

  
**UNIVERSITY OF MYSORE**  
Estd. 1916

**Vishwavidyanilaya Karyasoudha**  
**Crawford Hall, Mysuru- 570 005**

No.AC2(S)/55/2024-25

Dated: 20.07.2024

**Notification**

**Sub:-** Syllabus and Scheme of Examinations of Biochemistry (UG) programme (I & II Semester) from the Academic year 2024-25.


- Ref:-**
1. Decision of Board of Studies in Biochemistry (CB) meeting held on 10.06.2024.
  2. Decision of the Faculty of Science & Technology meeting held on 19-06-2024.
  3. Decision of the Academic Council meeting held on 28-06-2024.

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The Board of Studies in Biochemistry (CB) which met on 10-06-2024 has resolved to recommend & approved the Syllabus and Scheme of examinations of Biochemistry (UG) programme (I & II Semester) with effect from the Academic year 2024-25.

The Faculty of Science & Technology and Academic Council at their meetings held on 19-06-2024 and 28-06-2024 respectively has also approved the above said Syllabus and Scheme of examinations hence it is hereby notified.

The syllabus and Scheme of Examinations content may be downloaded from the University Website i.e., [www.uni-mysore.ac.in](http://www.uni-mysore.ac.in).

  
**Registrar**  
Registrar  
University of Mysore  
Mysore

**To:**

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Biochemistry, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Mathematics, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan, Manasagangothri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council, Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
10. Office Copy.

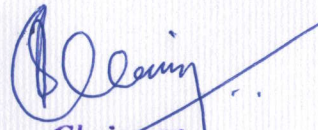


**UNIVERSITY OF MYSORE**  
**State Education Policy 2024-25**  
**SCHEME OF EXAMINATION FOR UNDERGRADUATE BIOCHEMISTRY**

Sem	Code		Title of the paper	Credit Pattern					C1	C2	C3	Total
				Theory	Tutorial	Practical	Credits	Total Credits				
I	DSC -1T	Theory	Bio-organic, Bio-inorganic & Bio-physical chemistry	3	0	0	3	5	10	10	80	100
	DSC -1P	Practical	Volumetric analysis –practical-1	0	0	2	2		5	5	40	50
II	DSC-2T	Theory	Biomolecules	3	0	0	3	5	10	10	80	100
	DSC- 2P	Practical	Biomolecules-practical-2	0	0	2	2		5	5	40	50
III	DSC-3T	Theory	Biochemical Techniques & Enzymology	3	0	0	3	5	10	10	80	100
	DSC-3P	Practical	Biochemical Techniques	0	0	2	2		5	5	40	50
IV	DSC- 4T	Theory	Metabolism I & Human Physiology	3	0	0	3	5	10	10	80	100
	DSC-4P	Practical	Colorimetric Estimations	0	0	2	2		5	5	40	50
V	DSC-5T	Theory	Metabolism II & Molecular Biology	3	0	0	3	5	10	10	80	100
	DSC-5P	Practical	Enzyme Assay & Molecular Biology	0	0	2	2		5	5	40	50
	DSC-6T	Theory	Molecular Basis of Infectious Diseases	3	0	0	3	5	10	10	80	100
	DSC-6P	Practical	Molecular Basis of Infectious Diseases	0	0	2	2		5	5	40	50
VI	DSC-7T	Theory	Nutrition And Clinical Biochemistry	3	0	0	3	5	10	10	80	100
	DSC-7P	Practical	Nutrition And Clinical Biochemistry	0	0	2	2		5	5	40	50
	DSC-8T	Theory	Plant Biochemistry	3	0	0	3	5	10	10	80	100
	DSC-8P	Practical	Plant Biochemistry	0	0	2	2		5	5	40	50

NOTE: 1. Theory = 3 credits (3 hours/week); Practical= 2 credits (4 hours/week) or (One day/week)

2. Titles, credit pattern and marks distribution given for III to VI semesters are tentative only.

  
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 Mysore - 576 006  
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## Theory syllabus

B.Sc. Semester-I

Paper code: **DSC-1T: SEPBC-101**

Paper Title: **BIO-ORGANIC, BIO-INORGANIC & BIO-PHYSICAL CHEMISTRY**

Paper title	<b>BIO-ORGANIC, BIO-INORGANIC &amp; BIO-PHYSICAL CHEMISTRY</b>
Paper code	DSC-1T: SEPBC-101
Paper credits	03
Total contact hours	48
Duration of ESA (Hours)	03
Formative assessment marks	20
Summative assessment marks	80

### Unit 1: Bioorganic Chemistry

16 HRS

#### **i. Concept of Biochemistry:**

Definition and scope of biochemistry. Important discoveries in biochemistry.

**ii. Hydroxy acids:** Structure, properties & biological importance of lactic acid (Action of heat, oxidation), tartaric acid (salt formation) and citric acid (Action of heat, salt formation).

**Dicarboxylic acids and ketoacids** Structure & biological importance of succinic acid, fumaric acid, pyruvic acid,  $\alpha$ -ketoglutaric acid and oxaloacetic acid.

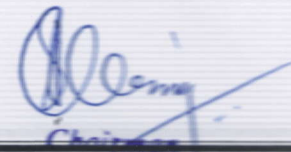
#### **iii. Heterocyclic compounds:**

Occurrence, structural formula and biological importance of the following - furan, pyrrole, thiophene, pyridine, pyran, thiazole, pyrimidine, purine, indole, imidazole.

#### **iv. Steroids:**

Basic ring system in steroids, structure & biological importance of cholesterol. Biological importance of ecdysone, ergosterol and estradiol.

**v. Terpenes:** Isoprene rule, classification. Occurrence and importance of:





limonene, juvenile hormone-I, phytol and lycopene.

**vi. Flavonoids/ Phenolics:**

Occurrence & biological importance of quercetin, capsaicin, anthocyanin & curcumin.

**v. Alkaloids:** Definition, classification based on their chemical composition with examples. Physiological action of LSD and morphine. Biological importance of reserpine, piperine, cocaine, theobromine, caffeine, nicotine and atropine..

**Unit 2: Bioinorganic Chemistry**

**16 HRS**

**i. Co-ordination compounds:**

Transition metals, properties (Colour, oxidation states, magnetic properties). Co-ordinate bond, double and complex salts – differences with examples. Co-ordination number.

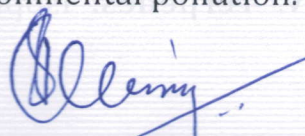
Porphyrin nucleus and classification. Structure and the biological role of metal ions in important metalloporphyrin occurring in nature, (Hb, cytochrome, chlorophyll, Vit-B<sub>12</sub>). Bile pigments: chemical nature.

**ii. Radiochemistry:**

Natural and artificial radioactivity, characteristics of radioactive elements, units of radioactivity, disintegration constant, half-life,  $\alpha$ ,  $\beta$  and  $\gamma$  radiation. Detection of radioactivity by GM counter, scintillation counter and its advantages. Applications of radioisotopes – <sup>3</sup>H, <sup>14</sup>C, <sup>131</sup>I, <sup>60</sup>CO and <sup>32</sup>P. Biological effects of radiations. Safety measures in handling radioisotopes

**iii. Elements, their biological and environmental effects:**

- a) **Nitrogen:** Fixation of atmospheric nitrogen – symbiotic and non-symbiotic. Nitrogen cycle. Environmental pollution by nitrogen compounds
- b) **Phosphorous:** Importance of phosphorus compounds in biological system, phosphorous cycle.
- c) **Oxygen:** Formation of ozone in atmosphere. Role of ozone in maintenance of life on earth. Effects of environmental pollutants on ozone layer.
- d) **Sulphur and selenium:** Importance of compounds of sulphur and selenium in biological system. Effect of sulphur compounds on environmental pollution.

  
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### Unit 3: Biophysical Chemistry

16 HRS

#### **i. Concentration units:**

Avogadro's number, molecular weight, mole, mole fraction, molarity, equivalent weight, normality, molality, percentage solutions.

#### **ii. Properties of water**

Molecular structure of water, physical properties of water, Water as an universal solvent.

#### **iii. Distribution law:**

Distribution law, partition coefficient, application of distribution law.

#### **iv. Acids, bases and buffers:**

Lewis concept of acids and bases. Ionic product of water. pH scale, buffers, Henderson Hasselbalch equation, pKa values, buffer capacity, preparation of acidic and basic buffer solutions. Theory of acid-base indicators. Choice of indicators. pH titration curve and isoelectric pH of aminoacids.

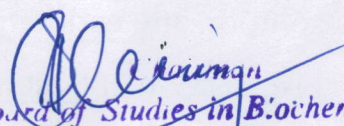
#### **v. Electrochemistry:**

Specific, Equivalent and Molar conductance. Reference electrodes (Hydrogen Electrode and Calomel electrode), quinhydrone electrode, glass electrode. Conductometric titrations [Strong acid against strong base, weak acid (amino acid) against NaOH]. Determination of pKa value of amino acid by pH meter.

#### **vi. Photochemistry:**

Definition of photochemistry, Phosphorescence, fluorescence, chemiluminescence and bioluminescence. explanation with examples Beer-Lambert's law.

Colorimeter and Spectrophotometer - construction, principle and applications. Principles & applications of IR, fluorescence, NMR and CD spectra.

  
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## Practical Syllabus

Paper code: DSC-1P: SEPBC-102;

Paper Title: Volumetric Analysis-Practicals-1

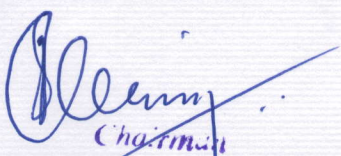
<b>Paper title</b>	<b>Volumetric analysis</b>
Paper code	DSC-1P: SEPBC-102
Paper credits	02
Total contact hours	48 (4h/week)
Duration of ESA (Hours)	3
Formative assessment marks	10
Summative assessment marks	40

### Volumetric Analysis

1. Concept of molarity, molality and normality. Calculation and preparation of molar solutions. (Problems to be given in exams). Calculation and preparation of normal solutions and percent solutions and dilute solutions.
2. Calibration of volumetric glassware (Burette and Pipette).
3. Preparation of standard Oxalic acid solution. Standardization of NaOH solution and estimation of  $H_2SO_4$  in the given solution. (phenolphthalein).
4. Preparation of standard Sodium carbonate solution, standardization of HCl (Methyl orange) and estimation of NaOH in the given solution (methyl orange or phenolphthalein).
5. Preparation of  $ZnSO_4$  solution. Standardization of EDTA solution and estimation of total hardness of water using Eriochrome black- T indicator.
6. Preparation of standard oxalic acid solution. Standardization of NaOH solution and estimation of acidity in vinegar.
7. Preparation of standard Potassium dichromate and estimation of



- ferrous/ferric mixture using diphenylamine indicator (**Demonstration**).
8. Preparation of standard Oxalic acid solution. Standardization of  $\text{KMnO}_4$  solution and estimation of calcium in milk.
  9. Preparation of standard potassium biphthalate solution, standardization of sodium hydroxide solution and estimation of hydrochloric acid present in the given solution.
  10. Preparation of standard potassium biphthalate solution, standardization of sodium hydroxide solution and estimation of alkalinity of antacids.



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## Theory Syllabus

**B.Sc. Semester-II**

**Paper code: DSC-2T:SEPBC-201**

**Paper Title: BIOMOLECULES**

<b>Paper title</b>	<b>BIOMOLECULES</b>
Paper code	DSC-2T: SEPBC-201
Paper credits	03
Total contact hours	48
Duration of ESA (Hour)	03
Formative assessment marks	20
Summative assessment marks	80

### UNIT 1: Carbohydrates

**16 hours**

- i. Monosaccharides:** Definition, classification and biological importance. Configuration relationship of D-aldoses, D-ketoses. General properties of aldoses and ketoses. Oxidation, reduction, reducing property, formation of glycosides, acylation, methylation, condensation - phenyl hydrazine, addition - HCN. Stereochemistry of monosaccharides, (+) and (-), D and L, epimers, anomers, and diastereoisomers. Mutarotation. Structure of galactose, mannose, ribose and fructose. Structure and biological importance of deoxy sugars and sugar acids.
- ii. Disaccharides:** Occurrence and structures of maltose, isomaltose, sucrose, lactose and trehalose. Biological importance of trehalose.
- iii. Polysaccharides:** Partial structure, occurrence and importance of starch, glycogen, inulin, cellulose, chitin, and pectin.
- iv. Glycosaminoglycans:** Structure of amino sugars, neuraminic and muramic acids. Occurrence, importance and the structure of the repeating units of heparin, hyaluronic acid, teichoic acid and chondroitin sulphate. Bacterial cell wall polysaccharide, peptidoglycans.



## UNIT 2: Amino acids and Proteins

16 hours

### **i. Amino acids**

Structure and classification of amino acids based on polarity. D and L notation, zwitterionic properties, pKa values. Reactions of the amino groups with  $\text{HNO}_2$ ,  $\text{LiAlH}_4$ , phenylisothiocyanate, dansyl chloride, 1-fluoro-2,4-dinitro benzene. Reaction of carboxyl group with hydrazine.

### **ii. Peptides:**

Peptide bond-formation and characteristics. Structure and biological importance of glutathione. Biological importance of valinomycin, leu-enkephalin and endorphins. Chemical synthesis of di-peptides by Merrifield solid phase synthesis.

### **iii. Proteins:**

Isolation of proteins: - dialysis, salting in & salting out, pH precipitation and solvent precipitation. Criteria of purity of proteins.

Classification of proteins based on solubility, structure and functions with examples.

Structural organization of proteins:

Primary structure of proteins, methods of determining N and C-terminal amino acid residues, sequencing by Edman's degradation method.

Secondary Structures -  $\alpha$  helix,  $\beta$ -sheet,  $\beta$ - bend

Tertiary structure: Forces stabilizing the structure- structure of myoglobin.

Quaternary structure: 3D structure of hemoglobin.

Denaturation and renaturation of proteins, Anfinsen's experiment.

## UNIT 3: Lipids and Nucleic acids

16 hours

**i. Acylglycerols:** Classification and biological role, fatty acids - nomenclature of saturated and unsaturated fatty acids. Mono, di and triacylglycerols. Saponification, saponification value, iodine value, acid value and significance. Rancidity, hydrolysis.



**ii. Phosphoglycerides:** Structure of lecithin (phosphatidylcholine), cephalins and phosphatidyl inositol. Biological role of phosphoglycerides.

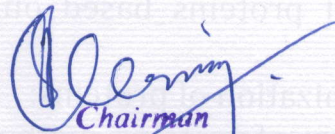
**iii. Sphingolipids:** Structure and importance of sphingomyelin.

**iv. Glycerosphingolipids:** Composition and importance of gangliosides and cerebroside. Prostaglandins: Types, structure of PGE<sub>2</sub>, and PGF<sub>2</sub> Alpha. Biological roles of thromboxanes, leukotrienes and prostaglandins.

**v. Plasma lipoproteins:** Types- chylomicrons, VLDL, LDL, and HDL, apolipoproteins and their functions.

**vi. Nucleic acids:** Composition of DNA and RNA. Nucleosides and Nucleotides. Other functions of nucleotides – source of energy, component of coenzyme and second

messengers. Chargaff's rule. Watson and Crick model of DNA. Nucleic acid chemistry- UV absorption, Effects of alkali and acid on DNA and RNA, Chemical reactions of RNA and DNA. Melting of DNA (T<sub>m</sub>). Types of RNA (mRNA, tRNA and rRNA), Secondary structures of tRNA – clover leaf model.



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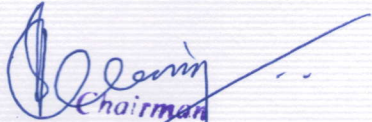
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Paper code: DSC-2P: SEPBC-202;  
Paper Title: Biomolecules-Practicals-2

Paper title	Biomolecules-practicals-2
Paper code	DSC-2P: SEPBC-202
Paper credits	02
Total contact hours	48 (4h/week)
Duration of ESA (Hours)	3
Formative assessment marks	10
Summative assessment marks	40

1. Qualitative analysis of monosaccharides (glucose, fructose).
2. Qualitative analysis of disaccharides & polysaccharides
  - a. (lactose, maltose, sucrose & starch).
3. Reactions of lipids: triacylglycerol and cholesterol (solubility, acrolein test, Salkowski test, Lieberman-Burchard test).
4. Precipitation reactions of proteins (albumin).
5. Colour reactions of proteins (albumin, casein, gelatin).
6. Qualitative analysis of amino acids (arginine, tryptophan, tyrosine, cysteine & phenylalanine).
7. Reactions of nucleic acids: diphenylamine test and orcinol test

  
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**Theory Question paper pattern**  
**Question paper pattern is common to all Semesters (I – VI Sems.)**  
**C3 – Examination**  
**BIOCHEMISTRY**

**Duration: 3 Hours**

**Max. Marks: 80**

**Instructions:** 1. Write equations/reactions/ labelled diagrams wherever necessary.  
2. Answer all Parts.

**Part A**

Answer any ten of the following:

2x10=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

**Part B**

Answer any six of the following:

5x6=30

- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

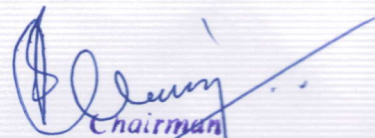
**Part C**

Answer any three of the following:

10x3=30

- 21.
- 22.
- 23.
- 24.

(Questions within Part C may be framed with sub questions)

  
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**Practical Examination, question paper pattern**  
**Biochemistry DSC-1P: SEPBC-102**

Duration: 03 hours

Max Marks: 40

**Instructions.**

1. The student will be evaluated on the basis of skill, comprehension and recording the results of the experiment.

2. Students must compulsorily submit completed practical records duly signed by batch teachers and certified by HOD.

The student is evaluated for 40 marks as per the following scheme.

	Components	Marks
A	Record	05
B	Procedure writing	10
C	Experiment (May contain two expts)	25
	<b>Total</b>	<b>40</b>

**B. Procedure writing – Assessment**

First 20 min. is given for writing the procedure.

- Principle: 03 marks
- procedure: 07 marks

**(Procedure writing is given for any one of the following experiments)**

1. Calibration of volumetric glassware (Burette and Pipette).
2. Preparation of standard Potassium dichromate and estimation of ferrous/ferric mixture using diphenylamine indicator.
3. Preparation of standard Oxalic acid solution. Standardization of  $\text{KMnO}_4$  solution and estimation of calcium in milk.
4. Preparation of  $\text{ZnSO}_4$ . Standardization of EDTA and estimation of total hardness of water using Eriochrome black-T indicator.

**C. Experiment – 25 Marks (Volumetric analysis).**

One of the following experiments is to be given for conducting (principle, reaction, tabular column and calculation part is to be written)

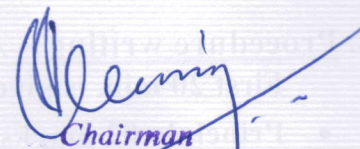
1. Preparation of standard Sodium carbonate solution, standardization of HCl (Methyl orange) and estimation of NaOH in the given solution. (methyl orange or phenolphthalein).
2. Preparation of standard Oxalic acid, Standardization of NaOH and estimation of  $\text{H}_2\text{SO}_4$  in the given solution (phenolphthalein).



3. Preparation of standard potassium biphthalate, Standardization of NaOH and estimation of HCl in the given solution. (Phenolphthalein).
4. Preparation of standard oxalic acid solution, Standardization of NaOH solution and estimation of acidity in vinegar.
5. Preparation of standard potassium biphthalate solution, Standardization of sodium hydroxide solution and estimation of alkalinity of antacids.

**Marks distribution for assessment of volumetric analysis (Experiment):**

Principle and Reaction	03 marks
Preparation of standard solution	03 marks
Standardization	08 marks
Estimation	09 marks
Report	02 marks



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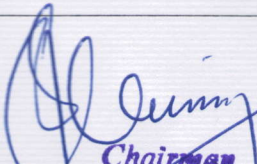
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# B.Sc. Biochemistry

## List of Examiners (UG) 2023 onwards

Sl.No.	Names	Address
1.	Smt. Premalatha	Maharani's science College for
2.	Dr.Kumar M.S.	Women, U.G and P.G. Department of
3.	Smt. Roopa K	Biochemistry
4.	Dr.Sharath Chandra S.P.	J.L.B. Road, Mysore
5.	Smt. Komala	
6.	Smt. Husna Almas	Biochemistry Department, Sharada
7.	Raghuhar M.	Vilas College, Mysore
8.	Mr.Likith	
9.	Ms. Ramya	Biochemistry Department, Mahajana
10.	Smt.Radhika	First Grade College, Mysore
11.	Dr. Punith H.R.	Biochemistry Department, MMK and
12.	Dr.Chaithyana Pandit	SDM College Mysore
13.	Dr.Wethroe Kapfe	
14.	Prof.J.Rajesh	YCM, Mysore.
15.	Smt.Ayisha Firdouse	
16.	Smt.Uma Devi	JSS Women's College, Saraswathipuram, Mysore.
17.	Dr.Chethan	JSS Ooty Road College, Mysore.
18.	Dr. Latha	
19.	Dr.Hajeera Banu	
20.	Dr.Jyothsna Karanth	Biochemistry Department, Government
21.	Dr.Shobha N.	College for Women, Mandya.
22.	Smt.Sunitha	Biochemistry Department, Government
23.	Mr.Bhargava C.S.	Science College, Hassan.
24.	Smt. Kavitha K.R.	
25.	Smt.Sajeeda Niketh	Biochemistry Department, Government
26.	Mr.Rajeev Kolgi	Science College, Nrupathunga Road,
27.	Mr.Haleshappa	Banglore.

  
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28.	Dr. Asma Saquib	Biochemistry Department, Maharanis Science College for Women, Palace Road, Bangalore.
29.	Smt. Rashmi	
30.	Smt. Suma	
31.	Dr. Keshamma	
32.	Dr. Nagana Gowda	
33.	Dr. Nagesh Babu	
34.	Ms. Anjali	
35.	Dr. Vidya	Biochemistry Department, Government First Grade College, Chitradurga.
36.	Dr. B.L.Nanda	
37.	Dr. Bhagyalakshmi	Biochemistry Department Tumkur University, Tumkur.
38.	Dr. Savitha	
39.	Dr. Prabhakar B.T.	Sahyadri Science College, Shivamogga.



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