DAVANGERE UNIVERSITY B.Sc. BIOCHEMISTRY

(KSHEC-SEP Syllabus: 2024-25)

SEMESTER-I

24SEPBC-I: PRINCIPLES OF BIOCHEMISTRY AND CELL BIOLOGY

TOTAL HOURS-56

Course Learning Objectives:

- a) To understand the basic principles of biochemistry and cell biology.
- b) To understand water as solvent of life, buffer and importance of buffers in biological systems, atom and chemical bonding.
- c) To understand the osmotic pressure, metalloporphyrins and radioactive elements.
- d) To acquire knowledge of organic reactions, isomerism and stereochemistry of molecules, thermodynamics, exothermic and endothermic reactions
- e) To study the differences between animal and plant cellular system, Cell organelles and Cytoskeletal elements

Course Outcome:

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

- a) Explain importance of water and buffers in biological system.
- b) Describe the biological role of metal ions and characteristics of radioactive elements.
- c) Identify chemical reactions, isomers and thermodynamics
- d) Differentiate plant and animal cells and cell organelles.

PART A: PRINCIPLES OF BIOCHEMISTRY

UNIT 1:

(14 Hrs)

Introduction: Scope, history and development of Biochemistry. Milestones in Biochemistry.

Chapter-1.1.1

Water and Units of measurements of solutions: Water as solvent of life, Dissociation of water, Ionic products of water. Meaning of Normality, Molarity, Molality and Mole fraction, percentage solutions (numerical problems from above).

Chapter-1.1.2

Buffers Concept of pH, pOH, simple numerical problems on pH, Dissociation of weak acids and electrolytes, Brownsted-Lowry, Arrhenius, Lewis concept of acids and bases, titration curves of weak acid and bases. Meaning of Ka and pKa values, Buffer and its action, Buffers in biological system, Henderson-Hasselbalch equation and its significance. Determination of pH using indicators, pH meter.

Chapter-1.1.3

The Atom and Chemical bonding: Elementary composition of living matter, structure of atom, ionisation potential, nature of chemical bonding, Types of chemical bonding (Electrovalent, covalent and co-ordinate bonds) Characteristics of bonding (Bond length, bond angle, and bond energy), Hydrogen bonds and weak interactions, atomic and molecular orbitals, formation of molecules (in brief),

ಕುಲಸಚಿವರು ದಾವಣಗೆರೆ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಿವಗಂಗೋತ್ರಿ, ದಾವಣಗೆರೆ-577007

Dr. U.S. MAHABALESHWAR

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Professor & Dean, Science & Technology
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Davangere-577 007, Karnataka, India

UNIT 2: (14 Hrs)

Chapter-1.2.1

Colligative properties: Osmotic pressure and its measurements by Berkeley and Hartley's method. Laws of osmotic pressure. Hypo, hyper and isotonic solutions. Effects of osmotic pressure on living cells. Donnan membrane equilibrium, application in biological system.

Chapter-1.2.2

Porphyrins: Porphyrin nucleus – Structure. Structure and the biological role of metal ions in important metalloporphyrins-Hb, cytochromes, chlorophyll & Vit-B₁₂.

Chapter-1.2.3

Radiation chemistry: Introduction, natural and artificial radioactivity. Characteristics of radioactive elements, units of radioactivity, disintegration constant, half-life, Detection of radioactivity by scintillation counter and advantages. Uses of radioisotopes in biological system – ³H, ¹⁴C, ¹³¹I, ⁶⁰Co and ³²P. Biological effects of radiations. Radiation Hazaards. Safety measurements in handling radio isotopes.

UNIT 3: (14 Hrs)

Chapter-1.3.1

Reaction mechanisms: Types of reactions-Oxidation- reduction reaction, substitution, addition, elimination, rearrangement, condensation, decarboxylation, reversible and irreversible reactions with an example each. Concept of inductive effect and resonance. Concepts of the following – carbanions, carbocations, free radicals, carbenes, nucleophiles and electrophiles.

Chapter-1.3.2

Isomerism: Stereoisomerism, types, Geometrical isomerism- (fumaric acid/maleic acid and unsaturated fatty acids), optical isomerism — optical activity, Chiral and Achiral carbon atom, Enantiomers, diastereomers, meso and dl forms, D and L notation, R and S, E and Z -Amino acids, sugars and lipids. Tautomerism (purines), Fischer-projection formulae.

Chapter-1.3.3

Thermodynamics: Basic principles of thermodynamics, terminology, free energy, standard free energy, enthalpy, entropy, laws of thermodynamics, exothermic and endothermic reactions with examples.

PART B: CELL BIOLOGY

UNIT 4: (14 Hrs)

Chapter-1.4.1

Types of cells: Prokaryotic and eukaryotic cell, differences between animal and plant cellular system.

Chapter-1.4.2

Cell organelles: Structure and functions of sub cellular organelles-cell wall, plasma membrane, nucleus, chromosome, mitochondria, chloroplast, ribosome, endoplasmic reticulum, Golgi complex, lysosome, glyoxysomes, peroxisomes. Marker enzymes.

Chapter-1.4.3

Cytoskeletal elements: Types, microfilaments, microtubules and intermediary filaments- distribution, types, structure and chemical composition, biological importance, function.

Suggested References/Text books:

- 1. Principles of Physical Chemistry BR Puri, Madan S Pathania, LR Sharma, Vishal Publishing Co.
- 2. Advanced organic chemistry by Bahl and Bahl
- 3. Introduction to stereochemistry 2012, Kurt Mislow, Dover publications.
- 4. Cell Biology -P.S. Verma and V.K. Agarwal S, Chand Publishing (2016).
- 5. Essentials of Cell Biology -Sanjay Kumar Sharma, Agrotech press 1ST edition.
- 6. Cell Biology C.B.Powar, Himalaya publishing House, 2010
- Cell Biology: Fundamentals and Applications Arunima
 V Mukerjee, oxford BookCompany, 2009
- 8. Cell and Molecular Biology -E.D.P De Robertis and E.M.F. De Robertis, Lea and Febiger.
- 9. The Cell: A Molecular Approach -Geoffrey Cooper and Robert.E. Hausman, Sinauer Associates, 2018
- 10. Molecular Cell Biology -J.E. Darnell, H.Lodish, David Baltimore. W.H. Freeman and Co, 2002.

DAVANGERE UNIVERSITY **B.Sc. BIOCHEMISTRY**

(KSHEC-SEP Syllabus: 2024-25)

24SEPBC-I Practical: PRINCIPLES OF BIOCHEMISTRY AND CELL BIOLOGY

Duration: 4Hrs/Week

- 1. Preparation of solutions:
 - Percentage solutions
 - Molar solutions
 - Normal solutions
 - Dilution of Stock solutions
- 2. Standardization of pH meter.
- 3. Preparation of Buffer solutions using pH meters.
- 4. Titration curve of
 - Strong acid v/s weakbase
 - Weak acid v/s strong base
- 5. Isolation of mitochondria.
- 6. Isolation of chloroplast.
- 7. Estimation of given HCl using approximate N/10 NaOH and potassium biphthalate.
- 8. Estimation of Mohr's salt using approximate N/10 KMnO4 and Oxalic acid crystals.
- 9. Estimation of H_2O_2 using approximate N/10 KMnO4 solution.
- 10. Estimation of Hardness of water using EDTA solution and ZnSo₄
- 11. Estimation of NaOH using N/10 HCl and oxalic acid crystals.

Chairman B.O.S.

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DAVANGERE UNIVERSITY B.Sc. BIOCHEMISTRY

(KSHEC-SEP Syllabus: 2024-25)

24SEPBC-II: BIOMOLECULES AND CELLULAR BIOCHEMSITRY

TOTAL HOURS-56

Course Learning Objectives:

- a) To understand the structure and function of various biomolecules which constitute living organisms.
- b) To understand the structure and biological importance of carbohydrates and lipids.
- c) To understand the structure and properties of amino acids, peptides, proteins and nucleic acids.
- d) To understand the structure and dynamics of cell membrane and transport mechanism.
- e) To understand the cell- cell interaction, cell division and cell death.

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

- a) To know the structures and biological importance of carbohydrates and lipids.
- b) To know the structure and properties of amino acids, peptides, proteins and nucleic acids.
- c) Differentiate between prokaryotic and eukaryotic cell structure, cell-cell interaction, cell transport, cell division and cell death.

PART-A: BIOMOLECULES

UNIT 1:

Chapter-2.1.1

(14 Hrs)

CARBOHYDRATES: Classification and biological importance. Steriochemistry of monosaccharides, Enantiomers, Epimers, anomers and diasteriomers. Structure and biological importance of Monosaccharides: Structure and biological importance of Glucose, fructose, Galactose, Mannose and Ribose. Oxidation, Reduction and reaction with phenyl hydrazine.

Chapter-2.1.2

Disaccharides: Structure and biological significance of sucrose, lactose, maltose and Isomaltose.

Polysaccharides: Classification, Partial structure, occurrence and importance of homopolysaccharides- starch, glycogen and cellulose.

Heteropolys accharides -occurence, repeating units and importance of glycosaminoglycanschondrointin sulphate, keratan sulphate, dermatan sulphate and heparin.

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Chapter-2.1.3

LIPIDS: Classification and biological role.

Fatty acids: Nomenclature of saturated and unsaturated and unsaturated fatty acids. Physiological properties/importance.

Acylglycerols and their properties like saponification value, iodine value, acid value and their significance.

Phospholipids: Structure of lecithin, cephalins, phosphotidylinosital, plasmalogens, and cardiolipin. Biological role of phosphoglycerides. Structure and functions of (compound-phospho and glycolipids and derived lipids).

Sphingolipids: Structure and importance of sphingomyelin.

Glycosphingolipids: Structure and importance of gangliosides and cerebrosides.

Eicos anoids.

UNIT 2:

(14 Hrs)

Chapter-2.2.1

Amino acids: Definition, structure and classification of amino acids based on polarity and charge, Stereoisomerism, structure of standard amino acids, three letter and single letter abbreviations of amino acids, non standard and non protein amino acids.

Ionisation of amino acids – Acid- base properties, titration curves of amino acids, zwitterionic properties, optical activity of amino acids, reactions of amino acids. Ninhydrin, phenylisothiocyanate, Dansyl chloride and formaldehyde and their practical significance.

Chapter-2.2.2

Peptides and proteins: Definition and formation of peptide bond, structure and function of glutathione, vasopressin and oxytocin.

Proteins: Classification based on structure and functions, elementary studies of primary, secondary, tertiary and quaternary structure of protein. Tertiary structure of myoglobin and quaternary structure of Hemoglobin. Denaturation of proteins.

Chapter-2.2.3

Nucleic acids: Components of nucleic acids, structure of common purine and pyrimidine bases, tautomeric forms of bases, structure of nucleoside, nucleotide and polynucleotides. **DNA:** Watson and Crick model of DNA, forms of DNA, physical properties of DNA, Tm curve of DNA. **RNA:** types of RNA (t- RNA. m-RNA, r-RNA) unusual bases of nucleic acids.

PART-B: CELLULAR BIOCHEMISTRY

UNIT 3:

(14 Hrs)

Chapter-2.3.1

Cell wall and Cell membrane: Prokaryotic- Gram positive and Gram negative bacteria, eukaryotic cell wall - composition and functions.

Chapter-2.3.2

Cell membrane: Fluid mosaic model, monolayer, bilayer and liposomes as a model membrane system, Lateral and transverse movement of lipids and proteins, membrane fluidity and factors affecting membrane fluidity.

Chapter-2.3.3

Membrane transport- simple diffusion and facilitated diffusion. Passive transport, active transport, Primary active transport(Na⁺- K⁺ ATPase pump) and Secondary active transport(Na⁺- glucose transporter), Ion channel (voltage gated and ligand gated- acetyl choline receptors), Endocytosis, phagocytosis, pinocytosis and exocytosis in brief.

UNIT 4:

(14 Hrs)

Chapter-2.4.1

Extracellular matrix: Cell matrix proteins, cell matrix interactions, cell- cell interactions. junctions-adherence junction, tight junction, gap junction, desmosomes, hemidesmosomes, focal adhesions. Non-junctional adhesions-Caderins, Integrins and Selectins.

Chapter-2.4.2

Cell division and Cell cycle:

Types of cell division-Binary fission (Bacteria), budding (bacteria and yeast). Somatic cell division and reductioncell division, cytokinesis,. Stages in mitosis and meiosis. Overview of cell cycle, stages and check points.

Chapter-2.4.3

Cell death: Definition and differences between apoptosis and necrosis.

Suggested References/Text Books:

- 1. Harper's Illustrated Biochemistry-Rodwell, Bender, Botham, Kennelly and Weil, Lange Publishing, 31st Edition.
- 2. Text book of Biochemistry-Vasudevan, Shree Kumari, jAYPEE Brothers Medical Publishers, 2016.
- 3. Biochemistry-U Satyanarayana and U Chakrapani, Elsevier India, 2016
- 4. Biomolecules and Cell Biology-Prof.R.K Gupta, Rastogi Publications.
- 5. Cell Biology-P.S. Verma and V.K. Agarwal (2016). S Chand Publishing.
- 6. Essentials of Cell Biology-Sanjay Kumar Sharma, Agrotech press 1ST edition.
- 7. Cell Biology- C.B. Powar, Himalaya publishing House, 2010
- 8. Cell Biology: Fundamentals and Applications- Arunima Mukerjee, Oxford Book Company, 2009
- 9. Cell and Molecular Biology-E.D.P De Robertis and E.M.F. De Robertis, Lea and Febiger.
- 10. The Cell-Geoffrey Cooper and Robert.E. Hausman, Sinauer Associates, 2018
- 11. Moelcular Cell Bilogy -J.E. Darnell, H. Lodish, David Baltimore. W.H Freeman and Co,2002
- 12. Lehninger Principles of Biochemistry-David L. Nelson and Michael M.Cox, WH. Freeman, Seventh Edition.
- 13. Text Book of Biochemistry-Edward S West, Wilbert R Todd, Howard S Mason, John T Van Bruggen, Macmillan.
- 14. Principles of Biochemistry- Donald Voet, Charlotte W Pratt, Judith G Voet, Wiley, International Student Version Edition (2012)
- 15. Lippincot's Illustrated Reviews, Biochemistry- Denise Ferrier, Wolters Kluwer India Pvt. Ltd. Seventh edition (2017).

24SEPBC-II Practical: BIOMOLECULES AND CELLULAR BIOCHEMISTRY

Duration: 4hrs/Week

- 1. Qualitative analysis of Carbohydrates: Glucose, Fructose, Lactose, Maltose, Sucrose and starch.
- 2. Qualitative analysis of Amino acids
- 3. Qualitative analysis of Proteins: Albumin, casein
- 4. Qualitative analysis of Lipids
- 5. Study of mitosis using onion root tips.
- 6. Study of meiosis using onion flower bud.
- 7. Determination of Acid value of an oil sample.
- 8. Determination of Saponification number.
- 9. Determination of Iodine value.
- 10. Extraction of starch from potato
- 11. Extraction of casein from milk.

Practical proper Examination I & II semesters

Duration: 3Hrs

• Experimentation (Major & Minor/Spotters) -

30 Marks

Viva Voice

10 Marks

Total 40 Marks

Internal Assessment for Practical Paper/Course I-II semesters

Attendance

05 Marks

Record/Journal

05 Marks

Total 10 Marks

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

Sl. No.	Continuous Assessment Programme/Internal Assessment				
(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				

• 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.

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Department of Blochemistry

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THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR PAPER/COURSE/SUBJECT: BIOCHEMISTRY (Semesters I & II)

B.Sc. Semester-I Degree Examination; 2024-25 (Semester Scheme; New Syllabus: 2024-25)

SUBJECT: BIOCHEMISTRY

Paper –::	
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:	$(2\times10=20)$
a)	
b)	
c)	
d)	
e)	
f)	
g)	
h)	
i)	
Ú	
SECTION-B	
Answer any SIX of the following:	$(5 \times 6 = 30)$
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	

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SECTION -C

Answer Any Three of the following:

 $(10 \times 3 = 30)$

- 10. From Unit-I
- 11. From Unit-II
- 12. From Unit-III
- 13. From Unit-IV

DAVANGERE UNIVERSITY B.Sc. BIOCHEMISTRY

(KSHEC-SEP Syllabus: 2024-25)

<u>Titles of the Theory papers/courses from</u> <u>Semester-III to Semester-VI</u>

SEMESTER-III

24SEPBC-III: BIOCHEMICAL TECHNIQUES AND ENZYMOLOGY TOTAL HOURS -56

24SEPBC-III Practical: BIOCHEMICAL TECHNIQUES

Open Elective papers/courses

24SEPBC-OE1(A): Basic Principles of Biochemistry

TOTAL HOURS -32

24SEPBC-OE1(B): Clinical Biochemistry

TOTAL HOURS -32

SEMESTER-IV

24SEPBC-IV: HUMAN PHYSIOLOGY

TOTAL HOURS-56

24SEPBC-IV Practical: ENZYMOLOGY

Open Elective papers/courses

24SEPBC-OE2(A): Analytical Biochemistry

TOTAL HOURS -32

24SEPBC-OE2(b): Nutritional in Health and Disease

TOTAL HOURS -32

SEMESTER-V

24SEPBC-VA: BIOENERGETICS AND METABOLISM

TOTAL HOURS-56

24SEPBC-VB: CLINICAN BIOCHEMISTRY AND NUTRITION

TOTAL HOURS -56

24SEPBC-V Practical: CLINICAL BIOCHEMISTRY

SEMESTER-VI

24SEPBC-VIA: MOLECULAR BIOLOGY AND GENETIC ENGINEERING

TOTAL HOURS-56

24SEPBC-VIB: IMMUNOLOGY AND BASIC ENDOCRINOLOGY

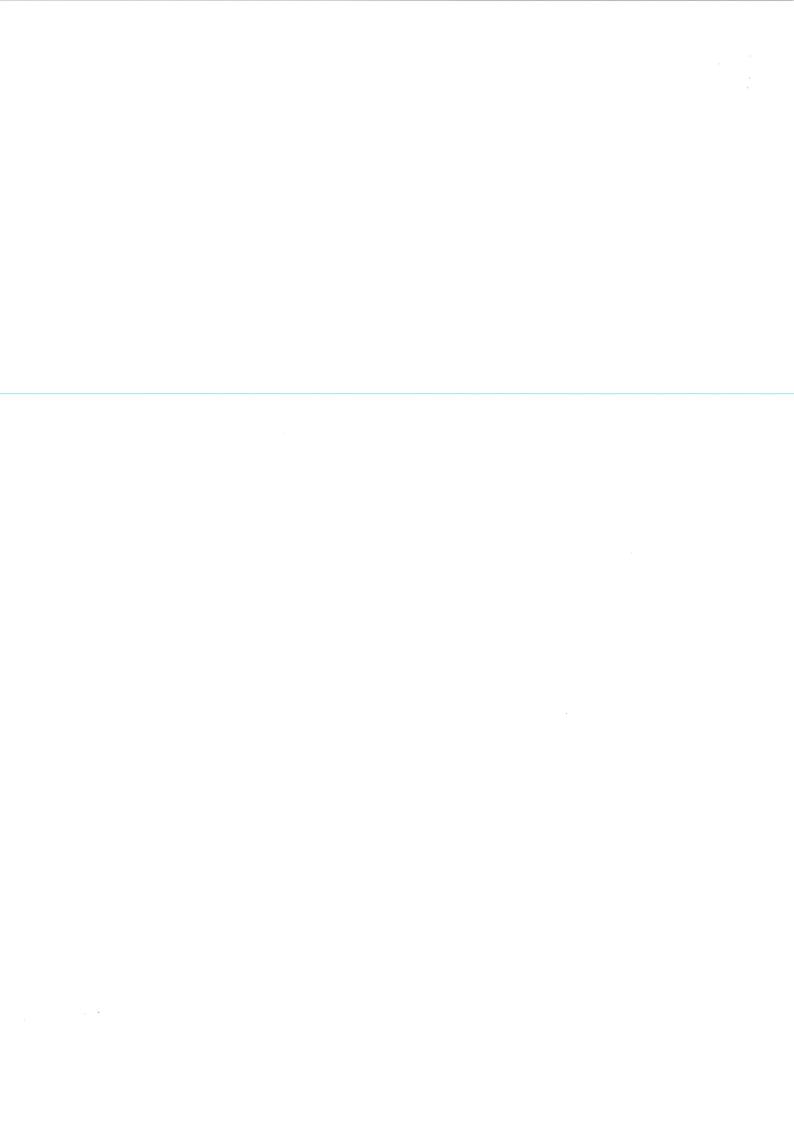
TOTAL HOURS-56

24SEPBC-VI Practical: MOLECULAR BIOLOGY AND IMMUNOLOGY

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Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25

a. 3 Majors with a General degree in all 6 Semesters

(Course Structure, Scheme of Teaching and Evaluation - 2024-25)

Curriculum Framework for UG Programmes as suggested by KSHEC (As per G.O. No.: ED 166 UNE 2023, Bengaluru, dated: 08-05-2024)

Sl. No.	Subject Category	No. of Credits
1	Major Courses	90
2	Languages	24
3	Compulsory	10
4	Electives/Optional	04
	Total	128

Note: Total Credits required to award Degree as per KSHEC: 128 (Minimum) and 150 (Maximum) for UG Degree.

Actual allocation of credits in Davangere University for UG-Science programmes

Sl. No.	Subject Category	No. of Credits
1	Major Courses	110
2	Languages	24
3	Compulsory	10
4	Electives/Optional	04
	Total	148

Semester-wise allocation of credits in Davangere University for UG-Science programmes

Year	Semester	Credits	Total Credits
1	I	23	4.5
1	II	23	46
2	III	25	50
2	IV	25	50
3	V	26	52
	VI	26	52
Total		148	148

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Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25

Case 1 or a.: 3 Majors with a General degree in all 6 Semesters – Number of papers/courses and credit course-wise in all semesters

Sl. No.	Paper/Course Code	Title of the Paper/Course	Subject Category	Teaching Hours per week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
		2					0	0	10
1	2	3	4	5	6	7	8	9	10
		Semest	e r-I						
	24-MC-IA		MC-T	04	80	20	100	03	3 Hrs.
	Practical – IA		MC-P	04	40	10	50	02	3 Hrs.
	24-MC-IB	24-MC-IB			80	20	100	03	3 Hrs.
	Practical – IB	MC-P	04	40	10	50	02	3 Hrs.	
1	24-MC-IC	MC-T	04	80	20	100	03	3 Hrs.	
	Practical – IC	MC-P	04	40	10	50	02	3 Hrs.	
	Language 1	LNG1	04	80	20	100	03	3 Hrs.	
	Language 2	LNG1	04	80	20	100	03	3 Hrs.	
	Environmental Studies (Compulsory 1)			02	40	10	50	02	2 Hrs.
			34	560	140	700	23		
Semester-II									
	24-MC-IIA		MC-T	04	80	20	100	03	3 Hrs.
	Practical – IIA	MC-P	04	40	10	50	02	3 Hrs.	
	24-MC-IIB		MC-T	04	80	20	100	03	3 Hrs.
	Practical – IIB	×	MC-P	04	40	10	50	02	3 Hrs.
2	24-MC-IIC		MC-T	04	80	20	100	03	3 Hrs.
	Practical – IIC		MC-P	04	40	10	50	02	3 Hrs.
	Language 1		LNG1	04	80	20	100	03	3 Hrs.
	Language 2		LNG1	04	80	20	100	03	3 Hrs.
	Indian Constitution (CMPL	02	40	10	50	02	2 Hrs.
		Total		34	560	140	700	23	

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Sl. No.	Paper/Course Code	Title of the Paper/Course	Subject Category	Teaching Hours per week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration		
1	2	3	4	5	6	7	8	9	10		
Semester-III											
	24-MC-IIIA		MC-T	04	80	20	100	03	3 Hrs.		
	Practical – IIIA		MC-P MC-T	04	40	10	50	02	3 Hrs.		
				04	80	20	100	03	3 Hrs.		
	Practical – IIIB 24-MC-IIIC	MC-P	04	40	10	50	02	3 Hrs.			
3	Practical – IIIC		MC-T	04	80	20	100	03	3 Hrs.		
			MC-P	04	40	10	50	02	3 Hrs.		
	Language 1 Language 2	LNG1	04	80	20	100	03	3 Hrs.			
	Computer Skills (Con	nnulcory 2)	LNG1	04	80	20	100	03	3 Hrs.		
	Elective/Optional	CMPL	02	40	10	50	02	2 Hrs.			
	Elective/Optional EL/OP					10	50	02	2 Hrs.		
		Total		36	600	150	750	25			
		Semeste	r-IV								
	24-MC-IVA		MC-T	04	80	20	100	03	3 Hrs.		
	Practical – IVA		МС-Р	04	40	10	50	02	3 Hrs.		
	24-MC-IVB		MC-T	04	80	20	100	03	3 Hrs.		
	Practical – IVB		МС-Р	04	40	10	50	02	3 Hrs.		
4	24-MC-IVC		MC-T	04	80	20	100	03	3 Hrs.		
	Practical – IVC		МС-Р	04	40	10	50	02	3 Hrs.		
	Language 1 L			04	80	20	100	03	3 Hrs.		
	Language 2			04	80	20	100	03	3 Hrs.		
	Personality Development (Compulsory 4)			02	40	10	50	02	2 Hrs.		
	Elective/Optional		EL/OP	02	40	10	50	02	2 Hrs.		
	Total			36	600	150	750	25			

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Sl. No.	Paper/Course Code	Title of the Paper/Course	Subject Category	Teaching Hours per Week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
		Semeste	er-V						
	24-MC-VA1		МС-Т	04	80	20	100	03	3 Hrs.
	24-MC-VA2		МС-Т	04	80	20	100	03	3 Hrs.
	Practical – VA		МС-Р	04	40	10	50	02	3 Hrs.
	24-MC-VB1	MC-T	04	80	20	100	03	3 Hrs.	
5	24-MC-VB2	MC-T	04	80	20	100	03	3 Hrs.	
	Practical – VB		MC-P	04	40	10	50	02	3 Hrs.
	24-MC-VC1	MC-T	04	80	20	100	03	3 Hrs.	
	24-MC-VC2	MC-T	04	80	20	100	03	3 Hrs.	
	Practical – VC	MC-P	04	40	10	50	02	3 Hrs.	
	Elementary Research (Compulsory 5)	CMPL	02	40	10	50	02	2 Hrs.	
	Total				640	160	800	26	
		Semeste	er-VI						
	24-MC-VIA1		MC-T	04	80	20	100	03	3 Hrs.
	24-MC-VIA2		MC-T	04	80	20	100	03	3 Hrs.
	Practical – VIA		MC-P	04	40	10	50	02	3 Hrs.
	24-MC-VIB1		MC-T	04	80	20	100	03	3 Hrs.
6	24-MC-VIB2		MC-T	04	80	20	100	03	3 Hrs.
	Practical – VIB		MC-P	04	40	10	50	02	3 Hrs.
	24-MC-VIC1		MC-T	04	80	20	100	03	3 Hrs.
	24-MC-VIC2			04	80	20	100	03	3 Hrs.
	Practical – VIC MC-P Project/Internship/Dissertation/AEDP AEDP				40	10	50	02	3 Hrs.
	Project/Internship/Disse		AEDP	04		10	50	02	
-		Total Count total		40	3600	160	4500	149	
	Grand total			218	3600	900	4500	148	

MC: Major Course; MC-T: Major Course Theory; MC-P: Major Course Practical; CMPL: Compulsory; EL/OP: Elective/Optional; AEDP: Project/Internship/Dissertation/Apprenticeship Embedded Degree Programme.



Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25

Case 1 or a.: 3 Majors with a General degree in all 6 Semesters – Number of papers/courses and credit course-wise in all semesters

Sem.	Major 1	Major 2	Major 3	Elective/ Optional	Language	Compulsory			
01 Theory paper/course and 01 Practical paper/course in each Major Subject (T+P)									
I	3+2 = 5	3+2 = 5	3+2 = 5		Language1- 3 Language2- 3	Compulsory1 2 Environmental Studies			
II	3+2 = 5	3+2 = 5	3+2 = 5		Language1- 3 Language2- 3	Compulsory2 2 Indian Constitution			
Ш	3+2 = 5	3+2 = 5	3+2 = 5	Elective 1 - 2	Language1- 3 Language2- 3	Compulsory3 2 Computer Skills			
IV	3+2 = 5	3+2 = 5	3+2 = 5	Elective2- 2	Language1- 3 Language2- 3	Compulsory4 2 Personality Development Skills			
02 Theory papers/courses and 01 Practical paper/course in each Major Subject (T+T+P)									
V	3+3+2 = 8	3+3+2 = 8	3+3+2 = 8			Elementary Research Methodology 2			
VI	3+3+2 = 8	3+3+2 = 8	3+3+2 = 8			Project/Internship/ Dissertation 2			
				100 to 100					
Total	36	36	36	04	24	12			
Jotos:			Total	148 Credits					

Notes:

- 1. Credit for the three major papers/courses includes theory, practical (skill enhancement paper/course), and tutorial/assignment/survey-based assignment/internship.
- 2. Practical paper(s)/course(s) (Compulsory/Skill enhancement paper/course) should provide practical experience which is complimentary to theory major paper(s)/course(s).
- 3. Project Work/Dissertation/Internship/Apprenticeship Embedded Degree Programme (AEDP) should also be considered to be part of the curriculum.
- 4. Project work/Dissertation/Internship during Semester-VI: Students for Project work may be allotted as per following formula.

Guidelines for framing the Syllabus for Theory papers/courses of Science subjects

The Board of Studies of respective Science subjects should ensure that,

- Every Theory paper/course or (Major Course) from **Semester-I to Semester VI** should have 5 **Course Learning Objectives (CLOs)** marked as (a e), wherein the first objective highlights about the course or theory paper (over all), while each of the other 4 CLOs should highlight each unit (Unit-1 to Unit-4) of the paper/course.
- Similarly Every course or Theory paper (Major Paper/Course) from **Semester-I to Semester VI** should have 4 Course Outcomes (COs) marked as (a d), wherein each of the 4 COs should highlight outcome of each unit (Units1 to 4) of the paper/course.
- Every Theory paper/course (Major Paper/Course) from Semester-I to Semester-VI shall have 04 Units for 56 hrs. of teaching. Each Unit shall be of 14 hrs. of teaching, wherein each unit shall have 3 chapters with chapter sub-headings.
- In Semester-III and Semester-IV elective papers/courses are offered. There shall be 02 elective papers/courses offered during each semester (Semester-III and Semester-IV) by every major subject offering Department, where a student shall choose/select/opt 01 elective paper out of two to study in each semester (Semester-III and Semester-IV).
- At the end of syllabus of every Theory paper/course (Semester-I to VI) List of Reference books or Suggested Readings should be provided.
- List of References under every Theory paper/course should include both Text books of both older editions and latest editions.
- Title of each Major subject (Theory and Practical papers/courses) should be clear without any duplication and ambiguity.
- Content in each chapter of every unit should not have any repetition or overlaps. Content should have latest updates with relevance.

The Board of Examiners of respective Science subjects should ensure while framing, scrutinizing and approving the question paper(s) for ensuing end-semester examination(s) that, each chapter in every unit of a theory paper/course shall be given preference to have questions in the final version of question paper(s).

THEORY PAPER/COURSE MODEL SEMESTER-I

24MC-I; PAPER-I: PRINCIPLES OF BIOCHEMISTRY AND CELL BIOLOGY

TOTAL HOURS -56

Course Learning Objectives:

- a) To understand water as solvent of life, buffer and importance of buffers in biological systems
- b) To understand atom and chemical bonding, colloids and their role in biological system
- c) To acquire knowledge of organic reactions, Chemical kinetics and catalysis, thermodynamics, exothermic and endothermic reactions
- d) To study the differences between animal and plant cellular system, Cell organelles and Cytoskeletal elements
- e) To acquire knowledge on basic principles biochemistry and understanding of cell and cell organelles.

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

- a) Explain importance of water and buffers in biological system.
- b) Describe the chemical bonding and structure
- c) Identify chemical reactions and thermodynamics
- d) Differentiate plant and animal cells and cell organelles.

UNIT 1:	(14 Hrs)
UNIT 2:	(14 Hrs)
UNIT 3:	(14 Hrs)
UNIT 4:	(14 Hrs)

Suggested References/Text books:

- > Principles of Physical Chemistry BR Puri, Madan S Pathania, LR Sharma, Vishal Publishing Co.
- > Cell Biology -P.S. Verma and V.K. Agarwal S, Chand Publishing(2016).
- Essentials of Cell Biology -Sanjay Kumar Sharma, Agrotech press 1ST edition.
- > Cell Biology C.B. Powar, Himalaya publishing House, 2010
- Cell Biology: Fundamentals and Applications Arunima V Mukherjee, Oxford Book Company, 2009
- > Cell and Molecular Biology -E.D.P De Robertis and E.M.F. De Robertis, Lea and Febiger.
- > The Cell: A Molecular Approach -Geoffrey Cooper and Robert E. Hausman, Sinauer Associates, 2018
- Molecular Cell Biology -J.E. Darnell, H. Lodish, David Baltimore. W.H. Freeman and Co,2002

THEORY PAPER/COURSE MODEL

EL/OP THEORY PAPERS/COURSES (Semesters III & IV): MOLECULAR BIOLOGY AND RECOMBINAT DNA TECHNOLOGY

TOTAL HOURS -32 Hrs

Course Learning Objectives:

- a) To acquire knowledge on DNA as genetic material, DNA replication, transcription, Genetic code and translation
- b) To understand the DNA damage, chromosomal mutation and gene mutation, DNA Recombination, DNA Repair and Concept of operon.
- c) To study the techniques and tools for RDT, vectors, Introduction of r-DNA into host cells and Identification of recombinants
- d) To learn the techniques involved in Genetic engineering, Polymerase chain reaction, Blotting techniques and Applications of Genetic engineering
- e) To understand molecular biology and learn the techniques for development of recombined clones.

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

- a) Explain DNA as genetic material, the process of replication, transcription and translation
- b) Describe the DNA damage, chromosomal and gene mutation, DNA Recombination, DNA Repair and Concept of operon
- c) Identify the tools for RDT, vectors, method to introduction of r-DNA into host cells and recombinants clones.
- d) Highlight the role of Polymerase chain reaction, Blotting techniques and Applications of Genetic engineering for development of recombinant clone.

UNIT 1:	(8 Hrs)
UNIT 2:	(8 Hrs)
UNIT 3:	(8 Hrs)
UNIT 4:	(8 Hrs)

Suggested References/Text Books:

- Essentials of Molecular Biology-Malathi.V, Pearson India, 1st Edition.
- Molecular Biology of the Gene-James D Watson, Pearson,
- Lehninger Principles of Biochemistry-David.L.Nelson and Michael M.Cox, WH. Freeman, seventh Edition.
- > Text Book of Biotechnology-RC Dubey, Mc Graw hill Education, 1st Edition.
- Text Book of Biotechnology-HK Das, Wiley, 5th Edition.
- > Biotechnology-BD Singh, Kalyani Publishers.
- > Biotechnology-U Satyanarayana, Books and Allied Ltd.
- Gene cloning and DNA Analysis: An Introduction-T.A. Brown. Wiley-Blackwell; Seventh Edition.
- > Principles of gene Manipulation and Genomics-Sandy B.Primrose, Richard Twyman, Oxford, Seventh Edition
- Molecular Biotechnology: Principles and Applications of Recombinant DNA-Bernard R. Glick, Jack J. Pasternak

Practical Proper Examination I-VI semesters

Duration: 3Hrs

• Experimentation (Major & Minor/Spotters) -

30 Marks

• Viva Voice

10 Marks

Total

40 Marks

Internal Assessment for Practical Paper/Course I-VI semesters

• Attendance

05 Marks

Record/Journal

05 Marks

Total

-----10 Marks

Project Work/Internship during VI semester

• Project work/Dissertation/Internship and preparation of Report -

40 Marks

• Viva Voice

10 Marks

Total

-----50 Marks

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Registrar
Davangere University
Shivagangotri, Davangere.

Chairman B.O.S.

Chairman B.O.S.

Capartment of Biochemistry

Davangere University

Shivagangothri, Davangere-577807

Continuous Assessment Programme/Internal Assessment/Formative Assessment Major Papers/Courses & Languages

Sl. No.			
(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			

• Attendance Marks-breakup

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%		03 Marks
05-7070		OJ WIGHNS
90-95%	-	04 Marks
>95%	-	05 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment Compulsory Papers/Courses & Elective or Optional Papers/Courses

Sl. No.	Continuous Assessment Programme/Internal Assessment			
(1)	(2)	(3)		
01	Two Session Tests with proper record for assessment $(2+2=4)$			
02				
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

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR COURSES/SUBJECTS (Semesters I -VI)

B.Sc. Semester-I Degree Examination; 2024-25 (Semester Scheme; New Syllabus: 2024-25)

SUBJECT: SCIENCE MAJOR COURSE

SOBJECT: SCIENCE MAJOR COURSE	
Paper –: Paper Code:	
Paper Code:	
Time: 3 Hours	Max. Marks: 80
Instructions to candidates:1) All sections are compulsory2) Draw neat and labelled diagrams wherever necessary.	
SECTION-A	
1. Answer all the following questions:	(2×10=20)
a)	(= 10 20)
b)	
c)	
d)	
e)	
f)	
g)	
h)	
i)	
j)	
SECTION-B	
Answer any SIX of the following:	(5×6=30)
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	Λ

Department of Biochemistry Davangere University
Shivagangothri, Davangere-577907 11

SECTION -C

Answer Any Three of the following:	$(10 \times 3 = 30)$
10.	From Unit-I/Unit-I
11.	From Unit-II/Unit-II
12.	From Unit-III/Unit-III
13.	From Unit-IV/Unit-IV

THEORY EXAMINATION QUESTION PAPER PATTERN FOR COMPULSORY & ELECTIVE OR OPTIONAL PAPERS/COURSES (Semesters I - V)

B.Sc. Semester-I/II/III/IV/V Degree Examination; 2024-25 (Semester Scheme; New Syllabus: 2024-25)

SUBJECT: SCIENCE COURSES

	SCHOOL SCIENCE CO	UKSES
Paper – CMPL & ELECT	IVE/OPTIONAL I - V :	
	Paper Code:	
Time: 2 Hours	ections are compulsory wheat and labelled diagrams wherever necessary. SECTION-A Owing questions: (2×5=10) SECTION-B The following: (5×6=30) Chairman B.O.S. Department of Biochemistry Davangere University Shivarangound, Davangere 577607	
Instructions to candidates:	mouleary	
2) Draw neat and labe	mpulsory elled diagrams wherever necessar	·
		<i>y</i> .
Answer all the following question	ons:	(2×5=10)
1.		
2.		
3.		
4.		
5.		
Answer any SIX of the following		(5×6-20)
6.	•	(5^0-30)
7.		
8.		
9.		
10.		
11.		
12.		
13.		
		\wedge
		11. 200
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Q bu	0 mg 12/2029	Department of Biochemistry
Dr. U.S. MAHABALESHWAR	Registrar	Shivagangothri, Davangere-577607
M.Sc., M.Phil., Ph.D. rofessor & Dean, Science & Technology	Davangere University	

Shivagangotri, Davangere.

Davangere University, Shivagangotri, Davangere-577 007, Karnataka, India.





Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25 a. 3 Majors with a General degree in all 6 Semesters

(Course Structure, Scheme of Teaching and Evaluation - 2024-25)

Curriculum Framework for UG Programmes as suggested by KSHEC, Government of Karnataka

(As per G.O. No.: ED 166 UNE 2023, Bengaluru, dated: 08-05-2024)

Sl. No.	Subject Category	No. of Credits
1	Major Courses	90
2	Languages	24
3	Compulsory	10
4	Electives/Optional	04
	Total	128

Note: Total Credits required to award Degree as per KSHEC: 128 (Minimum) and 150 (Maximum) for UG Degree.

Allocation of credits in Davangere University for UG-Science programmes

Class a: 3 Subjects combination in all 6 Semesters

Sl. No. Subject Category		No. of Credits
1	Major Courses	110
2	Languages	24
3	Compulsory	10
4	Electives/Optional	04
	Total	148

Semester-wise allocation of credits for UG-Science programmes of Davangere University

(Three Subjects combination)

Year	Semester	Credits	Total Credits		
1	I	23	4.6		
1	II	23	46		
2	III	25	7.0		
2	IV	25	50		
3	V	26	50		
3	VI	26	52		
Total		148	148		

Semester-wise allocation of credits in Davangere University for UG-Science programmes for framing syllabus of One Major Subject in Three Major Subjects combination (Class a stream)

Year	Semester	Credits	Total Credits
1	I	05	4.0
1	II	05	10
2	III	07*	4.4.5
2	IV	07*	14*
3	V	08	10*
	VI	10	18*
Total		40*	42**

^{*}Total number of credits including Major papers/courses (T+P) and Discipline specific Elective/Optional papers/courses.

(AEDP). Dr. U.S. MAHABALESHWAR
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Davangere-577 007, Karnataka, India

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Davangere University

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^{*}Total number of credits including Major papers/courses (T+P) and Discipline specific Elective/Optional papers/courses and Project Work/Dissertation/Internship/Apprenticeship Embedded Degree Programme



Bachelor of Science (B.Sc.) Semester Scheme Curriculum Structure for Undergraduate Programme for 2024-25

Syllabus to be framed by respective Science subjects (Departments) for One Subject

Sl. No.	Paper/Course Code	Title of the Paper/Course	Subject Category	Teaching Hours/ week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
	24 MC I	Sen	nester-I	04	80	20	100	03	3 Hrs.
1	24-MC-I Practical – I		MC-T MC-P	04	40	10	50	02	3 Hrs.
	Practical – 1	 Total	MIC-I	08	120	30	150	05	
			ester-II	00	1=0		200		
	24-MC-II	Sem	MC-T	04	80	20	100	03	3 Hrs.
2	Practical – II		MC-P	04	40	10	50	02	3 Hrs.
		Total		08	08	30	150	05	
		Sem	ester-III						
	24-MC-III		MC-T	04	80	20	100	03	3 Hrs.
3	Practical – III		MC-P	04	40	10	50	02	3 Hrs.
	Elective/Optional – I	*	EL/OP-I	02	40	10	50	02	2 Hrs.
Total			10	160	40	200	07		
		Sem	ester-IV						
	24-MC-IV		MC-T	04	80	20	100	03	3 Hrs.
4	Practical – IV		MC-P	04	40	10	50	02	3 Hrs.
	Elective/Optional-II*		EL/OP-II	02	40	10	50	02	2 Hrs.
	Total		10	160	40	200	07		
		Sen	nester-V	,					
	24-MC-VA		MC-T	04	80	20	100	03	3 Hrs.
5	24-MC-VB		MC-T	04	80	20	100	03	3 Hrs.
	Practical – V		MC-P	04	40	10	50	02	3 Hrs.
		Total		12	200	50	250	08	
Semester-VI									
	24-MC-VIA		MC-T	04	80	20	100	03	3 Hrs.
6	24-MC-VIB		MC-T	04	80	20	100	03	3 Hrs.
	Practical – VI		MC-P	04	40	10	50	02	3 Hrs.
	Project work/Disserta	ntion/Internship/AEDP	AEDP	04	40	10	50	02	3 Hrs.
		Total		14	200	60	250	10	
		Grand total		64	960	240	1200	42	

MC: Major Course; MC-T: Major Course Theory; MC-P: Major Course Practical; EL/OP: Elective/Optional; AEDP: Apprenticeship Embedded Degree Programme.

^{*}In Semester-III and Semester-IV elective papers/courses are offered. There shall be 02 elective papers/courses offered during each semester (Semester-III and Semester-IV) by every major course offering Subject/Department, where a student shall choose semester (Semester-III and Semester-IV).

Chairman B.O.S.

Department of Biochemister semester (Semester-III and Semester-IV) by every major course offering Subject/Department, where a student shallchoose/select/opt



Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25

Case 1 or a.: 3 Majors with a General degree in all 6 Semesters – Number of papers/courses and credit course-wise in all semesters

Semester	Major Course (Paper) Major 1	Elective/ Optional	AEDP	
01 Theory pap	er/course and 01 Practic	al paper/course in each Major	Subject (T+P)	
I	3+2=5		, ,	
II	3+2 = 5			
III	3+2 = 5	Elective 1 - 2		
IV	3+2 = 5	Elective2- 2		
02 Theory papers/courses and 01 Practical paper/course in each Major Subject (T+T+P)				
V	3+3+2 = 8		, ,	
VI	3+3+2=8		Project/Internship/	
7.1	3+3+2 - 6		Dissertation 2	
THIS SEED AND SEED AN	NO 300 NO			
Total	36	04	02	
Grand Total 42 Credits				

Notes:

- 1. Credit for the three major papers/courses includes theory, practical (skill enhancement papers/course), and tutorial/assignment/survey-based assignment/internship.
- 2. Practical paper(s)/course(s) (Compulsory/Skill enhancement paper/course) should provide practical experience which is complimentary to theory major paper(s)/course(s).
- 3. Project Work/Dissertation/Internship/Apprenticeship Embedded Degree Programme (AEDP) should also be considered to be part of the curriculum.
- 4. Project work/Dissertation/Internship/Apprenticeship Embedded Degree Programme (AEDP) during Semester-VI: Students for Project work may be allotted as per following formula,

 $Project \ allot ment \ to \ Students \ = \frac{Total \ number \ of \ students \ in \ a \ three \ subjects \ combination}{Number \ of \ subjects \ in \ a \ combination \ (Three)}$

Registrar Pavangere University Myagangotri, Davangere. Dr. U.S. MAHABALESHWAR

M.Sc., M.Phil., Ph.D.

Professor & Dean, Science & Technology
Davangere University, Shivagangotri,
Davangere-077 007, Karnataka, India.

Guidelines for framing the Syllabus for Theory papers/courses of Science subjects

The Board of Studies of respective Science subjects should ensure that,

- Every Theory paper/course or (Major Course) from **Semester-I to Semester VI** should have 5 **Course Learning Objectives (CLOs)** marked as (a e), wherein the first objective highlights about the course or theory paper (over all), while each of the other 4 CLOs should highlight each unit (Unit-1 to Unit-4) of the paper/course.
- Similarly Every course or Theory paper (Major Paper/Course) from **Semester-I to Semester VI** should have 4 Course Outcomes (COs) marked as (a d), wherein each of the 4 COs should highlight outcome of each unit (Units1 to 4) of the paper/course.
- Every Theory paper/course (Major Paper/Course) from Semester-I to Semester-VI shall have 04
 Units for 56 hrs. of teaching. Each Unit shall be of 14 hrs. of teaching, wherein each unit shall
 have 3 chapters with chapter sub-headings.
- In Semester-III and Semester-IV elective papers/courses are offered. There shall be 02 elective papers/courses offered during each semester (Semester-III and Semester-IV) by every major subject offering Department, where a student shall choose/select/opt 01 elective paper out of two to study in each semester (Semester-III and Semester-IV).
- At the end of syllabus of every Theory paper/course (Semester-I to VI) List of Reference books or Suggested Readings should be provided.
- List of References under every Theory paper/course should include both Text books of both older editions and latest editions.
- Title of each Major subject (Theory and Practical papers/courses) should be clear without any duplication and ambiguity.
- Content in each chapter of every unit should not have any repetition or overlaps. Content should have latest updates with relevance.

The Board of Examiners of respective Science subjects should ensure while framing, scrutinizing and approving the question paper(s) for ensuing end-semester examination(s) that, each chapter in every unit of a theory paper/course shall be given preference to have questions in the final version of question paper(s).

Chairman B.O.S.

Department of Biochemistry

Davangere University

Shivagangothri, Davangere-577007

THEORY PAPER/COURSE MODEL

SEMESTER-I

24MC-I; PAPER-I: PRINCIPLES OF BIOCHEMISTRY AND CELL BIOLOGY

TOTAL HOURS -56

Course Learning Objectives:

- a) To understand water as solvent of life, buffer and importance of buffers in biological systems
- b) To understand atom and chemical bonding, colloids and their role in biological system
- c) To acquire knowledge of organic reactions, Chemical kinetics and catalysis, thermodynamics, exothermic and endothermic reactions
- d) To study the differences between animal and plant cellular system, Cell organelles and Cytoskeletal elements
- e) To acquire knowledge on basic principles biochemistry and understanding of cell and cell organelles.

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

- a) Explain importance of water and buffers in biological system.
- b) Describe the chemical bonding and structure
- c) Identify chemical reactions and thermodynamics
- d) Differentiate plant and animal cells and cell organelles.

UNIT 1:	(14 Hrs)
UNIT 2:	(14 Hrs)
UNIT 3:	(14 Hrs)
UNIT 4:	(14 Hrs)

Suggested References/Text books:

- > Principles of Physical Chemistry BR Puri, Madan S Pathania, LR Sharma, Vishal Publishing Co.
- > Cell Biology -P.S. Verma and V.K. Agarwal S, Chand Publishing(2016).
- Essentials of Cell Biology -Sanjay Kumar Sharma, Agrotech press 1ST edition.
- Cell Biology C.B. Powar, Himalaya publishing House, 2010
- Cell Biology: Fundamentals and Applications –ArunimaV Mukherjee, Oxford Book Company, 2009
- > Cell and Molecular Biology -E.D.P De Robertis and E.M.F. De Robertis, Lea and Febiger.
- > The Cell: A Molecular Approach -Geoffrey Cooper and Robert E. Hausman, Sinauer Associates, 2018
- Molecular Cell Biology -J.E. Darnell, H. Lodish, David Baltimore, W.H. Freeman and Co.2002

THEORY PAPER/COURSE MODEL

EL/OP THEORY PAPERS/COURSES (Semesters III & IV): MOLECULAR BIOLOGY AND RECOMBINAT DNA TECHNOLOGY

TOTAL HOURS -32 Hrs

Course Learning Objectives:

- a) To acquire knowledge on DNA as genetic material, DNA replication, transcription, Genetic code and translation
- b) To understand the DNA damage, chromosomal mutation and gene mutation, DNA Recombination, DNA Repair and Concept of operon.
- c) To study the techniques and tools for RDT, vectors, Introduction of r-DNA into host cells and Identification of recombinants
- d) To learn the techniques involved in Genetic engineering, Polymerase chain reaction, Blotting techniques and Applications of Genetic engineering
- e) To understand molecular biology and learn the techniques for development of recombined clones.

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

- a) Explain DNA as genetic material, the process of replication, transcription and translation
- b) Describe the DNA damage, chromosomal and gene mutation, DNA Recombination, DNA Repair and Concept of operon
- c) Identify the tools for RDT, vectors, method to introduction of r-DNA into host cells and recombinants clones.
- d) Highlight the role of Polymerase chain reaction, Blotting techniques and Applications of Genetic engineering for development of recombinant clone.

UNIT 1:	(8 Hrs)
UNIT 2:	(8 Hrs)
UNIT 3:	(8 Hrs)
UNIT 4:	(8 Hrs)

Suggested References/Text Books:

- Essentials of Molecular Biology-Malathi.V, Pearson India, 1st Edition.
- Molecular Biology of the Gene-James D Watson, Pearson,
- Lehninger Principles of Biochemistry-David.L.Nelson and Michael M.Cox, WH. Freeman, seventh Edition.
- Text Book of Biotechnology-RC Dubey, Mc Graw hill Education, 1st Edition.
- Text Book of Biotechnology-HK Das, Wiley, 5th Edition.
- > Biotechnology-BD Singh, Kalyani Publishers.
- > Biotechnology-U Satyanarayana, Books and Allied Ltd.
- > Gene cloning and DNA Analysis: An Introduction-T.A. Brown Wiley-Blackwell; Seventh Edition.
- > Principles of gene Manipulation and Genomics-Sandy B.Primrose, Richard Twyman, Oxford, Seventh Edition
- Molecular Biotechnology: Principles and Applications of Recombinant DNA-Bernard R. Glick, Jack J. Pasternak

Practical Proper Examination I-VI semesters

Duration: 3Hrs

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

Internal Assessment for Practical Paper/Course I-VI semesters

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

Project Work/Internship during VI semester

Project work/Dissertation/Internship and preparation of Report - 40 Marks
 Viva Voice - 10 Marks
 Total 50 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment Major Papers/Courses

Sl. No.	I fonting and Accocoment Unorganism (Internal Accocoment	
(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

Continuous Assessment Programme/Internal Assessment/Formative Assessment <u>Elective or Optional Papers/Courses</u>

Sl. No.	Sl. Continuous Assessment Programme/Internal Assessment	
(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

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR COURSES/SUBJECTS (Semesters I -VI)

B.Sc. Semester-I Degree Examination; 2024-25 (Semester Scheme; New Syllabus: 2024-25)

SUBJECT: SCIENCE COURSES

Pa	aper:	
Time: 3 Hours	Paper Code:	 Max. Marks: 80
Instructions to candidates:		Max. Marks: 80
	ctions are compulsory	
2) Draw	neat and labelled diagrams where	ver necessary.
1. Answer all the following	SECTION-	
	questions:	$(2\times10=20)$
a) b)		
c)		
d)		
e)		
f)		
g) h)		
i)		
•		
j)	OT CTV O X X	_
American CIN CAL CIL	SECTION-I	
Answer any SIX of the follows:	wing:	(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		Λ
9. From Unit-IV		1.1.
		Department of B.O.S.
		Davangere University
		Chairman B.O.S. Department of Biochemistry Davangere University Shivagangothri, Davangere-577607

SECTION -C

Answer Any Three of the following:

 $(10 \times 3 = 30)$

- 10. From Unit-I
- 11. From Unit-II
- 12. From Unit-III
- 13. From Unit-IV

THEORY EXAMINATION QUESTION PAPER PATTERN FOR ELECTIVE OR OPTIONAL PAPERS/COURSES

(Semesters III & IV)

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

SUBJECT: SCIENCE COURSES

SUBJECT: SCIENCE COURSES				
Paper – ELECTIVE/OPTION	AL III & IV:			
Pape Time: 2 Hours	er Code:	Max. Marks: 40		
Instructions to candidates:		WIAX. WIAIKS: 40		
1) All sections are compulsory				
2) Draw neat and labelled diag	grams wherever necessary.			
	SECTION-A			
Answer all the following questions:		(2×5=10)		
1.		,		
2.				
3.				
4.				
5,				
Answer any SIX of the following:	SECTION-B	(5×6=30)		
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
		^		
. <	n. S			

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