B.Sc Syllabus for Biotechnology under CBCS

SEMESTER-I

Title : Biochemistry and Cell Biology **Course Code : UBTTC101**

Credits : 4 **Total marks : 100**
Internal Examination : 20 marks
End Semester Examination:80 marks
Duration : 3 hours

Validity of Syllabus: 2016, 2017, 2018 Dec. Exams

Unit-I : Water and its properties

Water and its properties; physico-chemical properties of water; Dissociation and association constants, pH and buffer, Henderson- Hasselbalch equation and its significance, hydrophobicity and hydrophilicity; Dielectric constant.

Unit-II : Basic Biochemistry

Carbohydrates: classification, structure and functions; Carbohydrate metabolism- glycolysis, TCA cycle, Electron transport chain; Biological oxidation: electron transfer and oxidative phosphorylation. Lipids and fats, classification of lipids and fatty acids, saturated and unsaturated fatty acids.

Unit -III : Proteins

Amino acids: structure and nomenclature; Structural organization of proteins, primary, secondary: The alpha- helix, beta-pleated sheet structures, tertiary and quaternary structure of proteins; Protein classification: fibrous and globular proteins and functions; Vitamins and hormones; types of vitamins and their deficiency symptoms, steroid and peptide hormones.

Unit -IV : Cell and its Functions

Cell theory, Structure of pro-and eukaryotic cells; Molecular organization and functions of cell membranes; Cell organelles; Nucleus, Mitrochondria, Chloroplast and endoplasmic reticulum; cytoskelton

Unit -V : Cytology and its Genetics

Cell cycle: checkpoints, regulation; Chromosome structure and function; Structural and numerical alterations of chromosomes, Mendelian and post Mendelian genetics, Bacterial genetic system; transformation, transduction and conjugation, Mutations; molecular basis, Overview of transposable elements in bacteria and plants.

References

1. Voet, D . and Voet, J.G. (2007) Biochemistry. John Wiley and Sons inc. USA.4th ed.
2. Stryer, L. (2004). Biochemistry. W.H. Freeman & Company, New York.4th ed.
3. Lehinger, A.L. (2006). Principles of Biochemistry. CBS Publishers & Distributors, New Delhi.
4. Murray, R.K., Granner, D.K., Mayers, P.A. and Rodwell, V.W. (2003) Harper's Biochemistry, Appleton, Lange Publishers, CT.6th edition
5. Alberts, B., Bray, J.L., Roberts, K, and Watson, J.D. (2008). Molecular biology of the Cell. Garland Publishing House, New York, 2nd ed.
6. Swanson, C.P. and Webster, P. (2006). The Cell. Prentice – Hall, Englewood Cliffs, USA.
7. Karp, G (2007) Cell and Molecular Biology : Concepts and Experiments. John Wiley Inc. New York. 5th ed.
8. Seage, S.L and Slabaugh, M.R. (1997). Organic and Biochemistry for Today. 3rd edition. Brooks/ cole Publishers.
9. Ritter, P. (1996). Biochemistry: A foundation. Books/ Cole Publishers.

Scheme of examination

The students shall be evaluated during the conduct of the course in the semester as follows :

Examination (Theory)	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks
Internal Assessment test	Upto 50% (after 45 days)	1 hour	20% (20 marks)
External End Semester University examination	Upto 100% (after 90 days)	3 hours	80% (80 marks)
Total			100

Scheme for Internal assessment Test : The question paper would comprise of one long answer type question of 10 marks and Five short answer type questions of 2 marks each.

Scheme for End Semester Examination: There shall be ten questions in all the End Semester University Examination, two from each Unit covering the entire syllabus. Each question would comprise of two parts : Part (a) Short answer type of 04 marks each and Part (b) Long answer type of 12 marks each. The numerical content in the question paper shall not exceed 15% of the maximum marks. The candidates are required to attempt any Five questions selecting one from each unit. All questions shall carry equal marks.

B.Sc Syllabus for Biotechnology under CBCS

Semester-I

Title : Laboratory Course based on Biochemistry and Cell Biology

Course Code : UBTPC102

Credits : 2

Total Marks : 50
Internal Examination : 25 marks
End SemesterExamination:25

Validity of Syllabus : 2016, 2017, 2018 Dec. Exams

Praticals

01. Preparation of physiological buffers.
02. Working of spectrophotometer.
03. Demonstration of Beer Lamberts Law
04. Determination of pKa value .
05. Qualitative test for detection of glucose in solution.
06. Quantitative estimation of glucose in the solution.
07. Qualitative test for detection of protein in solution.
08. Quantitative estimation of proteins in the solution.
09. Paper chromatography, TLC.
10. Induction of random mutagenesis in micro-organisms.
11. Determination of λmax of the given component.
12. To make temporary slide.
13. To make permanent slides.
14. To study different types of plant cells and animal cells.
15. To study mitosis and meiosis.

Scheme of Examination

Examination (Practical)	**Syllabus to be covered in the examination**	**% Weightage (marks)**
Daily evaluation of practical records / Viva voce / attendance etc.		50% (25 Marks including 5 for attendance 5for Viva-voce and 15 for internal test and day to day performance)
Final Practical Performance + Viva voce (External Examination)	100%	50% (25 Marks including 20 for external paper and 5 marks for viva voce)
Total		100% (50 Marks)

B.Sc Syllabus for Biotechnology under CBCS

SEMESTER II

Title : Microbiology and Enzymology **Course Code : UBTTC201**

Credits : 4 **Total marks : 100**
Internal Examination : 20 marks
End Semester Examination:80 marks
Duration : 3 hours

Validity of Syllabus : 2017, 2018, 2019 May Exams

Unit - I : Techniques in Microbiology

History, development and scope of Microbiology; Methods and control of sterilization; Principles and applications of microscopy (bright field, dark field, phase contrast, fluorescence and electron); Staining techniques; Microbiological media, composition and types; Growth curve; Pure culture techniques, culture collection and maintenance of cultures

Unit-II : Basic Microbiology

Prokaryotic cell structure and function; Flagella and motility; Eukarya: overview of Algae, Fungi, Slimemolds and protozoa; Basics of Microbial taxonomy; Viruses: Discovery , classification and structure.

Unit –III : Basics of Fermentation

Concept of Fermentation, Microbial growth kinetics; types of fermentation processes: batch, continuous, fed batch; media for industrial processes, sterilization of media and air, Bioreactors, design; Agitation and aeration, impeller and sparger. Bioprocess monitoring and control, scale up

Unit-IV :Enzymology

History of Enzymology, Enzyme vs chemical catalysts, general characteristics of enzymes, enzyme specificity, Nomenclature and classification of enzymes and their significance, Holoenzyme, apoenzyme, coenzymes, prosthetic group; Nature of active site, general mechanisms of enzyme action.

Unit –V : Enzyme Kinetics

Enzyme kinetics, Michaelis-Menten equation, K_m, V_{max}, Lineweaver-Burk plots, enzyme inhibition, Competitive, non-competitive, uncompetitive and mixed inhibition; Approaches for Isolation and purification of enzymes, Applications of enzymes in industries- food processing, dairy, textile, brewery, leather, detergent.

References

1. Trevor, P. (2002) 4th Ed. Understanding Enzymes, prentice Hall/ Ellis, Harwood, England
2. Nicholas, C. Price and Lewis Stevens (2007). Fundamentals of Enzymology. 6th edition.
3. Biotol, P. (2008), Principles of Enzymology for Technological Applications. Elsevier Pub
4. Stanbury, P.F. and Whitaker, A., (2007). Principles of Fermentation Technology Pergamon press, Oxford,
5. Lee, J.M., Biochemical Engineering, Prentice Hall Inc. Crueger, W. and Crueger, A. (2002). Biotechnology: A test book of industrial Microbiology, Science Tech Inc. Publishers
6. Stainer, R.Y., Ingraham, J.L., Wheelis, M. and Painter, P.R. (2003). General Microbiology.The Mac Millan Press Ltd. London.
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8. Prescott, L.M., Harley, J.P. and Klein, D.A. (2005). Microbiology. McGraw Hill, USA.

Scheme of Examinations

The students shall be evaluated during the conduct of the course in the semester as follows :

Examination (Theory)	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks
Internal Assessment test	Upto 50% (after 45 days)	1 hour	20% (20 marks)
External End Semester University examination	Upto 100% (after 90 days)	3 hours	80% (80 marks)
Total		100	

Scheme for Internal assessment Test : The question paper would comprise of one long answer type question of 10 marks and Five short answer type questions of 2 marks each.

Scheme for End Semester Examination: There shall be ten questions in all the End Semester University Examination, two from each Unit covering the entire syllabus. Each question would comprise of two parts : Part (a) Short answer type of 04 marks each and Part (b) Long answer type of 12 marks each. The numerical content in the question paper shall not exceed 15% of the maximum marks. The candidates are required to attempt any Five questions selecting one from each unit. All questions shall carry equal marks.

B.Sc Syllabus for Biotechnology under CBCS

Semester-II

Title : Laboratory Course based on Microbiology and Enzymology **Course Code : UBTPC202**

Credits : 2 **Total Marks : 50**
Internal Examination : 25 marks
End Semester Examination:25

Validity of Syllabus : 2017, 2018, 2019 May Exams

Practicals

01. To study different components, use and care of the compound bright field Microscope.
02. Culture characteristics of different microorganisms.
03. Different sterilization techniques.
04. Preparation of media for cultivation of bacteria.
05. Isolation of microorganisms from soil, air and water. Colony purification.
06. Enumeration of microorganisms; total vs viable count.
07. Study morphology of molds and yeast by methylene blue staining.
08. Bacterial staining: simple staining, Negative staining and Gram's staining.
09. Biochemical activities of microorganisms.
10. Antibiotic sensitivity of microbes.
11. Estimation of ά-amylase activity from saliva.
12. Effect of temperature and pH on enzyme activity.
13. Basics of Enzyme assays : amylase, Protease
14. Bioprocess for production of metabolites: ethanol, organic acids, antibiotics etc.

Scheme of Examination

Examination (practical)	**Syllabus to be covered in the examination**	**% Weightage (marks)**
Daily evaluation of practical records / Viva voce / attendance etc.		50% (25 Marks including 5 for attendance 5 for Viva-voce and 15 for internal test and day to day performance)
Final Practical Performance + Viva voce (External Examination)	100%	50% (25 Marks including 20 for external paper and 5 marks for viva voce)
Total		100% (50 Marks)