

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

Dated: 20.07.2024

**Notification**

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

- Ref:-**
1. Decision of Board of Studies in Biotechnology (CB) meeting held on 06-06-2024.
  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 Biotechnology (CB) which met on 06-06-2024 has resolved to recommend & approved the Syllabus and Scheme of examinations of Biotechnology (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 Biotechnology, 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.

## I Semester B.Sc. Degree BIOTECHNOLOGY

Program Name	<b>B. Sc Biotechnology</b>		Semester	<b>First</b>
Course Title	<b>Biomolecules and Microbiology</b>			
Course No.	<b>BTC 101T</b>	<b>Theory</b>	No. of Theory Credits	<b>3</b>
Contact hours	<b>48 hrs</b>		Duration of Exam	<b>3 Hours</b>
Formative Assessment Marks	<b>20</b>	Summative Assessment Marks	<b>80</b>	

### Unit I

**Carbohydrates:** Definition, classification, Fischer and Haworth structure of monosaccharides – ribose, glucose, galactose and fructose. Reducing and non-reducing sugars. Stereochemistry – Definition with examples. Epimers, enantiomers, anomers, isomers concept. Fischer and Haworth structure of Disaccharides – sucrose, maltose, lactose. Polysaccharides classification: homo and heteropolysaccharides, Structure of starch and glycogen. Biological importance of carbohydrates

**Nucleic Acids:** Nucleosides & Nucleotides – structure & nomenclature. DNA-Types, secondary structure of DNA (Watson and Crick model), RNA- Types and biological functions, structure of t-RNA (Clover leaf model).

### Unit II

**Proteins:** Amino acids- generalized structure, essential and non-essential amino acids, classification based on polarity, zwitter ionic structure, pKa value. D-and L- amino acids, optical activity. Peptide bond, structure of oxytocin. Classification of proteins with example. Primary, secondary, tertiary and quaternary structural organization of proteins. Structure of hemoglobin, myoglobin and collagen. Protein stability- covalent and noncovalent interactions, Biological importance of proteins.

**Lipids:** Definition, Biological role. Classification & Properties. Fatty acids- Unsaturated and saturated fatty acids and their nomenclature. Essential fatty acids and their biological importance. Biological role of different types of lipids- glycolipids, phospholipids, cholesterol.

### Unit III

General Introduction: scope and history, important discoveries by Robert Koch, Leeuwenhoek, Jenner, Pasteur, Flemming, Iwanosky. General account on structure, classification and

reproduction of bacteria, virus and fungi Microscopy Light microscopy: Bright, Dark field, Phase contrast Electron microscopy- SEM, TEM. Microbial nutrition: Nutritional classes of microorganisms, pure culture-types of pure culture techniques, methods of maintenance and preservation of culture- over layering with mineral oil and lyophilization.

#### Unit IV

Microbial growth pattern and methods of growth measurements- Growth curve, counting by Plate counting, Coulter counter counting and Turbidometry. Sterilization and Disinfection: a) Physical methods – Auto clave, Hot air oven, Laminar air flow, Seitz filter, sintered filter and membrane filter. Radiation-UV and Gamma Rays b) Chemical methods – Alcohol, Aldehydes, Phenols, Halogens and gaseous agents. Biological methods- antimicrobial agents –penicillin, streptomycin. Role of microbes in bio-geo cycles (N, C, S and P cycle), Biological nitrogen fixation. Symptoms causative agents and control **a.** plant diseases- Bacterial leaf blight, TMV, Downy mildew **b.** animal diseases-Tuberculosis, Dengue and Candidias

Program Name	<b>B. Sc Biotechnology</b>		Semester	<b>First</b>
Course Title	<b>Biomolecules and Microbiology</b>			
Course No.	<b>BTC 101P</b>	<b>Practicals</b>	No. of Credits	<b>2</b>
Contact hours	<b>64 hrs</b>		Duration of Exam	<b>3 Hours</b>
Formative Assessment Marks	<b>10</b>		Summative Assessment Marks	<b>40</b>

1. To study the principle and applications of important instruments (pH meter, Colorimeter, Laminar Air Flow unit, autoclave, incubator).
2. Qualitative analysis of sugars.
3. Qualitative analysis of amino acids
4. Reducing sugar estimation by DNS method.
5. Protein estimation by Biuret method or Lowry's method.
6. Separation of amino acids by circular paper chromatography.
7. Estimation of iodine value of lipids.
8. Preparation of media: nutrient agar, nutrient broth and potato dextrose agar
9. Isolation and culture of micro-organisms from soil, air and water.
10. Inoculation Techniques: stab, point, streak, pour plate and spread plate.
11. Microbial growth determination by turbidometry.
12. Bacterial Staining Techniques-simple and differential (gram's).
13. Biochemical activity of Microbes: catalase test, starch hydrolysis, gelatin hydrolysis

## II Semester B.Sc. Degree BIOTECHNOLOGY

Program Name	B. Sc Biotechnology		Semester	Second
Course Title	Cell Biology and Genetics			
Course No.	BTC- 102T	Theory	No. of Theory Credits	3
Contact hours	48 hrs		Duration of Exam	3 Hours
Formative Assessment Marks	20		Summative Assessment Marks	80

### Unit I

Concept, development and scope of Biotechnology

Unit I General Introduction: Historical perspectives. The cell theory, ultrastructure of plant and animal cell, different types of Cells-Prokaryotes and eukaryotes. Cell organelles: structure and functions of cell wall, plasma membrane membrane proteins, cytoplasm, nucleus, mitochondria, chloroplast, Golgi bodies, endoplasmic reticulum, ribosomes, lysosomes, peroxisomes, cytoskeleton. Special cells: stem cells, Cancer cells.

### Unit II

Cell Division: Cell cycle, phases, Significance of cell cycle. Cell division, Interphase nucleus, achromatic apparatus, synaptonemal complex Mitosis and meiosis, regulation of cell cycles cell cycle checkpoints, and enzymes involved in regulation.

Cell interaction and motility: Cell signaling, cell junctions-Septate, tight and gap junctions, cell motility, flagella and ciliary motion, Structure and functions of muscle cells, nerve cell structure and functions.

### Unit-III

History of genetics: Introduction and brief history of genetics. Mendelian theory: Laws of inheritance- dominance, segregation, incomplete dominance, codominance with an example. Law of independent assortment, test cross, back cross. Deviations to Mendelian inheritance, complementary, supplementary and interaction of genes (13:3 ratio) epistasis. Sex-linked inheritance, Chromosome theory of inheritance, linkage and crossing over. Maternal Inheritance: Plastid inheritance in Mirabilis, Mitochondrial inheritance.

### Unit-IV

Mutation-Natural and induced mutations, mutagenesis- Chemical, physical and biological mutagens, Molecular mechanisms, thymine dimers. Eukaryotic chromosomes: Types, chromatin structure, nucleosomes, higher order chromatin organization. Special chromosomes- lampbrush, polytene and B - chromosome. Chromosomal aberrations:

Deletion, duplication, inversion, translocation and ploidy. Chromosomal disorders in humans.  
Genetic recombination in bacteria: Transformation, transduction and conjugation.

Program Name	<b>B. Sc Biotechnology</b>		Semester	<b>Second</b>
Course Title	<b>Cell Biology and Genetics</b>			
Course No.	<b>BTC 102P</b>	<b>Practicals</b>	No. of Credits	<b>2</b>
Contact hours	<b>64 hrs</b>		Duration of Exam	<b>3 Hours</b>
Formative Assessment Marks	<b>10</b>	Summative Assessment Marks	<b>40</b>	

- 1) Study and maintenance of simple and compound microscope
- 2) Use of Micrometer and calibration, measurement of onion epidermal cells and yeast
- 3) Study of divisional stages in mitosis from onion root tips
- 4) Study of divisional stages in meiosis in grasshopper testes/onion or Rhoeo flower buds.
- 5) Mounting of polytene chromosomes
- 6) Buccal smear - Barr bodies
- 7) Karyotype analysis - Human and Onion Human – Normal and Abnormal – Down and Turner’s syndromes
- 8) Isolation and staining of Mitochondria
- 9) Isolation and staining of Chloroplast
- 10) RBC cell count by Haemocytometer
- 11) Simple genetic problems based on theory
- 13) Study of Wild type Drosophila- male and female
- 14) Study of phenotype mutants of Drosophila (Images/Alive) - Bar eye, vestigial wing, and Yellow body

Model Theory Paper Pattern

**B.Sc. Degree Examination**

**Time: 3 Hrs**

**Max. Marks: 80**

**Instructions: 1. Answer all the questions.**

**2. Draw neat labelled diagrams wherever necessary**

**PART-A**

**1. Answer all the five questions-**

**2 x 5 = 10**

- a.
- b.
- c.
- d.
- e.

**PART-B**

**Answer any six of the following:**

**5 x 6 = 30**

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

**PART-C**

**Answer any four of the following:**

**10 x 4 = 40**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

**Model Practical Examination Scheme**

**I Semester B.Sc. Degree Examination  
BIOTECHNOLOGY**

**BTC 101P (Biomolecules and Microbiology)**

**Time: 3 Hrs**

**Max Marks: 40**

**Q1. Conduct any one of the following experiment** **15 M**

- a. Estimation of Glucose in the given sample
- b. Estimation of protein in the given sample
- c. Identify the given amino acid by circular chromatography
- d. Perform any three inoculation technique
- e. Determine Grams reaction for the given bacteria

Scheme of Valuation

- a. Writing Principle -3M
- b. Conducting experiment -5M
- c. Calculation/Tabulation/observation -5M
- d. Result-2M

**Q2. Identify and comment on A, B, C, D and E** **3X5=15 M**

- a. Identification -1M
- b. Comment/Description-2M

(Microscope, LAF, Autoclave, Incubator, pH meter, colorimeter, iodine value, Growth curve, catalase test, starch hydrolysis test, gelatin hydrolysis test)

**Q3. Record** **5 M**

**Q4. Viva** **5 M**

**Model Practical Examination Scheme**

**II Semester B.Sc. Degree Examination  
BIOTECHNOLOGY  
BTC 102P (Cell Biology and Genetics)**

**Time: 3 Hrs**

**Max Marks: 40**

**Q1. Conduct any one of the following experiment** **15 M**

- a. Measurement of given cell using Micrometer
- b. Temporary slide preparation for mitosis
- c. Temporary slide preparation for meiosis
- d. Mounting Polytene Chromosome
- e. Counting number of cells using haemocytometer

Scheme of Valuation

- a. Writing Principle -3M
- b. Conducting experiment -5M
- c. Calculation/Tabulation/observation -5M
- d. Result-2M

**Q2. Comment on A, B, C, D and E** **3X5=15 M**

- a. Identification -1M
- b. Comment/Description-2M

(Bar bodies/Genetic problems/prokaryotic cell/ eukaryotic cell/ Karyotype - Normal female/Normal male/ Down syndrome/ Turner's syndrome/cavity slide for cell motility/Microscope)

**Q3. Record** **5 M**

**Q4. Viva** **5 M**