

DAVANGERE  UNIVERSITY

Shivagangothri, Davangere-577007.

**Scheme and Syllabus for
B.Sc. Degree Biochemistry**

SEP Syllabus

(Karnataka State Higher Education Council Bengaluru)

for

**Semester-III & IV
(with effect from 2024-25)**

**Department of Studies in Biochemistry
Shivagangothri, Davangere-577007.**

DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHEC-SEP Syllabus: 2024-25) SEMESTER-III
24SEPBC-III: BIOCHEMICAL TECHNIQUES AND ENZYMOLOGY

TOTAL HOURS -56

Course Learning Objectives:

- a) To understand the basic principles of biochemical techniques that are useful for studying the structure and function of biomolecules.
 - b) To understand the methods used in protein and nucleic acid purification and identification.
 - c) To understand the construction, working and applications of colorimeter and spectrophotometer.
 - d) To acquire knowledge of enzyme structure, function and regulation.
 - e) To understand the role of enzymes in biochemical processes that sustain life.
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Course Outcome:

On successful completion of the course, the student will be able to:

- a) Know the different biochemical techniques used for separation and characterization of biomolecules.
 - b) Know the cell fractionation techniques using different types of centrifugation methods.
 - c) Explain importance of enzymes and their role as biological catalysts.
 - d) Describe the enzyme structure, activity, classification and nomenclature.
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PART A: BIOCHEMICAL TECHNIQUES

Unit1:

(14Hrs)

Chapter-3.1.1

General Principles of chromatography – Distribution coefficient; adsorption and partition. Rf values.

Planar chromatography techniques: Paper chromatography – Principle and applications of ascending, descending, circular and 2D – chromatography.

Thin-layer chromatography (TLC) – Principle, procedure and applications.

Chapter-3.1.2

Column chromatography – Principle and applications of gel filtration, ion-exchange, affinity chromatography, gas-liquid chromatography and HPLC.

Chapter-3.1.3

Centrifugation- Definitions and relationship between **RPM and RCF**. Svedberg's constant. Design of centrifuge. Principle and applications of density gradient centrifugation, differential centrifugation and ultracentrifugation.

UNIT 2:

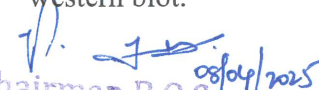
(14 Hrs)


Chapter-3.2.1

Electrophoresis – Principle, procedure and applications of paper and gel electrophoresis (Agarose and SDS-PAGE). Visualizing proteins, nucleic acids. Zymogram and reverse zymogram, 2-D electrophoresis.

Chapter-3.2.2

Blotting techniques – Principle, procedure and applications of Dot blot, Southern, northern, western blot.


Chairman B.O.S.
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Dr. U.S. MAHABALESHWAR
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Chapter-3.2.3

Spectrophotometric techniques- Electromagnetic spectrum, Beer-Lambert's law, principle, design and applications of colorimeter, UV-Vis spectrophotometer, principle and applications of IR spectroscopy.

PART B: ENZYMOLOGY

UNIT 3:

(14 Hrs)

Chapter-3.3.1

Introduction to enzymes: Definition, historical perspective, general characteristics. Co-factors – coenzymes and metal ions. Classification of enzymes based on IUB with examples. Unit of enzyme activity – definition of IU, enzyme turnover number. Nature of enzyme- protein and non-protein. Specific activity. Enzyme specificity.

Chapter-3.3.2

Active site – Concept of active site. Lock and key model, Koshland's induced fit theory.

Chapter-3.3.3

Enzyme kinetics- Factors affecting rate of enzyme catalyzed reactions. Effect of enzyme concentration, substrate concentration, pH and temperature.

Michaelis – Menten equation (derivation not required). Lineweaver – Burk (L-B) plot.

Determination of V_{max} & K_m from L-B plot and their significance.

UNIT 4:

(14 Hrs)

Chapter-3.4.1

Enzyme inhibition: Enzyme inhibition –competitive, non-competitive and uncompetitive. Graphical representation using LB plot.

Chapter-3.4.2

Enzyme regulation- Feedback regulation and Allosteric regulation. Allosteric enzymes – phosphofructokinase-1 (PFK-1) as an example

Chapter-3.4.3

Isoenzymes – Lactate dehydrogenase (LDH); Multi-enzyme complex – Pyruvate dehydrogenase complex; Multi-functional enzymes – Fatty acid synthase; Industrial and medical applications of enzymes.

Suggested References/Text books:

1. Principles and Techniques of Biochemistry and Molecular Biology. Wilson K, Walker J, Cambridge University Press. (2010).
2. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry. Trevor Palmer and Phillip L. Bonner. 2nd Edition, Woodhead Publishing.
3. Biophysical Chemistry: Principles, Techniques and Applications. Alen G. Marshall. John Wiley & Sons, New York (1978).
4. Principles of Biochemistry. Nelson DL, Lehninger AL, Cox MM. Macmillan Pubs. (2008)
5. Biochemistry. Voet D, Voet JG. John Wiley & Sons, New York (1995)
6. Enzymes. Malcom Dixon and Edwin C Webb. Elsevier Publishers.

7. Text Book of Biochemistry. Vasudevan, Shree Kumari, Jaypee Brothers Medical Publishers, (2016).
 8. Biochemistry. U Satyanarayana and U Chakrapani, Elsevier India, (2016).
 9. Introduction to Centrifugation. Ford T.C and Graham J.N. Bioscientific Publishers Ltd, Oxford.
 10. Biophysical Chemistry (Principles and Techniques). Avinash Upadhyay, Kakoli Upadhyay, and Nirmalendu Nath. Himalaya Publishers.
 11. Tools of Biochemistry. Terrance G. Cooper.
 12. An Introduction to Spectroscopy for Biochemist. SB Brown. Academic Press, London.
 13. Techniques in Biochemistry. T Devasena and G Rajagopal. Ahuja Publishing House (2010).
 14. Fundamentals of Enzymology, 3rd edition. Nicholas C Price and Lewis Stevens, Oxford University Press (2012).
 15. Understanding Enzymes. Tevor Palmer. Ellis Horwood Ltd.
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24SEPBC-III Practical: BIOCHEMICAL TECHNIQUES

Duration: 4Hrs/Week

1. Identification of amino acid by circular paper chromatography.
2. Ascending paper chromatography of amino acids.
3. Separation of plant pigments by column chromatography using silica gel-G.
4. Two dimensional chromatography of amino acids.
5. Polyacrylamide gel electrophoresis [PAGE] of proteins (Demo).
6. Agarose gel electrophoresis [AGE] of DNA (Demo).
7. Separation of lipids by TLC (Demo).
8. Colorimetric estimation of glucose by DNS method
9. Separation of serum and plasma from blood by centrifugation.
10. Absorption spectra of protein (BSA) and nucleic acids (Demo).
11. Verification of Beer-Lambert's law, determination of extinction coefficient.
12. Separation of serum proteins by paper electrophoresis (Demo)

DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHCE-SEP Syllabus: 2024-25) SEMESTER-IV
24SEPBC-IV: HUMAN PHYSIOLOGY

TOTAL HOURS -56

Course Learning Objectives:

- a) To understand the basic body plan in humans and location of various organs.
 - b) To know how the human body functions at various levels.
 - c) To study different organ systems operating in living organisms.
 - d) To acquire knowledge of enzymes involved in digestion of food particles.
 - e) To understand the role of each organ system in maintaining homeostasis.
-

Course Outcome:

On successful completion of the course, students will be able to:

- a) To know how the different organs and systems work together to maintain health.
 - b) To know the functioning of each organ system.
 - c) Explain importance of enzymes and their role in digestion.
 - d) Take care of themselves and also educate the people around for healthy living.
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HUMAN PHYSIOLOGY

UNIT 1:

(14Hrs)

Chapter 4.1.1

Introduction: Definition and scope of physiology. Levels of organization in the human body. Basic body plan in humans & Location of organs.

Chapter 4.1.2

Neuron: Types of neurons, generalized structure of multipolar neuron. Neurotransmission: Resting membrane potential, action potential, transmission of nerve impulse along an axon and across a synapse. Excitatory and inhibitory neurotransmitters.

Chapter 4.1.3

Muscle: Types of muscles and their structure. Ultrastructure of skeletal muscle. Contractile and regulatory proteins of muscle. Sliding filament model of skeletal muscle contraction.

UNIT 2:

(14Hrs)

Chapter 4.2.1

Body fluids: Blood volume, composition and functions; RBC, WBC and platelets, their structure and functions. Mechanism of blood coagulation. Biochemical events in transport of CO₂ and O₂ in blood. Cerebrospinal fluid, lymph and their functions. Blood brain Barrier.

Chapter 4.2.2

Cardiovascular system: Structure and function of the heart. Types of blood vessels. Cardiac cycle, Blood pressure.

Chapter 4.2.3

Excretory system: Structure of the nephron, formation of urine – Glomerular filtration, tubular reabsorption and secretions.

UNIT 3:**(14Hrs)****Chapter 4.3.1**

Acid-base balance: Maintenance of normal pH of the body fluids. Blood buffers. Role of lungs and kidney in acid base balance.

Chapter 4.3.2

Reproductive system: Male and female reproductive organ. Spermatogenesis and oogenesis. Hormonal regulation of reproduction. Pregnancy.

Chapter 4.3.3

Bone: Composition and structure of long bone, growth and remodeling of long bone. Factors affecting its growth.

UNIT4:**(14Hrs)****Chapter 4.4.1**

Respiratory System: Lungs, structure and functions, gas exchange, oxygen binding by hemoglobin, factors affecting oxygenation.

Chapter 4.4.2

Digestive System and GIT: Anatomy of GIT and accessory organs, Digestion, absorption & transport of carbohydrates, lipids and proteins. Role of various enzymes involved in digestive process.

Chapter 4.4.3

Liver: Structure of a liver lobule. Role of liver in metabolic, storage and detoxification.

Suggested References/Text Books:

1. Human Physiology. Chatterjee C C, Volume-I & II, Medical allied Agency. New Delhi (2020).
2. Principles of Anatomy and Physiology. Gerard J Tortora, Bryan H Derrickson. 13th edition, John Wiley & Sons (2000).
3. Textbook of Medical Physiology. Guyton and Hall, 10th edition, Elsevier Health Sciences (2015).
4. Essentials of Medical Physiology. Sembulingam K & Prema Sembulingam, 3rd edition, Jaypee Brothers (2019).
5. The Cell. Geoffery M. Coper, Oxford University Press (2001).
6. Human Physiology: The Mechanisms of Body Functions. A J Vander, et al., McGraw-Hill (1985).

24SEPBC-IV Practical: ENZYMOLOGY

Duration: 4Hrs/Week

Enzyme Assays:

1. Salivary amylase
 - a. Determination of activity of salivary amylase by DNS method.
 - b. Determination of specific activity of salivary amylase by DNS method.
 - c. Determination of pH optimum of salivary amylase.
 - d. Determination of K_m and V_{max} of salivary amylase.
 - e. Determination of initial velocity [time kinetics] of salivary amylase.
 - f. Determination of optimum temperature of salivary amylase.
 - g. Effect of sodium chloride on amylase.
 2. Isolation of Urease and demonstration of its activity.
 3. Determination of activity of yeast invertase.
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Practical proper Examination III & IV semesters Duration: 3Hrs

• Experimentation (Major & Minor/Spotters)	-	30 Marks
• Viva Voice	-	10 Marks
Total -		40 Marks

Internal Assessment for Practical Paper/Course III-IV semesters

• Attendance	-	05 Marks
• Record/Journal	-	05 Marks
Total -		10 Marks

Continuous Assessment Programme/Internal Assessment/
Formative Assessment for Major Paper/Course/Subject: Biochemistry

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	• Attendance with proper record	05
TOTAL MARKS		20

• **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks

THEORY EXAMINATION QUESTION PAPER PATTERN FOR
MAJOR PAPER/COURSE/SUBJECT: BIOCHEMISTRY
(Semester – III / IV)

B.Sc. Semester-III/IV Degree Examination; 2025-26
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: BIOCHEMISTRY

Paper – _____ : _____

Paper Code: _____

Time: 3 Hours

Max. Marks: 80

Instructions to candidates:

- 1) All sections are compulsory
- 2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

1. Answer *all* the following questions:

(2×10=20)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

SECTION-B

Answer any *SIX* of the following:

(5×6=30)

2. From Unit-I
3. From Unit-I
4. From Unit-II
5. From Unit-II
6. From Unit-III
7. From Unit-III
8. From Unit-IV
9. From Unit-IV

SECTION -C

Answer **Any Three** of the following:

(10×3=30)

10. From Unit-I

11. From Unit-II

12. From Unit-III

13. From Unit-IV

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Open Elective Paper (III Semester)
DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHCEC-SEP Syllabus: 2024-25) SEMESTER-III
24SEPBC-OE1(A): BASIC PRINCIPLES OF BIOCHEMISTRY

TOTAL HOURS -32

Course Learning Objectives:

- a) To study basics of biomolecules, metabolism and biochemical processes in living organisms.
- b) To study the enzymes & coenzymes structure and functions.
- c) To study basics of vital physiology.
- d) To study biochemical techniques used in isolation and purification of biomolecules.

Course Outcome: On successful completion of the course, the student will be able to:

- a) Know how the different organ systems work together to maintain health.
 - b) Know the techniques used in proteins and nucleic acid identification and purification.
 - c) Explain importance of enzymes and their role in digestion.
 - d) Take care of themselves and also educate the people around for healthy living.
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BASIC PRINCIPLES OF BIOCHEMISTRY

UNIT 1: (8Hrs)

Chapter 4.1.1

Introduction: Definition and scope of Biochemistry and importance of biochemistry.

Chapter 4.1.2

Biomolecules: Carbohydrates - classification, structure, functions (Monosaccharides, oligosaccharides, polysaccharides).

Proteins - Amino acids, peptide bond, protein structure (primary), functions.

Lipids - Classification, fatty acids, triglycerides, phospholipids (PC, PE, SM), steroids.

Nucleic acids - Bases, sugars, nucleosides, nucleotides, Structures of DNA & RNA.

UNIT 2: (8Hrs)

Chapter 4.2.1

Biochemical techniques –Chromatography – paper, TLC. Column chromatography (Silica gel), electrophoresis (SDS-PAGE, Agarose gel electrophoresis). Elementary knowledge of techniques used in protein and nucleic acid isolation, purification and identification. Use of colorimeter – principle, construction, working.

Chapter 4.2.2

Vitamins: Definition, classification, Source, deficiency symptoms of fat and water soluble vitamins. Coenzymes - TPP, Nicotinamide, FMN, Coenzyme A, Lipoic acid, Biotin & Folate.

UNIT 3: (8Hrs)

Chapter 4.3.1

Enzymes: Properties and classification. Enzyme-substrate interaction - Theories, factors affecting enzyme activity, enzyme regulation.

UNIT 4: (8Hrs)

Chapter 4.3.2

Metabolism I: Overview of metabolic pathways. Carbohydrate metabolism – glycolysis, TCA cycle, ETC. Protein metabolism – transamination, deamination, decarboxylation, Urea cycle.

Chapter 4.4.1

Metabolism II: Lipid metabolism – Lipolysis, Fatty acid degradation, cholesterol synthesis and breakdown. Nucleic acid metabolism: Pathways for synthesis and degradation of nucleic acids.

Chapter 4.4.2

Physiology: Digestion and absorption of carbohydrates, proteins and lipids. Structure and function of neuron. Types of muscles, Muscle contraction, Blood- composition and function. Hormones – classification, endocrine glands and functions.

Suggested References/Text Books:

1. Lehninger's Principles of Biochemistry. Nelson DL, Lehninger AL, Cox MM. Macmillan Publishers (2008).
 2. Principles and Techniques of Biochemistry and Molecular Biology. Wilson K, Walker J. Cambridge University Press (2010).
 3. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry. 2nd Edition. Trevor Palmer and Phillip L. Bonner. Woodhead Publishing.
 4. Text Book of Biochemistry. Vasudevan, Shree Kumari. Jaypee Brothers Medical Publishers (2016).
 5. Biochemistry-U Satyanarayana and U Chakrapani. Elsevier India (2016).
 6. Fundamentals of Biochemistry. J.L. Jain. S. Chand publications (2004).
 7. Biochemistry, Lubert Stryer, 4th edition, W.H. Freeman & Co. (1995).
 8. Principles of Biochemistry. 3rd edition. Geoffrey L. Zubay. William W. Parson, Dennis E.Vance, W.C. Brown Publishers (1995).
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Open Elective Paper (III Semester)
DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHEC-SEP Syllabus: 2024-25) SEMESTER-III
24SEPBC-OE1(B): CLINICAL BIOCHEMISTRY

TOTAL HOURS -32

Course Learning Objectives:

- a) To study the basics of health and diseases.
- b) To study disease associated with blood, liver, kidney and endocrine system.
- c) To study metabolic disorders.
- d) To learn the interpretation of laboratory tests.
- e) To know the normal and abnormal constituents of body fluids.

Course Outcome: On successful completion of the course, the student will be able to:

- a) Understand the various investigations to study the disorders of blood, liver, kidney, gastrointestinal system and endocrine system.
 - b) Understand metabolic disorders with respect to diabetes and coronary heart diseases.
 - c) Understand the importance of clinical enzymes.
 - d) To understand the enzymes in metabolism.
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CLINICAL BIOCHEMISTRY

UNIT 1:

(8Hrs)

Chapter 4.1.1

Introduction: Clinical biochemistry: Definition, scope, collection & preservation of biological fluids.

Chapter 4.1.2

Urine: Normal composition of urine – Volume, pH, colour, specific gravity. Chemical analysis and normal values of the constituents- urea, uric acid, creatinine, pigments and their clinical significance. Abnormal constituents of urine – glucose, albumin, ketone bodies, variations in urea, creatinine, pigments and their clinical significance in brief.

UNIT 2:

(8Hrs)

Chapter 4.2.1

Blood: Normal constituents of blood and their variation in pathological conditions- urea, uric acid, creatinine, glucose, bilirubin, total protein, albumin/globulin ratio. Blood- RBC, WBC and platelets: structure and functions. Total WBC count, differential count, erythrocyte count, platelet count, glycated haemoglobin, Hb%, blood grouping & ESR. C-reactive protein and subpopulation of blood cells.

Chapter 4.2.2

Blood: Lipid profile: cholesterol, triglycerides, lipoproteins: chylomicrons, VLDL, LDL and HDL. Hypo and lipoproteinemia, atherosclerosis.

UNIT 3:

(8Hrs)

Chapter 4.3.1

Renal function test: Clinical importance of renal function tests. Urine tests- protein, glucose. Blood tests - Creatinine, urea. GFR. Urea & creatinine clearance tests and its interpretation. renal calculi, uremia.

Chapter 4.3.2

Liver disorders:

Cirrhosis, hepatitis, fatty liver and jaundice (pre, post and hepatic). Estimation of conjugated and total bilirubin in serum (Diazo method). Detection of bilirubin and bile salts in urine (Fouchet's test and Hay's test).

UNIT4:

(8Hrs)

Chapter 4.4.1

Clinical enzymes:

Alkaline phosphatase, serum transaminases (SGPT & SGOT), Cardiac injury profile - CPK and LDH.

Chapter 4.4.2

Inborn errors of Metabolism:

Fructosuria, galactosemia, Sickle cell anaemia, phenyl ketonuria, alkaptonuria, Lesch-Nyhan syndrome, Neimann – Pick disease, Glycogen storage disease (Von-Gierke's disease), Type III glycogen storage disease (Cori's disease).

Suggested References/Text Books:

1. Text Book of Medical Biochemistry. M.N. Chatterjee and Rane Sinde
2. Text Book of Biochemistry with Clinical Correlation. 3rd edition. Thomas M. Devlin. John Wiley-Liss Inc. Publication
3. Practical Clinical Biochemistry. Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
4. Principles of Internal Medicine. Volume I and II. Harrison T.R. Fauci, Braunwald, Isselbacher 14th edition, MC-Graw Hill, New York.
5. Tietz Fundamentals of Clinical Chemistry (5th edition). Tietz, C.A. Burtis, E.R. Ashwood (eds), Saunders WB Co.
6. Textbook of Medicinal Chemistry. V Alagarsamy. Published by Elsevier Health Sciences, (2013).
7. Textbook of Human Physiology. Saradha Subramaniam. Published by S Chand & Company Pvt Ltd, (2012).
8. Fundamentals of Biochemistry for Medical Students. Ambika Shanmugam, (2012).
9. Fundamentals of Biochemistry. Jain, J.L. S..Chand publication, 6th Edition, (2005).
10. Harper's Illustrated Biochemistry. 31st edition. Victor W Rodwell, et.al, , McGraw Hill Education, Lange (2018).

Open Elective Paper (IV Semester)
DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHEC-SEP Syllabus: 2024-25) SEMESTER-IV
24SEPBC-OE2(A): ANALYTICAL BIOCHEMISTRY

TOTAL HOURS -32

Course Learning Objectives:

- a) To understand the role of animal and plant models.
- b) To understand the various chromatography and spectrophotometry techniques.
- c) To know the techniques used in isolation of different biomolecules.
- d) To know the proper usage of radioisotopes and their applications.
- e) To acquire knowledge of different techniques used for studying proteins, lipids, nucleic acids, carbohydrates.

Course Outcome: On successful completion of the course, the student will be able to:

- a) Know the importance of animal and plant models.
 - b) Know the application of techniques used for isolation, identifying, quantifying and characterizing biomolecules.
 - c) Explain the techniques used to study DNA and RNA
 - d) Explain the use of radioisotopes and measuring radioactivity.
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ANALYTICAL BIOCHEMISTRY

UNIT 1:

(8Hrs)

Chapter 4.1.1

Preliminary techniques in Biochemistry: Animal and Plant models, choice of animals, types of studies.

Chapter 4.1.2

Cell fractionation techniques: Cell lysis, homogenization, extraction, salting in, salting out, dialysis and ultra filtration

UNIT 2:

(8Hrs)

Chapter 4.2.1

Chromatography-

Definition, distribution coefficient, types, principles of adsorption and partition chromatography. Planar chromatography – Ascending, descending, circular, 2D-paper chromatography; Thin-layer chromatography- and its advantages. Column chromatography – Principle, procedure and applications of gel filtration, affinity, ion exchange, adsorption chromatography, principle and applications of HPLC and GLC.

Chapter 4.2.2

Blotting techniques: Dot blot, Southern, Northern, Western blot, DNA finger print assay.

UNIT 3:

(8Hrs)

Chapter 4.3.1

Centrifugation: Sedimentation coefficient; RPM and RCF. Principle of differential and density gradient centrifugation. Ultra centrifuge – construction and applications.

Chapter 4.3.2

Electrophoresis:

Principle, procedure and applications of electrophoresis technique- PAGE, SDS – PAGE

UNIT 4:

(8Hrs)

Chapter 4.4.1

Radioisotopic techniques: Detection of radioactivity by GM-counter, scintillation counter. Applications of radioisotopes – ^3H , ^{14}C , ^{131}I , ^{60}Co and ^{32}P . Biological effects of radiations. Safety measurements in handling radio isotopes.

Chapter 4.4.2

Colorimetric and Spectrophotometric techniques:

Principle instrumentation and applications of colorimeter, UV-visible, infra-red and fluorescence spectroscopy.

Suggested References/Text books:

1. Principles and Techniques of Biochemistry and Molecular Biology. Wilson K, Walker J. Cambridge University Press (2010).
2. Biophysical Chemistry: Principles, Techniques, and Applications. Marshall AG Wiley, New York (1978).
3. Lehninger's Principles of Biochemistry: Nelson DL, Lehninger AL, Cox MM Macmillan (2008).
4. Biochemistry. Voet D, Voet JG New York: J. Wiley & Sons (1995).
5. Biochemistry. U Satyanarayana and U Chakrapani, Elsevier, India, (2016).
6. Introduction to Centrifugation. Ford T.C and Graham J.N. Bioscientific Publishers Ltd, Oxford.
7. Biophysical Chemistry (Principles and Techniques). Avinash Upadhyay, Kakoli Upadhyay, and Nirmalendu Nath. Himalaya Publishers.
8. Tools of Biochemistry. Teerance G. Cooper.
9. An Introduction to Spectroscopy for Biochemist. Brown. SB Academic Press.
10. Techniques in Biochemistry. T Devasena and G Rajagopal. Ahuja publishing house (2010).

Open Elective Paper (IV Semester)
DAVANGERE UNIVERSITY
B.Sc. BIOCHEMISTRY
(KSHCE-SEP Syllabus: 2024-25) SEMESTER-IV
24SEPBC-OE2(B): NUTRITION IN HEALTH AND DISEASE

TOTAL HOURS -32

Course Learning Objectives:

- a) To study the nutritional aspects for the functioning of the body.
 - b) To study the diet for maintaining health.
 - c) To study the therapeutic nutrition.
 - d) To study the importance of nutraceuticals.
 - e) To study the anti-nutritional factors.
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Course Outcome: On successful completion of the course, the student will be able to:

- a) Understand the various factors affecting the basal metabolism and their physiological functions.
 - b) Understand the nutritional values of vitamins, minerals, proteins, carbohydrates, and lipids.
 - c) Understand the beneficial effects of food components in the preventing and managing diseases.
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NUTRITION IN HEALTH AND DISEASE

UNIT 1: **(8Hrs)**

Chapter 4.1.1

Introduction: Concept of nutrition, Concepts of macro and micro nutrients, essential nutrients and their classification. Basal metabolic rate (BMR), factors affecting BMR, specific dynamic action of foods.

Chapter 4.1.2

Carbohydrates: Dietary sources of carbohydrates, protein sparing action, lactose intolerance.

UNIT 2: **(8Hrs)**

Chapter 4.2.1

Proteins: Dietary sources of proteins, nutritional classification, nutritive value of proteins-PER and biological value (BV). Essential amino acids. Nitrogen balance, mutual Supplementation of proteins. Malnutrition- Kwashiorkor and Marasmus.

Chapter 4.2.2

Fats: Dietary sources of fats, essential fatty acids, PUFA, biological importance.

UNIT 3: **(8Hrs)**

Chapter 4.3.1

Vitamins and minerals: **Vitamins:** Definition, classification, Source, deficiency symptoms of fat and water soluble vitamins. Sources, functions and deficiency disorders of Ca, P, Na, K, Fe, Zn, Cu, I. Water metabolism- distribution in body, factors affecting water balance.

Chapter 4.3.2

Diet: Recommended daily allowances, special nutrition for infants, children, during pregnancy, lactation and old age. Therapeutic nutrition for diabetes, cardiovascular disease, cancer patients. Osteoporosis and bone health. Wellness diets, fitness diets, obesity and weight management and BMI, mediterranean diet, nutrients as antioxidants, diet and cancer, food preservatives, food adulterants.

UNIT 4:

(8Hrs)

Chapter 4.4.1

Balanced diet: Composition of balanced diet for infants, children, Adults, elderly, pregnancy and lactating women, old age.

Chapter 4.4.2

Nutraceuticals:

Introduction, functional foods and pre and pro-biotics in health and disease prevention. Role of diet and nutrition in the prevention and treatment of disease.

Suggested References/Text Books:

1. Human Nutrition and Dietetics. S. Davidson and J.R. Passmore. Churchill Livingstone Publisher.
2. Human Nutrition and Dietetics. J.S. Garrow, W.Philip T. James, Alan Ralph. Churchill Livingstone Publisher.
3. Modern Nutrition in Health and Disease. Michael G. Wohl, Robert S. Goodhart, Maurice E. Shils. Lea & Febiger Publisher, U.S.A.
4. Mechanism and Theory in Food Chemistry. DWS Wong. Springer Cham Publishers.
5. Advanced Text Book on Food and Nutrition, Vol. I & II. Swaminathan M. The Bangalore Press.
6. Food Science, 3rd edition. Srilakshmi B. New Age International Publishers (2003).
7. Food, Nutrition and Health. Tapsell L. Oxford University Press (2010).
8. Modern Nutrition in Health and Disease. Maurice E.Shils, Moshe Shike. Lippincott Williams & Wilkins, Philadelphia

THEORY EXAMINATION QUESTION PAPER PATTERN FOR:
BIOCHEMISTRY (OPEN ELECTIVE)
(Semesters III / IV)

B.Sc. Semester-III/IV Degree Examination; 2025-26
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: BIOCHEMISTRY

Paper – _____ : _____

Paper Code: _____

Time: 2 Hours

Max. Marks: 40

Instructions to candidates:

- 1) All sections are compulsory
- 2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

Answer **all** the following questions:

(2×5=10)

- 1.
- 2.
- 3.
- 4.
- 5.

SECTION-B

Answer any **SIX** of the following:

(5×6=30)

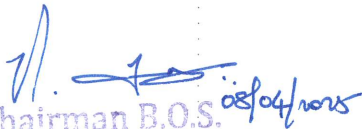
6. From Unit-I
7. From Unit-I
8. From Unit-II
9. From Unit-II
10. From Unit-III
11. From Unit-III
12. From Unit-IV
13. From Unit-IV

**Continuous Assessment Programme/Internal Assessment/
Formative Assessment for Biochemistry - Open Elective**

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	• Attendance with proper record	05
TOTAL MARKS		20

• **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks


 Chairman B.O.S. 08/04/2025
 Department of Biochemistry
 Davangere University
 Shivangangothri, Davangere-577007



Continuous Assessment Programme/Internal Assessment/Formative Assessment
Elective/Optional Papers

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (2+2 = 4)	04
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	03
03	• Attendance with proper record	03
TOTAL MARKS		10

• **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
85-90%	-	02 Marks
90-100%	-	03 Marks

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