



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN

[Autonomous]

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Elayampalayam - 637 205. Tiruchengode, Namakkal Dt., Tamil Nadu

VIVEKANANDHA
EDUCATIONAL INSTITUTIONS

1.1 Curriculum Design and Development

1.1.2

SYLLABUS REVISION

B.Sc., BIOCHEMISTRY

2017-18

PG AND RESEARCH DEPARTMENT
OF BIOCHEMISTRY

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF BIOCHEMISTRY
CBCS SYLLABUS - UG
(For candidates admitted from 2017-2018 onwards)

Sem	Subject code	Part	Course	Subjects	Hrs/week	Credit	Int. marks	Ext. mark	Tot. mark
I	17U1LT01	I	Language-I	Tamil-I	4	3	25	75	100
	17U1LH01			Hindi-I					
	17U1LM01			Malayalam-I					
	17U1LE01	II	English-I	Foundation English I	4	3	25	75	100
	17U1BCC01	III	Core-I	Chemistry of Biomolecules	5	5	25	75	100
	17U1BCCP01			Major Practical-I	5	3	40	60	100
	17U1CHA01	III	Allied-I	Allied chemistry I	4	4	25	75	100
				Allied Chemistry Practical I	4	3	-	-	-
17U1VE01	-	-	Value education (Yoga)	2	2	25	75	100	
			Lib and Sports	2	0				
			Total	30	23	165	435	600	
II	17U2LT02	I	Language-II	Tamil-II	4	3	25	75	100
	17U2LH02			Hindi-II					
	17U2LM02			Malayalam-II					
	17U2LE02	II	English-II	Foundation English-II	4	3	25	75	100
	17U2BCC02	III	Core-II	Major- Biochemical Techniques	5	5	25	75	100
	17U2BCCP02			Major Practical-II	5	3	40	60	100
	17U2CHA02	III	Allied-II	Allied Chemistry II	4	4	25	75	100
	17U2CHAP01			Allied Chemistry Practical II	4	3	40	60	100
17U2VES01	IV	-	Environmental studies	4	4	25	75	100	
			Lib and Sports	2	0				
			Total	30	23	205	495	700	
III	17U3LT03	I	Language -III	Tamil-III	4	3	25	75	100
	17U3LH03			Hindi-III					
	17U3LM03			Malayalam-III					
	17U3LE03	II	English-III	Foundation English-III	4	3	25	75	100
	17U3BCC03	III	Core-III	Enzymes and Enzyme Technology	4	4	25	75	100
	17U3BCCP03			Major Practical-III	5	3	40	60	100
	17U3MBP03	III	Allied-III	Allied Microbiology	4	4	25	75	100
	17U3UMB03			Allied Microbiology Practical	4	3	40	60	100
			Lib and Sports	2	0				
17U3BCS01	IV	SBEC-I	Biostatistics	2	2	25	75	100	
			Total	30	23	205	495	700	
IV	17U4LT04	I	Language-IV	Tamil-IV	4	3	25	75	100
	17U4LH04			Hindi-IV					
	17U4LM04			Malayalam-IV					
	17U4LE04	II	English-IV	Foundation English-IV	4	3	25	75	100
	17U4BCC04	III	Core-IV	Major-Intermediary Metabolism	4	4	25	75	100
17U4BCCP04	Major Practical-IV			5	3	40	60	100	

	17U4BTA04	III	Allied-IV	Allied Biotechnology	4	4	25	75	100
	17U4BTAP03			Allied Biotechnology lab	4	3	40	60	100
	17U4BCS02	IV	SBEC-II	Plant Biochemistry	2	2	25	75	100
			Lib&Sports		2	0			
				Total	30	23	205	495	700
V	17U5BCC05	III	Core-V	Human Physiology	5	5	25	75	100
	17U5BCC06	III	Core-VI	Molecular Biology	5	5	25	75	100
	17U5BCCP05	III	Core-V Practical	Major Practical-V	5	3	40	60	100
	17U5BCCP06	III	Core-VI Practical	Major Practical-VI	5	3	40	60	100
	17U5BCE01 17U5BCE02	III	Elective-I	1. Drug Biochemistry 2. Nutritional Biochemistry	4	3	25	75	100
	17U5BCN01 17U5BCN02	III	NMEC I	1. Health and Hygiene 2. Biochemistry in Diagnosis	2	2	25	75	100
	17U5BCS03	IV	SBEC-III	Genetic Engineering	2	2	25	75	100
			Lib and Sports	1	0				
	17U5EX01	-	-	Extension Work	1	1	-	-	-
				Total	30	24	245	555	800
VI	17U6BCC07	III	Core-VII	Immunology and Immunotechniques	5	5	25	75	100
	17U6BCC08	III	Core-VIII	Clinical Biochemistry	5	5	25	75	100
	17U6BCCP07	III	Core-VII Practical	Major Practical-VII	5	3	40	60	100
	17U6BCCP08	III	Core-VIII Practical	Major Practical-VIII	5	3	40	60	100
	17U6BCE03 17U6BCE04	III	Elective-II	1. Biochemistry of Hormones 2. Cell Biology	4	3	25	75	100
	17U6BCN03 17U6BCN04	III	NMEC II	1. Biochemistry and Health 2. Molecular basis of human disease	2	2	25	75	100
	17U6BCS04	IV	SBEC-IV	Biochemistry in diagnostic medicine	2	2	25	75	100
				Lib and Sports	1	0			
	17U6BCPR1	III	-	Mini Project	1	1	40	60	100
				Total	30	24	205	495	700
Overall Total					180	140	1230	2940	4200

NO DELETION

Semester: I
Paper Code: 14U1BCC01
Credit : 05

Core Paper : I
Total Number of Hours : 75
5Hours/ Week

BIOMOLECULES

Objective:

On successful completion of the course the students should have understood the significance of the complex bio-molecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.

Unit I: (15 Hours)

Carbohydrates - Definition, Classification, Monosaccharides –Structure and biological importance (glucose, fructose, mannose, galactose and pentoses- ribose and deoxy ribose), Chemical reactions. Stereoisomer's, Optical activity, Mutarotation,. Disaccharides – Structure and biological importance of Sucrose, lactose, maltose and cellobiose. Homopolysaccharides- structure of starch and glycogen. Heteropolysaccharides-structure and function of hyaluronic acid.

Unit II: (15 Hours)

Lipids - Definition, classification of lipids, simple, compound and derived. Simple lipids-Physical and chemical properties of fats. Characterisation of fat – Saponification number, acid number, Iodine number and RM number. Compound lipids-Structure and function of phospholipids, glycolipids and lipoproteins. Derived lipids-Fatty acids-saturated and unsaturated. Essential fatty acids. Steroids-Structure of cholesterol.

Unit III: (15 Hours)

Amino acids and Proteins – Amino acids-classification, structure and properties. Protein classifications (based on solubility and composition, function) and properties. Primary, secondary (excluding Ramachandran plot), tertiary and quaternary structure of Proteins.

Unit IV: (15 Hours)

Nucleic acids – Introduction,Composition - Structure of Purines and Pyrimidines - Nucleotides and Nucleosides. DNA - Double helix,DNA denaturation and renaturation and types . RNA – Types(mRNA,tRNA,rRNA and hnRNA) .

Unit V: (15 Hours)

Vitamins - Definition, Classification. Fat soluble vitamins(A,D,E,K) – Sources, Structure and Physiological functions & Deficiency states. Water soluble vitamins (B&C) - Sources, Structure, deficiency and Physiological functions.

TEXT BOOKS:

- Jain, J.L.(2007) **Fundamentals of Biochemistry**. 3rd Revised Edition. S.Chand and Co Ltd, NewDelhi.
- Bery, J.M. Tymoezko, J.L. and Stryer, L. (2008) **Biochemistry**. 6th Edition, W.H. Freeman and Company, New York.
- Satyanarayana, U. (2002). **Biochemistry**. 2nd Edition. Books and Allied (P) Ltd.
- Voet, D. and Voet, G. (2008), **Fundamentals of Biochemistry** – Life at the Molecular level,

2nd Edition, John Wiley & Sons. Inc., New York.

5. Zubay, G. (1999), **Biochemistry**. 4th Edition, WCB. McGraw-Hill, New York.

REFERENCE BOOKS:

1. Nelson, D.L. and Cox, M. M. (2008). **Lehninger's Principles of Biochemistry**. 6th Edition. Freeman Publishers. New York.
2. Stryer, L. and Hall, J.E. (2009). **Biochemistry**: Library of Congress Cataloguing-in Publication Data, Bery, Jeremy Mark.
3. Robert Murray, Bender, (2012) **Harper's Illustrated Biochemistry**. 29th Edition, McGraw Hill.


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TAMILNADU.

YEAR I – SEMESTER I
CHEMISTRY OF BIOMOLECULES

Paper	: Core I	Total Hours	: 60
Hours/Week	: 5	Exam Hours	: 03
Credit	: 5	Internal	: 25
Paper Code	: 17U1BCC01	External	: 75

Aim:

To understand the structure, functions and behavioral properties of biomolecules.

Objective:

The objective of the paper is to make the students to understand the structure, properties and functions of the biomolecules like carbohydrates, lipids, proteins, nucleic acids, vitamins and minerals.

OUTCOME:

Students completing this course will be able to describe the basic structure, properties and functions of the biomolecules like carbohydrates, lipids, proteins, nucleic acids, vitamins and minerals.

CONTENT:

Unit I – (15 Hrs.): Carbohydrates – Occurrence, Definition and Classification of Carbohydrates. Monosaccharides –Structure of aldose and ketoses, stereo isomerism and optical isomerism of sugars, anomers, epimers, **enantiomers and mutarotation of sugars**. Monosaccharide: linear and cyclic structure of glucose, fructose, galactose, mannose and ribose. Functions and properties Disaccharides – Occurrence, Structure, chemistry and functions of sucrose, lactose, and maltose Homopolysaccharides- structure of starch, glycogen and cellulose. Heteropolysaccharides-structure and function of hyaluronic acid and heparin

5 %

Unit II – (15 Hrs.): Lipids - Definition, classification and function of lipids, simple, compound and derived lipids with examples. Simple lipids- classification, nomenclatures, structures of fatty acids, Physical and chemical properties of fatty acids – Saponification number, acid number, Iodine number and **RM number and their applications**. Compound lipids-Structure and function of phospholipids, glycolipids and lipoproteins. Steroids-Structure and functions of cholesterol.

5 %

Unit III – (15 Hrs.): Amino acids and Proteins – Amino acids-Definition, classification based on charge and polarity, structure and properties: stereo and optical isomerism, zwitter ions in aqueous solution, General reactions of amino acids based on carboxyl group, amino group and both carboxyl and amino group. Essential and nonessential and semi essential amino acids.

Peptides: Definition, function and examples (glutathione, oxytocin and vasopressin)

Protein: classifications based on shape, solubility and composition and function.

Protein Architecture: Primary, Secondary(excluding Ramachandran plot), tertiary and quaternary structure of Proteins.

10%

Unit IV – (15 Hrs.): Nucleic acids – Introduction,Composition - Structure of Purines and Pyrimidines- Nucleotides and Nucleosides.

DNA - Double helix –Watson and Crick model, A, B and Z forms of DNA. RNA – Types (mRNA,tRNA,rRNA and hnRNA) .

Unit V – (15 Hrs.): Vitamins and Minerals - Definition, Classification of Fat soluble vitamins(A,D,E,K) and Water soluble vitamins (B complex vitamins & Vitamin C) - Sources, Chemical nature (without structure), functions and deficiency symptoms.

Minerals: Requirements, macro and micro minerals (source and functions).

5 %

TEXT BOOKS:

1. Jain, J.L. 2007. **Fundamentals of Biochemistry**. 3rd Revised Edition. S.Chandand Co Ltd, NewDelhi.
2. Satyanarayana, U. (2002). **Biochemistry**.2nd Edition.Books and Allied (P) Ltd.
3. Voet, D. and Voet, G. (2008), **Fundamentals of Biochemistry** – Life at the Molecular level, 2nd Edition, John wiley& Sons. Inc., Newyork.
4. Zubay, G. (1999), **Biochemistry**. 4thEdition, WCB. Mcgraw-Hill, New York.

REFERENCE BOOKS:

1. Nelson,D.L. and Cox,M. M. (2008). **Lehninger’s Principles of Biochemistry**. 6th Edition. Freeman Publishers. New York.
2. Stryer,L. and Hall, J.E. (2009). **Biochemistry**: Library of Congress Cataloguing-in Publication Data, Bery, Jeremy Mark.
- 3.Robert Murray, Bender,(2012)**Harper’s Illustrated Biochemistry**.29th Edition, McGraw Hill.

WEB SOURCES

<http://ull.chemistry.uakron.edu/genobc/>.

<http://www.biology.arizona.edu/biochemistry/biochemistry.html> .

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 TAMILNADU.

NO DELETION

Semester : I
 Paper Code: 14U1BCCP01
 Credit : 04

Core Practical : I
 Total Number of Hours : 45
 3Hours/ Week

**SEMESTER I
 CORE - BIOCHEMISTRY PRACTICAL – I**

I.Preparation of solution

- 1.Normal, Molar, Percentage solution and calculation

II. QUALITATIVE AND QUANTITATIVE ANALYSIS

A.QUALITATIVE ANALYSIS

1. ANALYSIS OF SUGARS

- a) Monosaccharides-Glucose, Fructose, Galactose, Pentose.
- b) Disaccharides-Sucrose, Maltose and Lactose.
- c) Polysaccharides-Starch

2. ANALYSIS OF AMINO ACIDS

- a) Histidine b) Tyrosine c) Tryptophan
- d) Methionine e) Cysteine f) Arginine

REFERENCE BOOKS:

1. Jayaraman ,S.(2003). **Laboratory Manual in Biochemistry**. New Age International (P) Limited. New Delhi.
2. Sadasivam, S. and .Manickam, P. (2004). **Biochemical Methods**. 2nd Edition, New Age International (P) Limited, New Delhi.

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ADDITION

YEAR I – SEMESTER I
CORE - BIOCHEMISTRY PRACTICAL – I

Paper	: Core Practical I	Total Hours	: 75
Hours/Week	: 5	Exam Hours	: 03
Credit	: 3	Internal	: 40
Paper Code	: 17U1BCCP01	External	: 60

I. Preparation of Solution

1. Normal, Molar, Percentage solution and calculation

II. QUALITATIVE ANALYSIS**A. ANALYSIS OF SUGARS**

- a) Monosaccharides-Glucose, Fructose, Galactose, Pentose.
- b) Disaccharides-Sucrose, Maltose and Lactose.
- c) Polysaccharides-Starch

II. QUALITATIVE ANALYSIS OF AMINO ACIDS

- a) Histidine b) Tyrosine c) Tryptophan
- d) Methionine e) Cysteine f) Arginine

25 %

III. ANALYSIS OF LIPIDS

- a) Oil, Unsaturated fat, Sterol

REFERENCE BOOKS:

1. Biochemical Methods 1992, by **S.Sadasivam and A. Manickam**, Second Edition, New Age International Publishers, New Delhi.
2. Laboratory Manual in Biochemistry, 1981. **J.Jayaraman**, New Age International publishers, New Delhi.

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NO DELETION

Semester: II
Paper Code: 14U2BCC02
Credit : 05

Core Paper : II
Total Number of Hours : 75
5Hours/ Week

ENZYMES

Objectives:

On successful completion of the course the students will acquire knowledge about Techniques of isolation & purification of the enzymes. Kinetics of the enzymes Enzymes that are used in medicine and industry.

Unit I: (15 Hours)

Enzymes – Introduction, IUB Classification and nomenclature, properties, enzyme units and enzyme specificity. Definition – co-enzymes, holoenzymes, apo enzymes, co-factors, prosthetic group (definition only). Definition of metalloenzymes and metal activated enzyme

Unit II: (15 Hours)

Active site - Characteristics, theories of ES complex–Lock and key, induced fit theory. Monomeric enzymes, Oligomeric enzymes- definition with examples.

Enzyme kinetics – Activation Energy, Derivation of Michaelis - Menton equation. Linear modification of Line – Weaver and Burk plot, Eadie – Hofstee plot. Significance of Km. Factors affecting the enzyme activity - pH, temp, enzyme and substrate concentration,

Unit III : (15 Hours)

Co-Enzymes: Definition, Structure and functions of TPP, NAD, NADP, FAD, FMN, Coenzyme A, Multienzyme Complex: Pyruvate dehydrogenase complex. Mechanism of enzyme action: General acid base catalysis, covalent catalysis, Proximity orientation. Mechanism of action of Lysozyme and chymotrypsin.

Unit IV: (15 Hours)

Enzyme inhibition – Reversible inhibition, Competitive, Non competitive & Uncompetitive inhibition. Irreversible inhibition, Feedback inhibition. Allosteric enzymes- properties, and models, Mechanism of action of Aspartate transcarbamylase. Covalent modification.

Unit V: (15 Hours)

Enzyme Technology - Immobilized enzymes: Types and techniques of immobilization. Application of immobilized enzymes. Industrial Production of enzymes: Amylase, Proteases, Pectinases. Industrial uses of enzymes and Therapeutic uses of Enzymes..


TEXT BOOKS

- Nicholas., C. Price , (1998). **Fundamentals of Enzymology**. 2nd Edition, Oxford University Press.
- Trevor Palmer, (2004). **Enzymes**. 5th Edition, Affiliated East –West press (P) Ltd.
- Gary Walsh, Denis, and Headon, (2002). **Protein Biochemistry and Biotechnology**. John

Wiley and Sons Ltd, USA.

REFERENCES BOOKS

1. Dixon ,E.C webb , (1979). **Enzymes**. 3rd Edition, CJR thorne and K.F.Tipton, Longmans Green & Co , London and Academic Press, New York.
2. Ashok Pandey, Colin webb, Carlos Ricardo Soccol, Christian., (2005). **Enzyme technology**, Asiatech Publishers, Inc., Delhi.
3. Chapline ,M.F Bucke,C (1990). **Enzyme Technology**. 1st Edition, Cambridge University Press. New York.
4. Chapline, Bucke,C (1990). **Protein Biotechnology**. 1st Edition, Cambridge University Press, New York.


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ADDITION

YEAR II – SEMESTER III

ENZYMES AND ENZYME TECHNOLOGY

Paper	: Core III	Total Hours	: 60
Hours/Week	: 4	Exam Hours	: 03
Credit	: 4	Internal	: 25
Paper Code	: 17U3BCC03	External	: 75

Aim: To inculcate knowledge on enzymes, classification, structure kinetics and applications.

Objectives: On successful completion of the course the students will acquire knowledge about Techniques of isolation & purification of the enzymes. Enzyme Kinetics Enzymes that are used in medicine and industry.

OUTCOME: Students completing this course will possess knowledge on enzyme. Students learned knowledge about Techniques of isolation & purification of the enzymes. Enzyme Kinetics and Enzymes that are used in medicine and industry.

Unit I (12 Hours): Enzymes– Introduction, Nomenclature and Classification of enzymes. Holoenzyme, apoenzymes, prosthetic group, metalloenzymes and metal activated enzymes, abzymes, ribozymes, enzyme specificity and enzyme units. Co-enzymes, co-factors (Definition only)

Active site– Definition, theories of ES complex–Lock and key, induced fit theory.

5 %

Unit II(12 Hours) Enzyme kinetics – Order of reaction, Activation Energy, Derivation of Michalis – Menton equation, Line – Weaver and Burk plot, Eadie – Hofstee plot. Significance of Km and Vmax. Factors affecting the enzyme activity - pH, temp, enzyme and substrate concentration, inhibitors and activators.

5 %

Unit III (12 Hours) Enzyme inhibition – Reversible inhibition, Competitive, Non competitive & Uncompetitive inhibition. Irreversible inhibition, Feedback inhibition and covalent modification - Allosteric enzymes- properties, and models, Mechanism of action of Aspartate transcarbamylase. Covalent modification. Isoenzymes : Lactate dehydrogenase.

Unit IV (12 Hours) Co-Enzymes: Definition, Structure and functions of TPP, NAD, NADP, FAD, FMN, Coenzyme A, Multienzyme Complex: Pyruvate dehydrogenase complex. Mechanism of

enzyme action: General acid base catalysis, covalent catalysis, Proximity orientation. Mechanism of action of Lysozyme and chymotrypsin.

Unit V (12 Hours) Enzyme Technology-Immobilized Enzymes: Types and techniques of immobilization. Application of immobilized enzymes in Industry, food and health, Clinical application of enzymes Isolation and purification of enzymes (Affinity Chromatography)

TEXT BOOKS


1. Nicholas., C. Price, (1998). **Fundamentals of Enzymology**. 2nd Edition, Oxford University Press.
2. Trevor Palmer, (2004). **Enzymes**. 5th Edition, Affiliated East –West press (P) Ltd.
3. Gary Walsh, Denis, and Headon, (2002). **Protein Biochemistry and Biotechnology**. John Wiley and Sons Ltd, USA.

REFERENCES BOOKS

1. Dixon, E.Cwebb, (1979). **Enzymes**. 3rd Edition, C.J.R. Thorne and K.F. Tipton, Longmans Green & Co, London and Academic Press, New York.
2. Ashok Pandey, Colin Webb, Carlos Ricardo Soccol, Christian, (2005). **Enzyme technology**, Asiatech Publishers, Inc., Delhi.
3. Chapline, M.F. Bucke, C. (1990). **Enzyme Technology**. 1st Edition, Cambridge University Press. New York.

WEB SOURCES

- www.ebi.ac.uk/enzymeportal
- <http://expasy.org/enzyme/>.
- <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>.
- www1.lsbu.ac.uk/water/enztech/inhibition.html


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NO DELETION

Semester: IV
Paper Code: 14U4BCC04
Credit : 05

Core Paper : IV
Total Number of Hours : 75
5Hours/ Week

INTERMEDIARY METABOLISM

Objectives: Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body. Interrelationship between carbohydrate, fat and protein metabolism. Role of purine and pyrimidines in nucleic acid metabolism.

UNIT – I

(12 Hours)

Biological oxidation: Introduction, Enzymes in biological oxidation, Redox potential, Electron Transport Chain & its inhibitors, structure of ATPase complex, chemiosmotic theory, Oxidative phosphorylation & its inhibitors, Mitochondrial shuttle system.

UNIT – II

(13 Hours)

Carbohydrate Metabolism: Introduction, glycolysis, TCA cycle, and its energetics. Glycogen metabolism: Glycogenesis & Glycogenolysis, Alternative pathways: HMP pathway, gluconeogenesis, glyoxylate cycle and its importance.

UNIT – III

(12 Hours)

Lipid Metabolism: Introduction, Oxidation of fatty acids (alpha, beta, omega oxidation). Denovo synthesis of Fatty acid, Biosynthesis of cholesterol, Biosynthesis of TG, Phospho lipids (Phosphatidyl serine, Phosphatidyl ethanolamine), Metabolism of ketone bodies.

UNIT – IV

(13 Hours)

Protein Metabolism: Degradation of proteins – Deamination, Transamination & Decarboxylation. Transport of ammonia. Urea cycle. Catabolism of carbon skeleton of amino acids (Alpha Keto Glutarate, Pyruvate, Aromatic amino acids) . Interrelation between carbohydrates, fat and protein metabolism.

UNIT-V

(10 Hours)

Nucleic acid Metabolism: Introduction, Biosynthesis & degradation of purine and pyrimidine nucleotides, inhibitors of nucleic acid metabolism.

TEXT BOOKS


1. Nelson, David, L. and Cox, (2008). **Lehninger Principles of Biochemistry**. 5th Edition, W.H. Freeman and Co., New York.
2. Donald Voet, Judith, G. Voet, and Charlotte, W Pratt, (2008). **Fundamentals of Biochemistry**, 3rd Edition. John Wiley & Sons, New Jersey.
3. Eric, E. Conn, P.K. Stumpf, G. Brueins, and Ray, H. Doi, (2005). **Outlines of Biochemistry**. 5th Edition, John Wiley and sons, Singapore.
4. Lubert Stryer, (1995). **Biochemistry**. 4th Edition .WH freeman and co, Sanfrancisco.
5. Thomas, M. Devlin, (1997). **Text book of Biochemistry**. 4th Edition A John Wiley, Inc Publication, New York.
6. Zubay G L, (1988). **Biochemistry**. 4th Edition . W M C Brown Publishers, USA.

REFERENCE BOOKS

1. Devlin, T.M.(2002) **Textbook of Biochemistry with Clinical Correlations**. John Wiley and sons, INC. New York.
2. Bowsher, C, Steer, M. and Tobin, A (2008). **Plant Biochemistry**. Garland Science, Taylor and Francis Group, LLC. New York.
3. Robert Murray, Bender, (2012) Harper's **Illustrated Biochemistry**. McGraw Hill.

WEB REFERENCES

1. www.britannica.com/science/glyoxylate-cycle
2. <https://www.uic.edu/classes/phar/.../transaminationofaminoacid.htm>
3. www.slideshare.net/YESANNA/transamination-deamination
4. <http://krebbling.blogspot.in/2006/12/glyoxylate-cycle.html>
5. www.chem4kids.com/files/bio_nucleicacids.html


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**YEAR II – SEMESTER IV
INTERMEDIARY METABOLISM**

Paper	: Core IV	Total Hours	: 60
Hours/Week	: 5	Exam Hours	: 03
Credit	: 5	Internal	: 25
Paper Code	: 17U4BCC04	External	: 75

AIM: To make the students understand Intermediary metabolism: principles of bioenergetics, catabolism and anabolism, the metabolic pathway. Central metabolic pathways: glycolysis, citric acid cycle, the pentose phosphate pathway, gluconeogenesis. Energy stores: glycogen and fatty acids.. Integration of metabolic pathways.

OBJECTIVES: The aim is targeted with objectives of providing information related to carbohydrate, fat and protein metabolism that takes place in our body. Interrelationship between carbohydrate, fat and protein metabolism. Role of purine and pyrimidines in nucleic acid metabolism. Various disorders related to each metabolism.

OUTCOME: As the students complete the course they can able to learn about carbohydrate, fat and protein metabolism that takes place in our body and Interrelationship between carbohydrate, fat and protein metabolism,

UNIT – I (15 Hours) Carbohydrate Metabolism: Introduction, glycolysis, TCA cycle, and its energetics. Glycogen metabolism: Glycogenesis & Glycogenolysis, Alternative pathways: HMP pathway, gluconeogenesis, glyoxylate cycle and its importance.

20 %

UNIT – II (15 Hours) Lipid Metabolism: Introduction, Oxidation of fatty acids (alpha, beta, omega oxidation). Denovo synthesis of Fatty acid, Biosynthesis of cholesterol, Biosynthesis of TG, Phospho lipids (Phosphatidyl serine, Phosphatidyl ethanolamine), Ketone bodies and its metabolism

UNIT –III(15 Hours) Protein Metabolism: Degradation of proteins – Deamination, Transamination & Decarboxylation. Transport of ammonia. Urea cycle. Catabolism of carbon skeleton of aminoacids (Alpha Keto Glutarate, Pyruvate, Aromatic aminoacids) . Interrelation between carbohydrates, fat and protein metabolism.

UNIT – IV(15 Hours) Biological oxidation: Introduction, Enzymes in biological oxidation, Redox potential, Electron Transport Chain & its inhibitors, structure of ATPase complex, chemiosmotic theory, Oxidative phosphorylation & its inhibitors, Mitochondrial shuttle system.

20 %

UNIT-V (15 Hours) Purine Nucleotide Metabolism: Introduction, Biosynthesis(Denovo) Salvage

Pathway & degradation of purine Nucleotide.

Pyrimidine nucleotides Metabolism: Introduction, Biosynthesis & degradation of pyrimidine. Inhibitors of nucleic acid metabolism.

TEXT BOOKS

1. Nelson, David, L. and Cox, (2008). **Lehninger Principles of Biochemistry**. 5th Edition, W.H.Freeman and Co., New York.
2. Donald Voet, Judith, G. Voet, and Charlotte, W Pratt, (2008). **Fundamentals of Biochemistry**, 3rd Edition. John Wiley & Sons, New Jersey.
3. Eric, E. Conn, P.K. Stumpf, G. Brueins, and Ray, H. Doi, (2005). **Outlines of Biochemistry**. 5th Edition, John Wiley and sons, Singapore.
4. Lubert Stryer, (1995). **Biochemistry**. 4th Edition .WH freeman and co, Sanfrancisco.
5. Thomas, M. Devlin, (1997). **Text book of Biochemistry**. 4th Edition A John Wiley, Inc Publication, New York.
6. Zubay G L, (1988). **Biochemistry**. 4th Edition . W M C Brown Publishers, USA.

REFERENCE BOOKS

1. Devlin, T.M.(2002) **Textbook of Biochemistry with Clinical Correlations**. John Wiley and sons, INC. New York.
2. Bowsher, C, Steer, M. and Tobin, A (2008). **Plant Biochemistry**. Garland Science, Taylor and Francis Group, LLC. New York.
3. Robert Murray, Bender, (2012) Harper's **Illustrated Biochemistry**. McGraw Hill.

WEB SOURCES

- www.britannica.com/science/glyoxylate-cycle
- <https://www.uic.edu/classes/phar/.../transaminationofaminoacid.htm>
- www.slideshare.net/YESANNA/transamination-deamination

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NO DELETION

YEAR II – SEMESTER IV
CORE - BIOCHEMISTRY PRACTICAL – IV

Paper	: Core Practical IV	Total Hours	: 75
Hours/Week	: 5	Exam Hours	: 03
Credit	: 3	Internal	: 40
Paper Code	: 14U4BCCP04	External	: 60

I. COLORIMETRY

- | | | |
|------------------------------|---|------------------------|
| 1. Estimation of Glucose | - | Ortho Toludine Method |
| 2. Estimation of Fructose | - | Seliwanoff's Method |
| 3. Estimation of Pentose | - | Bial's Method |
| 4. Estimation of Cholesterol | - | Zaks Method |
| 5. Estimation of Protein | - | Biuret Method |
| 6. Estimation of Phosphorus | - | Fiske Subbarow Method. |

REFERENCES

- Medical Laboratory Technology** - a Procedure Manual for Routine Diagnostic Tests Vol. I (2010), Mukherjee, K.L., Tata Mc Graw–Hill Publishing Company Limited (New Delhi). ISBN: 9780070076594 / ISBN:9780070076631
- Medical Laboratory Technology - a Procedure Manual for Routine Diagnostic Tests Vol.II** (2010), Mukherjee, K.L., Tata Mc Graw – Hill Publishing Company Ltd. (New Delhi), ISBN: 9780070076648.
- Medical Biochemistry** (2005) 2nd ed., Baynes, J.W. and Dominiczak, M.H., Elsevier Mosby Ltd. (Philadelphia), ISBN:0-7234-3341-0.
- Experimental Biochemistry: A Student Companion** (2005) Rao, B.S. and Deshpande, V., IK International Pvt. Ltd. (New Delhi), ISBN: 81-88237-41-8.

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ADDITION

YEAR II – SEMESTER IV
CORE - BIOCHEMISTRY PRACTICAL – IV

Paper	: Core Practical IV	Total Hours	: 75
Hours/Week	: 5	Exam Hours	: 03
Credit	: 3	Internal	: 40
Paper Code	: 17U4BCCP04	External	: 60

I. COLORIMETRY

- | | | | |
|------------------------------|---|------------------------|-------------|
| 1 .Estimation of Glucose | - | Ortho Toludine Method | |
| 2. Estimation of Fructose | - | Seliwanoff's Method | |
| 3. Estimation of Pentose | - | Bial' s Method | |
| 4. Estimation of Urea | - | DAM Method | 15 % |
| 5 .Estimation of Cholesterol | - | Zaks Method | |
| 6. Estimation of Protein | - | Biuret Method | |
| 7 .Estimation of Phosphorus | - | Fiske Subbarow Method. | |

REFERENCES

- 1. Medical Laboratory Technology** - a Procedure Manual for Routine Diagnostic Tests Vol. I (2010), Mukherjee, K.L., Tata Mc Graw–Hill Publishing Company Limited (New Delhi). ISBN: 9780070076594 / ISBN:9780070076631
- 2. Medical Laboratory Technology - a Procedure Manual for Routine Diagnostic Tests Vol.II** (2010), Mukherjee, K.L., Tata Mc Graw – Hill Publishing Company Ltd. (New Delhi), ISBN: 9780070076648.
- 3. Medical Biochemistry** (2005) 2nd ed., Baynes, J.W. and Dominiczak, M.H., Elsevier Mosby Ltd. (Philadelphia), ISBN:0-7234-3341-0.
- 4. Experimental Biochemistry: A Student Companion** (2005) Rao, B.S. and Deshpande, V., IK International Pvt. Ltd. (New Delhi), ISBN: 81-88237-41-8.

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NO DELETION

Semester: V
Paper Code: 14U5BCC05
Credit : 05

Core Paper : V
Total Number of Hours : 60
5Hours/ Week

HUMAN PHYSIOLOGY & NEUROCHEMISTRY

Objective:

On successful completion of the course the students should have: Understood clearly on various alimentary parts of human body. Learnt more specific on the endocrinal activities learnt the mechanisms and actions of vital organs.

Unit I

12 Hours

Digestive System: Secretions of digestive tract, digestion, absorption, assimilation of carbohydrates, proteins, fats, nucleic acids, vitamins and minerals.

Unit II

12 Hours

Blood Composition and function: Red blood cells, Hemoglobin, white blood cells and platelets. Blood composition and function. Tidal volume, Vital Capacity, ERV, IRV.

Respiratory System: Transport and exchange of gases between lungs and tissues, Mechanism of blood coagulation.

Unit III

12 Hour

Cardiac system: Types, functions and physiology of muscle contraction, physiology of cardiac muscle, cardiac cycle and the regulation of heart pumping, ECG and blood pressure.

Unit IV

12 Hour

Urogenetal System : Structure and function of kidney, Nephron, Mechanism of urine formation, outline of structure and function of the male and female reproductive organs, spermatogenesis, menstrual cycle, physiology of pregnancy, parturition and lactation.

Unit V

12 Hour


Nervous System: Classification of nervous system, characteristics of sympathetic and parasympathetic function. Structure of neuron, resting potential and action potential, Propagation of nerve impulses, Structure of synapse, synaptic transmission.

TEXTBOOKS

- A.C. Guyton (1996) **Text book of medical physiology**, 10th Edition.
- Guyton **Text book of human physiology**
- C.Chatterjee **Text book of medicinal chemistry**
- Chatterjee A.C (2004) **Human Physiology**,. Volume I & II. 11th Edition Medical agency allied, Calcutta

REFERENCE

- William. F. Ganong, (2003) **Review of Medical Physiology**, 14th Edition, A Lange Medical book.
- M.M.Muthiah **Text book of biochemistry, Lecture notes on human physiology** Vol II 1991.
- Gerard J Tortora and Bryan derrickson **Principles of anatomy and physiology**, 14 th Edition.
- Gerard J Tortora and Bryan derrickson **Introduction to the human body** 14 th Edition


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ADDITION

YEAR III – SEMESTER V

HUMAN PHYSIOLOGY

Paper	: CORE V	Total Hours	: 60
Hours/Week	: 5	Exam Hours	: 03
Credit	: 5	Internal	: 25
Paper Code	: 17U5BCC05	External	: 75

Aim:

Human physiology deal with the understanding of biological, physiological activities along with the mechanism of action of various organs and its anatomy.

Objective:

On successful completion of the course the students should have: Understood clearly on various alimentary parts of human body. Learnt more specific on the endocrinal activities learnt the mechanisms and actions of vital organs.

Outcomes:

Students can be able to learn about the anatomy, biological, physiological activities along with the mechanism of action of various organs and various alimentary parts of human body.

Unit I**12 Hours**

Digestive System: Secretions of digestive tract, digestion, absorption, assimilation of carbohydrates, proteins, fats.

Unit II**12 Hours**

Blood Composition and function: Red blood cells, Hemoglobin, white blood cells and platelets. Blood composition and function. Tidal volume, Vital Capacity, ERV, IRV.

Respiratory System: Transport and exchange of gases between lungs and tissues, Mechanism of blood coagulation.

Unit III**12 Hour**

Cardiac system: Types, functions and physiology of muscle contraction, physiology of cardiac muscle, cardiac cycle and its regulation, ECG and blood pressure.

Unit IV**12 Hour**

Urogenetal System :Structure and functions of kidney, Nephron, Mechanism of urine formation, outline of structure and function of the male and female reproductive organs, spermatogenesis, menstrual cycle, physiology of pregnancy, parturition and lactation.

Unit V**12 Hour**

Nervous System: Classification of nervous system, characteristics of sympathetic and parasympathetic function. Structure of neuron, action potential, Propagation of nerve impulses, Structure of synapse, synaptic transmission.


TEXT BOOKS

1. Chatterjee, C., *Human Physiology*, Medical Allied Agency Calcutta., 11th edition, (1992).
2. Muthayya.N.M, *Human Physiology*, Jaypee publications, New Delhi, 3rdedi., 2002.
3. Sathyanarayana, U. *Text book of Biochemistry*, Books and Allied Ltd, Kolkatta, 2ndedi., 1999.

4. Willam F. Ganong. Review of medical physiology (2003), 21ST EDITION, The MC Graw-Hill companies, India.

REFERENCE BOOKS

1. **Carola.R. et al**, *Human Anatomy and Physiology*, International edi.
2. **Guyton**, *Text book of Medical Physiology*, W. B. Saunder's Company, 8th edition, (1991).
3. **Murray, R. K., Granner Mayes and Rod Well, Appleton and Lange, Harper's Biochemistry**, 24th edition (1996).
4. **Barbara A. Gyls Mary Elen Wedding**, *Medical Terminology Systems*, Davis plus International. 6th edition. 2008.


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Semester: V
 Paper Code: 14U5BCC06
 Credit : 05

Core Paper : VI
 Total Number of Hours : 60
 5Hours/ Week

BIOCHEMISTRY IN DIAGNOSTIC MEDICINE

Objective:

After the completion of this course the student would have understood. The aim and objective of various clinical laboratory test. The significance of various test and interpretation in diseased conditions.

Unit I

12 Hours

Laboratory Care and Instrumentation: Code of conduct for laboratory personnel - safety measures in the laboratory-chemical/Reagents, labeling, storage and usage. First Aid in laboratory accidents - Precautions and first aid equipments. Reporting laboratory tests and keeping records. General approach to quality control, Internal and External quality control.

Unit II

12 Hours

Blood Banking: Blood grouping- ABO System, ABO Grouping, Rh typing,. Coomb's test, Blood transfusion - Blood donors, donor screening, drawing of blood, compatibility testing, cross matching, blood transfusion complications.

Unit III

12 Hours

Clinical Hematology: Collection of blood - Anticoagulant, preservation, Estimation of Glycosylated haemoglobin, PCV, WBC, RBC, Platelets, ESR. Clotting time, bleeding time - normal value and clinical interpretation.

Unit IV

12 Hours

Urine Analysis: Composition, collection, preservation, gross examination, interfering factors and chemical examination. Significance of sugar, ketone bodies, bile pigments, hematuria, uric acid in urine. Microscopic examination of the urinary sediment and hematuria

Stool Examination: Specimen collection- inspection of faeces- odour, pH, Interfering substance. Test for occult blood, faecal fat, microscopic examination of stool specimen.

Unit V

12 Hours

Body fluids: Cerebrospinal fluid Composition and Analysis. Semen analysis, sputum examination, pregnancy test - Interpretation.


Endocrine function test: Laboratory methods of evaluation of endocrine disorder- Thyroid function test, Clinical disorder- diagnosis of T₄, I¹³¹ uptake, TSH Stimulation test.

TEXTBOOKS

1. Ramnik Sood **Laboratory practices in CMC procedure**, Clinical CMC, Vellore.
2. Sabitri sanyal-(1991), **Text book of pathology**, first edition,
3. June H.cella- (1994), **manual of laboratory test**, AITBS publishers.
4. Kanai L.Mukherjee, **Medical Laboratory Technology** Vol. I.Tata McGrawHill 1996,New Delhi.
5. GradWohl, **Clinical Laboratory-methods and diagnosis**,Vol-I
6. SabitriSanyal, B.I.Churchill **Clinical pathology**, Livingstone(P)Ltd, New Delhi.2000.
7. Judith Ann Lewis, **Illustrated guide to diagnostic tests**-students version,Springhouse Corporation, Pennsylvania, 1994.
8. M.N. Chatterjee and Rane Sinda **Text book of medical Biochemistry**

REFERENCE

1. L. Mukherjee **Medical Laboratory Technology** -Vol. I, II, III. Tata Mcgraw - Hill Publishing Company Limited
2. V.H. Talib **Medical Laboratory Technology**
3. A. John Wiley- Thomas M. Devlin, **Text book of Biochemistry with clinical correlation**, 3rd edition, Liss Inc. Publication
4. Harold Varley, **Practical Clinical Biochemistry**, 4th Edition, CBS Publication and Distributors, New Delhi.
5. Harrison T.R. Fauci, Braunwald, Isselbacher **Principles of Internal Medicine**, Volume I and II 14th Edition, MC-graw hill, Newyork.
6. Tietz **Fundamentals of Clinical Chemistry**- (5th edition) C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co


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ADDITION

YEAR III – SEMESTER V
BIOCHEMISTRY IN DIAGNOSIS

Paper	: NMEC II	Total Hours	: 30
Hours/Week	: 2	Exam Hours	: 03
Credit	: 2	Internal	: 25
Paper Code	: 17U5BCN02	External	: 75

SUBJECT DESCRIPTION:

This course presents about the techniques, diagnostic values and significance and the interpretation of various enzymes, bio-chemical parameters, hormones and immunoglobulins.

GOALS The students will have the knowledge about the basic functions in clinical lab test and their interpretations.

OBJECTIVES

After the completion of this course the student would have understood

- The aim and objective of various clinical laboratory test
- The significance of various test and interpretation in diseased conditions.

UNIT – I**06 Hours**

Approaches to clinical biochemistry: Concepts of accuracy, precision, sensitivity and reproducibility, Collection of clinical specimens, preservatives for blood and urine, transport of biological samples.

UNIT – II**06 Hours**

Hematology: Composition and functions of blood, Haemoglobin, PCV, ESR, RBC count, WBC count, Platelet count, Differential count, ESR and PCV.

UNIT – III**06 Hours**

Physical examination of urine: Volume, colour, odour, appearance, specific gravity and pH. Chemical examination of urine: Qualitative tests for Reducing sugar, protein, ketone bodies, Bile pigment, bile salt, Urobilinogen, and mucin. Microscopic Examination of urine.

UNIT – IV**06 Hours**

Stool examination: Collection of fecal specimen, preservation, physical examination:- volume, colour, odour and appearance. Chemical examination:- reducing sugar, occult blood test, detection of steatorrhea. Microscopic examination of stool.

UNIT – V**06 Hours**


Estimation of Biochemical components in Blood: Glucose, GTT, Glycosylated haemoglobin, protein, cholesterol, urea, Uric acid and Creatinine. Determination of enzyme activity: SGOT, SGPT and LDH.

TEXT BOOK

1. Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
2. Medical Biochemistry by MN Chatterjee, Rana Shinde, 8th edition, 2013, Jaypee publications.
3. Sabitri Sanyal, Clinical pathology, B.I.Churchill Livingstone(P)Ltd, New Delhi.2000.

REFERENCE

1. Kanai L.Mukherjee, Medical Laboratory Technology Vol. I.Tata McGrawHill 1996, New Delhi.
2. Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. John Wiley-Liss Inc. Publication.
3. Tietz Fundamentals of Clinical Chemistry- (5th edition) C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co.


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ADDITION**YEAR III – SEMESTER V****CORE - BIOCHEMISTRY PRACTICAL – V**

Paper	: Core Practical V	Total Hours	: 75
Hours/Week	:5	Exam Hours	: 06
Credit	: 3	Internal	: 40
Paper Code	: 17U5BCCP05	External	: 60

1. Qualitative analysis of secondary phytochemicals in medicinal plants
2. Extraction and confirmation
 - a. Pectin from orange peel
 - b. Caffeine from tea
 - c. Solanine from potato
3. Estimation of total alkaloids
4. Estimation of total flavonoids
5. Estimation of chlorophyll in leaves
6. Determination of Ash content from plant source
7. Determination of H₂O₂ radical scavenging assay.

100 %**REFERENCES**

1. **An Introduction to Practical Biochemistry.** David, T. Plummer, (1988). 3rd Edition. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. **Laboratory Manual in Biochemistry.** Pattabiraman, T.N. (1998). 3rd Edition. All India Publishers and Distributors. Chennai.
3. **Laboratory Manual in Biochemistry.** Jayaraman, S. (2003). 2nd Edition. New Age International (P) Limited. New Delhi
4. **Biochemical Methods.** Sadasivam S and Manickam P. (2004) 2nd Edition. New Age


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ADDITION

YEAR III – SEMESTER V**CORE - BIOCHEMISTRY PRACTICAL – VI**


Paper	: Core Practical VI	Total Hours	: 75
Hours/Week	:5	Exam Hours	: 06
Credit	: 3	Internal	: 40
Paper Code	: 17U5BCCP06	External	: 60

1. Isolation of genomic DNA from bacteria
2. Isolation of genomic DNA from plant
3. Isolation and identification of genomic DNA from animal tissue
4. Isolation of plasmid DNA
5. Restriction enzyme digestion
6. Transformation
7. DNA Ligation
8. SDS-PAGE - Demo

100 %

REFERENCES

1. **An Introduction to Practical Biochemistry.** David, T. Plummer, (1988). 3rd Edition. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. **Laboratory Manual in Biochemistry.** Pattabiraman, T.N. (1998). 3rd Edition. All India Publishers and Distributors. Chennai.
3. **Laboratory Manual in Biochemistry.** Jayaraman, S. (2003). 2nd Edition. New Age International (P) Limited. New Delhi
4. **Biochemical Methods.** Sadasivam S and Manickam P. (2004) 2nd Edition. New Age


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Semester: VI
Paper Code: 14U6BCC09
Credit : 05

Core Paper: IX
Total Number of Hours : 75
5 Hours/ Week

ENDOCRINOLOGY

OBJECTIVE:

On successful completion of the course the students should have: Understood clearly on various alimentary parts of human body. Learnt more specific on the endocrinal activities Learnt the mechanisms and actions of vital organs

UNIT – I

Introduction, classification of hormones. Role of second messengers in hormonal action. Cyclic AMP, Role of G-proteins. Calcium, calmodulin. Mechanism of action of Group I and Group II hormones. Hormones of the hypothalamus Anterior Pituitary hormone(Tropic hormone)- Posterior Pituitary (Oxytocin, Vasopressin)

UNIT – II

Hormones of the thyroid & parathyroid-chemical nature, secretion, function & disorders of thyroid & parathyroid hormones. Calcitriol biosynthesis and functions. Hyper and hypocalcemia. Hyper and hypoparathyroidism, Paget's disease, Ricket's and osteomalacia.

UNIT – III

Pancreatic & G.I. Tract hormones Chemical nature & functions of Insulin, Glucagon. Secretion, release, chemical nature and functions of Gastrin, Enterogastin, Secretin & Cholecystokinin.

UNIT – IV

Hormones of the Adrenal gland – chemical nature & functions of Adrenal medullary & Cortex hormones. Adrenal Corticol hormones- Glucocorticoids, Mineralocorticoids- synthesis and biological effects. Adrenal medullary hormones-Catecholamines: biosynthesis and biological effects.

UNIT – V

Gonadal hormones- Androgens and estrogens. Hormones of the testes and ovaries – chemical nature & functions of Androgens, Estrogens and Progesterone.

TEXT BOOKS

1. Murray, K.R., Granner, K.D., Mayes, P.A. and Rodwell, W.V. (2009) **Harper's Biochemistry**, 28th Ed, Appleton & Lange Stamford, Connecticut.
2. Guyton, A.C. and Hall, J.E (2006), **Textbook of Medical Physiology**, 11th Edition, Saunders Co. Pennsylvania.
3. Donald Voet , Judith G. Voet , Charlott W. Pratt , , **Fundamentals of Biochemistry** upgrade edition John Willey & Sons. Inc,

REFERENCE BOOKS

1. Foye, O.W., Lemke,J.L. and William D.A. (1995), **Medicinal Chemistry**, B.I.Waverly Pvt. Ltd., New Delhi.

2. West, E.S., Todd, W.R., Mason, H.S. and Van Brugge, T.J. (1966), **Biochemistry**. 4th Edition, The Macmillan Company, London.
3. Francis Sreenspan , Gordon J. 1997– **Basic & Clinical Endrocrinology** 5th Ed., Strewler Prentice – Hall International Inc.

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ADDITION**YEAR III – SEMESTER VI****BIOCHEMISTRY OF HORMONES**

Paper	: ELECTIVE III	Total Hours	: 60
Hours/Week	: 5	Exam Hours	: 03
Credit	: 5	Internal	: 25
Paper Code	: 17U6BCE03	External	: 75

OBJECTIVE:

On successful completion of the course the students should have: Understood clearly on various alimentary parts of human body. Learnt more specific on the endocrinal activities Learnt the mechanisms and actions of vital organs

UNIT – I**12 Hours**

Introduction, classification of hormones. Role of second messengers in hormonal action. Cyclic AMP, Role of G-proteins. Calcium, calmodulin. Mechanism of action of Group I and Group II hormones. Hormones of the hypothalamus Anterior Pituitary hormone (Tropic hormone)- Posterior Pituitary (Oxytocin, Vasopressin)

UNIT – II**12 Hours**

Hormones of the thyroid & parathyroid-chemical nature, secretion, function & disorders of thyroid & parathyroid hormones. Calcitriol biosynthesis and functions. Hyper and hypoparathyroidism, Paget's disease, Ricket's and osteomalacia.

UNIT – III**12 Hours**

Pancreatic & G.I. Tract hormones Chemical nature & functions of Insulin, Glucagon. Secretion, release, chemical nature and functions of Gastrin, Enterogastin, Secretin & Cholecystokinin.

UNIT – IV**12 Hours**

Hormones of the Adrenal gland – chemical nature & functions of Adrenal medullary & Cortex hormones. Adrenal Corticoid hormones- Glucocorticoids, Mineralocorticoids- synthesis and biological effects. Adrenal medullary hormones-Catecholamines: biosynthesis and biological effects.

UNIT – V**12 Hours**


Gonadal hormones- Androgens and estrogens. Hormones of the testes and ovaries – chemical nature & functions of Androgens, Estrogens and Progesterone.


TEXT BOOKS

1. Murray, K.R., Granner, K.D., Mayes, P.A. and Rodwell, W.V. (2009) **Harper's Biochemistry**, 28th Ed, Appleton & Lange Stamford, Connecticut.
2. Guyton, A.C. and Hall, J.E (2006), **Textbook of Medical Physiology**, 11th Edition, Saunders Co. Pennsylvania.
3. Donald Voet , Judith G. Voet , Charlott W. Pratt , , **Fundamentals of Biochemistry** upgrade edition John Willey & Sons. Inc,
4. Francis Sreenspan , Gordon J. 1997–**Basic & Clinical Endrocrinology** 5th Ed., Stewler Prentice – Hall International Inc.

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1. Foye, O.W., Lemke, J.L. and William D.A. (1995), **Medicinal Chemistry**, B.I. Waverly Pvt. Ltd., New Delhi.
2. West, E.S., Todd, W.R., Mason, H.S. and Van Brugge, T.J. (1966), **Biochemistry**. 4th Edition, The Macmillan Company, London.


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