, 20th edition, McGraw Hill Publishers, New York.
5. Melmed S, Polonsky KS, Larsen PR, Kronenberg HM. 2016. Williams Textbook of Endocrinology, 13th edition, Elsevier Publishers, India.
6. Wilson and Foster, 1992. Textbook of Endocrinology, 8th edition. W. B. Saunders publishers, USA.

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3. https://www.news-medical.net/health/Pituitary-Gland-Hormones-and-Functions.aspx
4. https://www.pdfdrive.com/williams-textbook-of-endocrinology-expert-consult-e189818749.html
5. https://www.pdfdrive.com/harrison-endocrinology-e34584578.html
6. https://www.pdfdrive.com/endocrinology-basic-and-clinical-principles-e33437813.html

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Semester: V-SBE-II: Phytotherapeutics

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To make aware of natural resources and environment and the importance of conserving the same.
- To know the exhaustive list of plants having active constituents effective against advanced diseases.
- To understand the phytochemistry of the drugs and the phytopharmacology of the drugs.

UNIT –I: Herbal Drugs and Allergens (06 Hours)

Classification of medicinal plants based on their effects – Ecological status with special reference to India, common herbal drugs available in market and their composition, Drug industries in India with special reference to Maharashtra.

UNIT –II: Types of Drugs and mechanism of their action (06 Hours)

Herbal drugs acting on brain and nervous system – Rheumatic arthritis – Psychoactive drugs – Depressants, Stimulants, hallucinogens – sources, effects, basic mechanism of action.

UNIT- III: Common Diseases and Drug Action-I (06 Hours)

Herbal drugs and Cardiovascular diseases – blood pressure – cardiac drugs of plant origins – alkaloids, anticoagulants – basic mechanism of action. Pulmonary / respiratory disorders – asthma – bronchitis – common cold – allergy – Remedy from plants.

UNIT- IV: Common Diseases and Drug Action-II (06 Hours)

Drugs for urinogenital disorders – roots of *Withania somnifera*– Memory stimulants – *Centella asiatica*– Drugs for dissolving kidney stones – *Musa paradiasica* (pseudostem) – Antiinflammatory drugs – *Cardiospermum* – Anticancer drugs – *Catharanthus roseus*.

UNIT- V: Evaluation of Herbal Extracts (06 Hours)

Qualitative and Quantitative estimation of active principles from standardized extracts by HPTLC, Biological standardization -Pharmacological screening of herbal extracts and Microbiological evaluation of herbal extracts Toxicity studies of herbal extracts.

Total Lecture Hours- 30

COURSE OUTCOME

The students will be able to,

1. Develop the ability to understand the plants as the source of medicines, the ecology of medicinal plants and the plant based drugs available in the market.
2. Acquire knowledge on the application of herbal drugs to cure various ailments
3. Learn major human ailments and the cure using herbal drugs as therapeutic agents
4. Isolate, identify and determine both quantitatively and qualitatively the active principles present in plant parts

5. Understand the significance of ayurveda and in herbal medicine, and also the. Pharmaco vigilance in herbal therapy and establish authentic standard.

TEXT BOOK(S)

1. Heinrich Michael. 2018. Fundamentals of Pharmacognosy and Phytotherapy, 3rd edition, Elsevier Health Sciences Publishers.
2. Jain Usman and Jadhav Tanvir. 2020. A Textbook of Phytochemistry, 2nd edition, S.Vikas and Compnay Publishers.
3. Kerry Bone and Simon Mills. 2013. Principles and Practice of Phytotherapy. 2nd Edition, Edinburgh New York : Churchill Livingstone Publishers.
4. Kokate CK. 2006. Pharmacognosy, 31st Edition, Nirali Prakashan Publishers.
5. Singh MP and Panda H. 2005.Medicinal Herbs with their formulations, 4th Rev.Edition, Daya Publishers.

REFERENCE BOOKS

1. Khan IA and Khanum A. 2004. Role of Biotechnology in medicinal & aromaticplants, Vol 1 and Vol 10, Ukkaz Publishers.
2. Purohit SS. 2005. Agricultural Biotechnology, 2nd edition. Dr.Updesh Purohit Publishers.
3. Slater A, Scott NW and Fowler MR. 2004. Plant Biotechnology – The genetic manipulation of plants, 2nd edition. Oxford University Press Publishers.
4. Francesco Capasso. 2003. Phytotherapy. A quick reference to herbal medicine. Springer Publishers.
5. Iqbal Ramzan. 2015. Phytotherapies, Efficacy, safety and Regulation, 1st edition. John Wiley Publishers.

E-RESOURCES

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3. https://publications.iarc.fr/_publications/media/download/2627/243766665abcdd12254dfd3ab98a0e47ab582f6c.pdf
4. https://www.slideshare.net/mrmodaq/herbal-medicine-43566287
5. https://www.intechopen.com/books/herbal-medicine/introductory-chapter-introduction-to-herbal-medicine

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V-SBE-III: Herbal Cosmetics

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To learn the history of herbal medicines and dietary supplements
- To understand the herbal drugs that could potentially be used in the cosmetic technology to produce various types of cosmetics
- To assess a product on the basis of standardization of an extract, adequate labeling, and intended use, preparation of hair and skin care products

UNIT –I: Standardization of Herbal Material (06 Hours)

Quality Control and Standardization of Herbal Medicines, Need for standardization, Assessment of quality – Stability, Safety, toxicity and efficacy. Standardization of Crude plant material, Plant preparations and Finished product. Steps Involved in Standardization - Pharmacognostic evaluation, Physico-chemical parameters, Chemical parameters, Chromatographic and spectroscopic analysis, Microbiological parameters.

UNIT –II: Cosmetic Technology-I (06 Hours)

Raw materials used for formulation of skin care and hair care cosmetics: source and description of raw materials of natural origin like fixed oils, waxes, gums, hydrophilic colloids, colours, perfumes, protective agents, bleaching agents, preservatives, antioxidants and other ancillary agents used in the cosmetic formulations.

UNIT –III: Cosmetic Technology-II (06 Hours)

Stability aspects of cosmetics: Shelf-life, effects of environmental factors like light, temperatures etc., on product stability. Quality control tests of different cosmetic products, Packaging of cosmetics. Herbs used as antioxidants, free-radical scavenger, antiseptic, antibacterial, antiwrinkle, anti-fungal.

UNIT –IV: Hair and Skin Care Products (06 Hours)

Hair Care Products: Hair structure, Shampoos, Conditioners, Setting lotion, Hair creams, Hair dyes. Herbal skin care cosmetics: Cleansing agents - apricot. Emollients - aloe, almond. Astringent – amla, Freshening agent - chandan, khus. Skin Pigmentation - saffron, ambi haldi

UNIT –V: Types of Cosmetics (06 Hours)

Coloured Cosmetics: Introduction, lip colour, nail polish and face make-up eye make-up- Solutions, Lotions, Suspensions, Ointments, Creams or emulsions, Gels, Sticks, Powders, Tablets and Aerosols. Dental products: Dentifrices, Oral rinses, Tooth powder, Tooth paste. Personal Hygiene Products: Shaving creams, after shave products.

Total Lecture Hours- 30

COURSE OUTCOME

The students will be able to,

1. Impart knowledge on the assessment of quality, quality control and standardization of herbal drugs
2. Learn plant based raw materials their source and information, and the various constituents used in the cosmetic formulation
3. Understand the stability, standardization, shelf life and quality control of herbal based cosmetic preparations .
4. Gain knowledge on the formulation of skin and hair care cosmetic products
5. Acquire knowledge on various types of cosmetics. In a nutshell it motivates the students to become entrepreneurs.

TEXT BOOK(S)

1. Vimaladevi, M. 2019. Textbook of Herbal Cosmetics, CBS Publishers.
2. Eiri Board. 2015. Herbal Cosmetics & Beauty Products with Formulations, Engineers India Research Ins Publishers.
3. Eiri Board. 2013. Hand Book of Synthetic And Herbal Cosmetics, Engineers India Research Ins Publishers.
4. Chattopadhyay, PK. 2013. Herbal Cosmetics & Ayurvedic Medicines, 3rd Revised Edition, Niir Project Consultancy Services and Publishers.
5. Panda, H. 2005. The Complete Technology Book on Herbal Beauty Products with Formulations and Processes, Asia Pacific Business Press Inc Publishers.

REFERENCE BOOK(S)

1. Nora Robson. 2017. Skin care: For dry skin. Lotions, creams, soap and scrubs. Make your own natural, organic cosmetics: Health & Beauty. (Volume 1), Create Space Independent Publishers.
2. Lorraine McCormick. 2019. Natural Soap Making for Beginners: How to Make Soap from Scratch Using Essential Oils, Herbs, and Other Natural Additives (Natural Health Care), Independently published.
3. Helen Markham. 2013. Dry Skin Care Solutions: 21 Completely Natural Remedies for Achieving Healthy and Radiant Skin (Completely Natural Skin Care Series) (Volume 1), Create Space Independent Publishing Platform.
4. Vesela Tabakova. 2017. How to Grow Long Hair with Herbs, Vitamins and Gentle Care: Natural Hair Care Recipes for Hair Growth and Health (Organic Beauty on a Budget),), Independently published.
5. Mandi Nyambi. 2019. Fresh Face: Simple routines for beautiful glowing skin, every day (Skin Care Book, Healthy Skin Care and Beauty Secrets Book), Illustrated edition, Chronicle Books Publishers.

E-RESOURCES

1. https://www.slideshare.net/rahimbrave/herbal-cosmetics-69811712
2. https://www.slideshare.net/ShresthaPandey1/herbal-cosmetics-for-hair-and-skin-care
3. https://www.slideshare.net/LavanyaSA/drlavanyasa-standardization-of-herbal-drugs
4. https://www.slideshare.net/zhaciil/technology-in-the-field-of-cosmetics
5. https://www.slidemembers.com/en_US/view/PPT-Templates/natural-cosmetic-presentation-ppt-11822
6. http://www.iamj.in/posts/2017/images/upload/269_277.pdf

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SEMESTER VI

Semester: VI-CC-VIII: Immunology

Ins. Hrs./Week: 6 **Course Credit**: 6 **Course Code**:

OBJECTIVES

- To study about the organs involved in the immune system and their biological functions
- To understand the immunity and its types, immune response and immunoglobulins
- To study about hypersensitivity reactions and the production polyclonal and mono clonal antibodies and their application

UNIT-I: Immune system (20 Hours)

Lymphoid organ – Types- Primary Lymphoid organ - Thymus, Bome marrow, Bursa and Secondary Lymphoid organ- Spleen, Lymphnode, Lymphocytes- their origin and differentiation, Types- B Cell, T Cell and NK cells. Antigen presenting cells- macrophages, dendritic cells, langerhans cell. Mechanism of phagocytosis. Complement –characteristic features, activation- Classical pathway and Alternative pathway- biological functions.

UNIT-II: Immunity (19 Hours)

Definition, Types - Innate immunity- classification- active and passive - mechanism of innate immunity and Acquired immunity- classification- active and passive- mechanism of acquired immunity. Humoral and cell mediated immunity. Immunity to infection against bacteria and virus. Cytokines- interleukins, Interferon-their role in immune response.

UNIT-III: Immunoglobulins (18 Hours)

Immunoglobulin- Definition, structure, types based on light and heavy chain, biological functions, generation of diversity. Antigen- Types, hapten, immunogen, factors determining antigenicity. Antigen-antibody interactions- agglutination, neutralization, complement fixation, opsonization, bacteriolysis and precipitation.

UNIT-IV: Immunity to infection (17 Hours)

Hypersensitivity reactions- Definition, types based on time duration & location and mechanism. Transplantation-Definition, types, graft acceptance, graft rejection- types-rejection mechanism and prevention, immune suppressive drugs. HLA-immune response genes, HLA molecules, Auto immune diseases- pathogenesis – treatment.

UNIT-V: Immunochemical techniques (16 Hours)

Production and applications of polyclonal antibodies. Principle, Production, biological significances of monoclonal antibodies. The precipitation reaction- immunodiffusion, immunoelectrophoresis, immunofluorescence, complement fixation test- principle, types, mechanism and biological significances. Principle, technique and applications of RIA and ELISA.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to,

1. Learn the structure and properties of lymphoid organs and role of Immune Cells.
2. Understand various types immunity, immune response and the importance of Immunity
3. Acquire knowledge about immunoglobulins and antigen – antibody interactions\
4. Understand the hypersensitivity reactions and organ transplantation and immune response
5. Learn the technique of production of polyclonal and monoclonal antibodies and their applications.

TEXT BOOK(S)

1. Anil K. Sharma. 2019. Immunology: An Introductory Textbook, 1st edition, Jenny Stanford Publishers, California.
2. Gupta SK. 2017. Essentials of Immunology, 2nd edition, ARYA Publishers, New Delhi.
3. Kenneth Murphy. 2017. Janeway's Immunobiology, 9th edition, W.W. Norton & Company Publishers, New York.
4. Mohanty SK. 2019. Essentials of Microbiology & Immunology, 1st edition, Paras Medical Publishers, New Delhi.
5. Robert R. Rich. 2020. Clinical Immunology- Principles And Practice, 5Th edition, Elsevier Publishers, India.
6. Shyamasree Ghosh. 2020. Computational Immunology Basics, 1st edition, CRC Press Publishers, England.

REFERENCE BOOK(S)

1. Abul K. Abbas, Andrew H. Lichtman, and Shiv Pillai. 2020. Cellular and Molecular Immunology, 10th edition, Elsevier Publishers, India.
2. Ashim K. Chakravarty. 2016. Immunology and Immunotechnology, 1st edition, Oxford Publishers, England.
3. Jenni Punt, Sharon A Stranford, Patricia P Jones and Judith A Owen. 2019. Kuby Immunology, 8th edition, Macmillan Education Publishers, London.
4. Peter J. Delves, Seamus J. Martin, Dennis R. Burton and Ivan M. Roitt. 2016. Roitt's Essential Immunology, 13th edition, Wiley-Blackwell Publishers, New Jersey.
5. Richard A. Goldsby, Thomas J. Kindt, Barbara A. Osborne, Janis Kuby. 2002. Immunology, 5th edition, W.H.Freeman Publishers, New York.

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2. https://www.cell.com/immunity/home
3. https://www.wpunj.edu/sec/vsec/science_courses/bio/BIOimmuANIM.html
4. https://www.youtube.com/watch?v=K09xzIQ8zsg
5. https://nptel.ac.in/content/syllabus_pdf/102105083.pdf

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Semester: VI-CC-IX: Clinical Biochemistry
Ins. Hrs./Week: 6 **Course Credit**: 6 **Course Code**:

OBJECTIVES

- To know the clinical aspects of various metabolic disorders
- To understand the significance of diagnostic Biochemistry
- To provide an advanced understanding of the biochemical mechanisms and patho physiological processes responsible for common biochemical disorders.

UNIT- I: Basic concepts of Clinical Biochemistry (19 Hours)

A brief review of units and abbreviations used in expressing concentrations and standard solutions. Specimen collection and processing (Blood, Urine, Faeces). Anticoagulant preservatives for blood and urine. Transport of specimens. Blood coagulation - disturbances in blood clotting - haemophilia A and haemophilia B. Blood groups, haemoglobin in Anaemias, Sickle Cell Anemia, Thallasemia, Porphyrias and porphyrinurias. Blood banking.

UNIT –II: Hepatic Function Test (17 Hours)

Homeostasis, Disorders of fluids, electrolyte balance and gastrointestinal system, disorder involving change in hydrogen ion concentration. Liver function tests, Jaundice, Haemolytic, Hepatic and Obstructive Jaundice. Renal function tests, normal and abnormal constituents of urine.

UNIT- III: Disorders of carbohydrate metabolism (18 Hours)

Sugar level in normal blood, maintenance of blood sugar concentration – endocrine influence on Carbohydrate Metabolism, Hypoglycemia, Glycosuria, Renal Threshold Value, Diabetes Mellitus – classification, complications, glucose tolerance test (GTT), Diabetic Coma, Diabetic Ketoacidosis, Glycogen Storage Diseases, Fructosuria, Galactosemia.

UNIT- IV: Disorders of Protein, Aminoacid and Nucleicacid metabolism (19 Hours)

Plasma proteins, their origin, significance and variation in diseases. Nitrogen Balance, Proteinuria, Multiple Myeloma, Wilsons Disease. Phenylketonuria, Alkaptonuria, Tyrosinosis, Albinism, Hartnupsdisease. Fanconic Syndrome, Cystinuria, Gout.

UNIT –V: Disorders of lipid metabolism (17 Hours)

Lipid metabolism in liver and adipose tissue, plasma lipoproteins, cholesterol triglycerides and phospholipids in health and diseases, Fatty Liver, Atherosclerosis, Lipid Storage Diseases, Hypolipoproteinemia and Hyperlipoproteinemia.

Total Lecture Hours- 90

COURSE OUTCOME

The Students will be able to,

1. Understand the difference between plasma, serum, normal and abnormal constituents in various body fluids, Blood clotting mechanism and anticoagulants.

2. Acquire knowledge on the nature and function of various enzymes, normal levels and elevated levels in various diseases.
3. Comprehend that blood is a universal fluid for carrying different minerals, nutrients, proteins etc to and from various tissues.
4. Learn that many diseases result from imbalance in certain enzymes and helps in diagnosis of liver, cardiac, gastrointestinal, kidney diseases.
5. Make the students knowledgeable and potential human resource with basic understanding on clinical biochemistry.

TEXT BOOK(S)

1. Bruce Alberts, Alexander D. Johnson and Julian Lewis. 2014. Molecular Biology of the Cell, 6th edition, WW. Norton & Company Publishers, New York, USA.
2. Carl Burtis A. Edward Ashwood R. and David Bruns E. 2012. Textbook of Clinical Chemistry and Molecular Diagnosis, 5th edition, Springer Publishers, New York.
3. Chatterjee MN. and Ranashinde. 2012. Text Book of Medical Biochemistry, 8th edition, Jaypee Brothers Medical Publisher, New York.
4. DevlinTM. 2011. Textbook of Biochemistry with Clinical Correlations. 7th edition, John Wiley & Sons Publishers, New York .
5. Graham Basten. 2011. Introduction to Clinical Biochemistry, Interpreting Blood Results. Book Boon. 2 nd edition, Bookboon.

REFERENCE BOOK(S)

1. Dennis Kasper and Eugene Braunwald. 2005. Principles of Internal Medicine. Harrison's Vol 1 & 2, 16th edition, McGraw-Hill Publishers, New York.
2. Harold Varley. 2006. Practical Clinical Biochemistry. 6th edition. CBS Publishers.
3. Lippincott William & Wilikns. 2018. Clinical Chemistry, Principles, Techniques, Correlations with Access. 8th edition. Michael Bishop, Edward Fody, & Larry Schoeff Publishers, Philadelphia.
4. Tata Mc Graw Hill Companies. 2001. The Metabolic & Molecular Basis of inherited Diseases, Vol 1, 8th edition, Vallersty Publishers, Mumbai.
5. Thomas M Devlin. 2006. Textbook of Biochemistry with Clinical Correlation. 2nd edition, Wiley & Sons Publishers, New York.

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2. https://www.enpab.it/images/2018/EbookBiologia%20Clinica%2001_Clinical%20Biochemistry%20and%20Metabolic%20Medicine%20-%20Martin%20Andrew%20Crook.pdf
3. http://www.student.oulu.fi/~taneliha/Harpers_Illustrated_Biochemistry_(29thEdition).pdf
4. https://static1.squarespace.com/static/6019d0bc7dff866728d961d3/t/601a68429c231608a9b8f2a0/1612343363359/biochemistry_satyanarayana_ebook_free.pdf
5. https://www.pdfdrive.com/biochemistry-books.html

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Semester: VI-CC-IX: Clinical Biochemistry Practical
Ins. Hrs./Week: 6 **Course Credit**: 4 **Course Code**:

1. Collection of Blood and Urine, Types of preservative and anticoagulants
2. Blood grouping, hemoglobin content, PCV, TC/DC count and ESR
3. Qualitative tests of Urine: Abnormal constituents:
   Sugar, Protein (Albumin), Ketone Bodies, Bile Pigments and Bile Salts.
4. Quantitative estimation in Blood
   - Glucose
   - Cholesterol
   - Calcium
   - Urea.
   - Iron
   - Bilirubin
   - Uric acid
   - Creatinine
5. Quantitative estimations in Urine
   - Glucose
   - Urea
   - Uric acid
   - Creatinine

COURSE OUTCOME

- Students are able to acquire the skill of blood sample collection, blood grouping quantitative estimation of blood constituents and quantitative and qualitative determination of urine.

TEXT BOOK(S)

1. Jayaraman J. 2011. Laboratory Manual in Biochemistry, 3rd edition, New Age International Pvt Ltd Publishers, New Delhi.
2. Sadasivam S. Manickam A. 2009. Biochemical Methods, 3rd edition, New age publishers, New Delhi.
3. SK. Sawhney SK. Randhir Singh. 2005. Introductory Practical Biochemistry, 2nd edition, Alpha Science International Ltd, Oxford, United Kingdom.

REFERENCE BOOK(S)

1. Alan H Gowenlock. 1998. Varley's Practical Clinical Biochemistry, 6th edition, CBS Publishers, India.
2. B. Godkar. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd edition, Bhalani Publishers.
3. Kanai L Mukerjee. 1996. Medical Lab Technology, Vol I& II, 1st edition, Tata Mcgraw Hill, Pennsylvania.
4. Ranjna Chawla. 2014. Practical Clinical Biochemistry Methods and Interpretations

(Paperback). 4th edition, Jaypee Brothers Medical Publishers, New York.

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1. https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors
2. http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y

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Semester: VI-MBE-II: Pharmaceutical Biochemistry
Ins. Hrs./Week: 5 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To provide a detailed study on the action of drugs on living systems.
- To understand the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of drugs.
- To make the students aware of biochemical aspects of drug discovery, drug screening and medicinal technologies

UNIT-I: General Principles of Pharmacology (15 Hours)

History of Drugs, Nature and Sources of drugs, Classification of drugs, Dosage forms of the drugs, Subdivision of pharmacology, routes of drug administration, absorption and distribution of drugs, factors influencing drug absorption and elimination of drugs. Toxicity assessment: acute, sub chronic, chronic exposure, determination of ED50 and LD50 values.

UNIT- II: Drug- Receptor interactions (15 Hours)

Pharmacodynamics – Site of drug action – Mechanism of action of drug - Agonist and antagonist. Types of receptor – Ion channel coupled receptors, G-Protein coupled receptors, Kinase linked receptors and Intracellular receptors, Enzyme as receptors, Binding forces involved in drug receptor interaction, drug action not mediated by receptors.

UNIT- III: Drug metabolism (14 Hours)

Definition – First Pass Metabolism, Chemical Pathways of Drug Biotransformation - Phase I reactions (Oxidation, Reduction, Hydrolysis) - Phase II reactions (Conjugation) – Drug metabolising enzymes – Microsomal enzymes and Non microsomal enzymes - Role of Cytochrome P_{450} in drug metabolism - Physiological importance of xenobiotic metabolism

UNIT –IV: Chemotherapy (16 Hours)

Introduction to parasitic and infectious diseases. Mode of action of antimicrobial (antibacterial, antiviral and antifungal) drugs. Biology of Malaria, Mechanism of action of antimalarial drugs - Cancer chemotherapy: Cancer and principles of cancer chemotherapy. Mode of action of anticancer drugs- antimetabolites, antibiotics, alkylating agents and other agents.

UNIT –V: Drugs acting on various systems (15 Hours)

CNS-sedative- hypnotic, GI tract drugs for peptic ulcer, diarrhoea and constipation. Miscellaneous drugs - antiseptic, disinfectant, chelating agents. Adverse drug reactions – side effect, secondary effect, toxicity - Drug Allergy - biological effects of drug abuse and drug dependence, drug tolerance and intolerance

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to,

1. Learn the history, source, nature and classification of drugs, drug administration and toxicity assessment
2. Understand the drug- receptor interactions, types of receptors and mechanism of action of drugs
3. Acquire knowledge on the chemical pathways of drug biotransformation and physiological importance of xenobiotic metabolism
4. Understand the infectious diseases and mode of action of therapeutic agents and mechanism of action of anti malarial and anti cancer drugs
5. Learn adverse drug reactions, drug allergy, toxicity, etc

TEXT BOOK(S)

1. Gordan Gibson, G. and Paul Skett. Nelson Thornes, 1999. Introduction to Drug Metabolism, 3rd edition, UK.
2. Haque SS and Randhawa SS. 2017. Pharmaceutical Biochemistry. 2nd edition, S.Vikas and Company
3. Harbans Lal, 2018. Essentials of Pharmaceutical Biochemistry. 2nd edition,CBS publishers and Distributors.
4. Jayashree Ghosh, 2010. A Textbook of Pharmaceutical Chemistry, 3rd edition, S.Chand & Company Ltd., New Delhi.
5. Kadam SS, Mahadik R. 1998. Text Book of Medicinal Chemistry, Vol. 15th edn. Nirali Prakashan Publishers.
6. Tripathi KD. 2010. Essentials of Medical Pharamacology, 7th edition, Jaypee Publishers.

REFERENCE BOOK(S)

1. Abdul wahab and Shahid Ullah khan, 2015. Handbook of Pharmaceutical Biochemistry for Health Professionals. LAP LAMBERT Academic Publishing.
2. Bertram Katzung, 2012. Clinical Pharmacology, 12th edition, Lange Publishers.
3. Donald Cairns, 2012. Essentials of Pharmaceutical Chemistry, 4th edition, Pharmaceutical Press.
4. Robert K. Murray, Daryl K. Granner, Peter A. Mayer and Victor W. Rodwell, Mc Graw Hill, New York, 2006. Harper's Biochemistry. 25th edition. Tata Mcgraw Hill Publishing company.
5. Thomas L. Lemke, David A. Williams, Victoria F. Roche and S. William Zito, Foye's Wolters Kluwer, 2012. Foye's Principles of medicinal Medicinal Chemistry. 7th edition, Lippincott Williams & Wilkins publisher.
6. Vyas SP, Kohli DV. 2019. Pharmaceutical Biochemistry,1st edition, CBS Publishers.

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4. https://epgp.inflibnet.ac.in/
5. https://guides.lndlibrary.org/pharmacy/pharm-books

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-NME-I: Health and Diseases

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To make the students learn the impaired metabolism of carbohydrate, lipid, protein and disorders leading to various diseases in human beings.
- To understand the functions and functional disorders of liver, kidney and heart
- To understand oncology with reference to cancer its epidemiology, prevention and therapy

UNIT-I: Specimen collection and processing (05 Hours)

Specimen collection and processing of blood, urine and faeces. Anticoagulants and preservatives for blood and urine. A brief review of units and abbreviations used in expressing concentrations, standard solutions and clinical values. Electrolytes and acid base balance. Maintenance of acid base balance by respiratory and renal mechanism. Acidosis and alkalosis.

UNIT- II: Disorders of Carbohydrate Metabolism (06 Hours)

Overview of regulation of blood glucose, Glucose Tolerance Test (GTT)-normal values and interpretations, causes of abnormal GTT curve, sugar levels in blood, renal glucosuria, hyperglycaemic hormones, Diabetes mellitus- pathological alterations in diabetes mellitus, acute and chronic complications of diabetes mellitus, management of diabetes mellitus, oral hypoglycaemic agents, hypoglycaemia.

UNIT-III: Disorders of Lipids and Proteins (06 Hours)

Plasma lipoproteins, General structure of Lipoproteins, lipoprotein metabolism and transport, lipoprotein disorders, cholesterol, triglycerides and phospholipids in health and diseases. Hyperlipidemia, hyperlipoproteinemia, abetalipoproteinemia. Abnormalities in nitrogen metabolism-phenylketonuria, cystinosis and homocystinuria.

UNIT-IV: Disorders of Liver, Kidney and Heart (06 Hours)

Functions of liver, kidney and heart. Jaundice, fatty liver. Diagnostic enzymes in different diseases-myocardial infarction, liver diseases, muscle diseases, bone diseases, cancers and GI tract diseases. Renal calculi, Cardiac arrest and management, causes, symptoms, pathophysiology and diagnosis of atherosclerosis.

UNIT-V: Oncology (07 Hours)

Cancer – definition, terminology-neoplasia, hyperplasia, hyperthropy, dysplasia, metaplasia, adenoma, sarcoma, epidemiology, etiologic factors, biochemistry of metastasis, prevention-primary, secondary and tertiary prevention, principles of cancer therapy, diagnosis and staging-TNM method, chemotherapeutic agents, tumor markers, treatment.

Total Lecture Hours- 30

COURSE OUTCOME

The students are able to,

1. Know about basic procedures during biological sample collections.
2. Learn various types of diseases associated with impaired carbohydrate metabolism
3. Understand the disorders of protein and lipid metabolism. And the associated diseases
4. Gain knowledge on disorders of liver, kidney and heart
5. Acquire knowledge on oncology, and epidemiology, prevention and treatment of cancer

TEXT BOOK(S)

1. Birn AE., Pillay Y & Holtz T. 2009. Textbook of international health: Global health in a dynamic world, 3rd edition, Oxford University Press Publishers, England.
2. Chakrabarty, Kaveri and Chakrabarty AS. 2019. Textbook of Nutrition in Health and Disease, 1st edition, Springer Publishers, New York, USA.
3. Chatterjea MN and Rana Shinde. 2007. Textbook of Medical Biochemistry, 7th edition, Jaypee Brothers Publishers, Chennai, Tamil Nadu.
4. Krishna Das KV. 2013. Clinical Medicine (A Textbook of Clinical Methods and Laboratory Investigations), 4th edition, Jaypee Brothers Medical publishers, Chennai, Tamil Nadu.
5. Seyed Mohammad Nabavi, Grazia D'Onofrio and Seyed Fazel Nabavi. 2020. Nutrients and Nutraceuticals for Active & Healthy Ageing, 1st edition, Springer Publishers, New York, USA.

REFERENCE BOOK(S)

1. Carl A. Burtis, Edward. Ashwood and David E. Bruns. 2011. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th edition, Saunders Publishers, United States.
2. Kaplan A, Jack KE, Opheim B, Toivola B and Lyon AW. 1995. Clinical Chemistry Interpretation and techniques, 4th edition, Williams and Wilkins Publishers, United States.
3. Simon Langley-Evans. 2015. Nutrition, health and disease: A lifespan approach, 2nd edition, John Wiley & Sons Publishers, New Jersey, United States.
4. Vibha Rani, Umesh and Yadav. 2018. Functional Food and Human Health, 1st edition, Springer Publishers, New York, USA.
5. William S. Hoffman. 1964. The Biochemistry of Clinical Medicine, 3rd edition, Year Book Medical Publishers, Chennai, Tamil Nadu.

E RESOURCES

1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_stude
2. https://www.researchgate.net/publication/327247966_Chapter-06_Carbohydrates-III_Regulation_of_Blood_Glucose_Diabetes_Mellitus
3. https://www.slideshare.net/amitverma1612147/lipoprotein-disorders
4. http://www.student.oulu.fi/~taneliha/Harpers_Illustrated_Biochemistry(29th_Edition).pdf
5. https://www.slideshare.net/ImranIqbal7/metabolic-disorders-2019
6. https://www.slideshare.net/veerundh/veerendhar-nadh-38767743
7. http://103.4.234.46/books/Lippincotts%20Illustrated%20Reviews%20Biochemistry%205th%20edition.p
8. https://ia801901.us.archive.org/26/items/KSembulingamEssentialsOfMedicalPhysiology6thEdition/K%20Sembulingam%20-20Essentials%20of%20Medical%20Physiology%2C%206th% 20Edition.pdf
9. https://www.pdfdrive.com/biochemistry-books.html
10. https://drive.google.com/file/d/10C4EYN0Sv2LPI9ZzhoV-
11. https://drive.google.com/file/d/1UyLEp6iXyKrqXuVwh-

12. https://drive.google.com/file/d/1tghNWPyuqPiqK1Rl11ZzUrFwcoMiuoMa/
13. https://pharmacologyonline.silae.it/files/newsletter/2009/vol3/44.Jagdish.pdf
14. https://www.slideshare.net/MiamiDadePA/1-introduction-to-oncology

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Semester: IV-NME-II: Health and Management

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To study the basic principles and practices of hospital management.
- To enable the students to understand the health facilities and health care services and structures in hospital industry.
- To impart knowledge on various health insurance policies in health care applicable to patients in hospital industry.

Unit –I: Introduction to Hospital management (05 Hours)

Introduction to Hospital management: Eligibility and personal skills required for Hospital management. Job opportunities in Hospital management. Important hospital management Institutes in India and around the World. Role of Hospital -Levels of care -Health care, delivery system and Hospital -Changing roles of Hospital.

Unit –II: Hospital management system (06 Hours)

Hospital management system: Benefits and Modules of Hospital management systems. Interfacing of analyzer. Pathology lab management. Radiology, Blood Bank, Pharmacology, management softwares. The operating suite: equipment of operating room-housekeeping of operating suite sterilizers-making and sterilizing dressings and linen supplies

Unit-III: Health Care Services (07 Hours)

Health Care Services: Health and Hospitals Services, Classification and Characteristics of Service Organizations, , Healthcare Revolution, Dimensions of Health, Indicators of Health- Composition of Health Sector, Types of Care, Pyramidal Structure of Health Services, Hospitals, Types of Hospitals and Role of Hospital in Healthcare

Unit-IV: Health care Facilities (06 Hours)

Health care Facilities: Functioning of modern hospitals & changing need of patients Hospitality in Hospital Care, Invasive and non-invasive diagnostic facilities in modern hospital Care offered in Specialty and Super specialty Hospitals. Non-Medical Services & Facilities –Stores –Catering -Records Room -Maintenance Services: Laundry, Mortuary

Unit-V: Health and Management (06 Hours)

Health and Management: Current Issues in Healthcare Accreditation-Tele medicine-Health Tourism-Health Insurance and Managed Care-Disaster Management-Hospital Wastes Management. Health Insurance in Private Health Sector Health Insurance in

developing and developed countries. Different Health Insurance Policies-analysis and management.

Total Lecture Hours- 30

COURSE OUTCOME

The students will be able to,

1. The students understand hospital management skills and health care delivery system
2. Learn the key concepts of health insurance, and display analytical skills through understanding rules, regulations and legislations in hospital context.
3. Acquire technical skills through gaining exposure to hospital house-keeping standards and design.
4. Understand the meaning of various terms pertaining to health and hygiene and practice personal hygiene.
5. Know about hospital management system, health care facilities and health care services

TEXT BOOK(S)

1. Aswathappa K., 2012, Organisational Behaviour, Tenth Edition, Himalaya Publishing House, New Delhi.
2. Gupta S And Kant S.,Hospital And Health Care Administration: Appraisal And Referral Treatise.Jaypee, New Delhi 1998
3. Luthans, F., 2014 Organisational Behaviour –An Evidence Based Approach, Twelfth Edition, Tata McGraw Hill. New Delhi.
4. Park k, 2005. Text book of preventive and social medicine. BanarsidasBhanot publishers:Jabalpur. 18th edition.
5. Prasad, L.M., 2014, Organisational Behaviour, Fifth Edition, Sultan &Chand, New Delhi.

REFERENCE BOOK(S)

1. John V. Basmajian and Charles E. Slonecker. 1989. Grant's Method of Anatomy: A Clinical Problem-solving Approach, BI Waverly Pvt. Ltd., New Delhi.
2. Watson and Roger. 2013. Anatomy and Physiology for Nurses.
3. Monica, J.E. Park and K. Park. 2011. Textbook of Preventive and Social Medicine, M/S Banarsidas Bhanot Elaine La Management in Health Care, Macmillan Press Ltd, London.
4. Sakharkar, B.M. 2009. Principles of Hospital Administration and Planning, Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
5. Francis, C.M. 2004. Hospital Administration, Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.

E RESOURCES

1. https://www.kobo.com/us/en/ebook/principles-of-hospital-administration-and-management
2. https://www.springer.com/gp/book/9783662496589
3. https://www.academia.edu/38166165/Healthcare_and_Hospital_Management_Edited_book_Excel
4. https://www.jaypeedigital.com/book/9789350907337/chapter/ch20

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