

Devi Ahilya Vishwavidyalaya
Indore

Syllabus for B.Sc. (Biochemistry) Semester System 2014-2017

Semester I

Paper: Biomolecules 1 (85+15 marks)

Practical (50 marks)

Semester II

Paper: Analytical Biochemistry (85+15 marks)

Practical (50 marks)

Semester III

Paper: Cell Biology, Physiology and Microbial Biochemistry (85+15 marks)

Practical (50 marks)

Semester IV

Paper: Enzymology and Molecular Biology (85+15 marks)

Practical (50 marks)

Semester V

Paper: Metabolism (85+15 marks)

Practical (50 marks)

Semester VI

Paper: Immunology, Clinical and Nutritional Biochemistry (85+15 marks)

Practical (50 marks)

Project (50 Internal+50 External=100 marks)

(Passing marks Theory 28/85 and 05/15 in CCE, Practical 17/50)

Shatnagar

Adair
17/6/2014

R. P. Indre
17/6/2014

DEVI AHILYA VISHWAVIDYALAYA
INDORE
Syllabus for B.Sc. (Biochemistry) (Admission 2014-2017)

B.Sc. Semester I

Paper: Biomolecules

Unit 1.

Introduction to Biochemistry, Water as a biological solvent.

Carbohydrates: Structure, occurrence and biological importance of monosaccharides and disaccharides Stereoisomerism and optical isomerism of sugars. Ring structure, epimers, anomers and mutarotation. Important reactions of sugars. Important derivatives of monosaccharides.

Structure, occurrence and biological importance of oligosaccharides and polysaccharides. e.g. Cellulose, glycogen and starch, chitin, agar. Mucopolysaccharides.

Unit 2

Fatty acids: Classification, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols, properties and characterization of fats – hydrolysis, saponification, halogenation, Acetyl number, Rancidity of fats, Reichert-Meissel number. Reaction of glycerol.

Glycerophospholipids (lecithins, cephalins, phosphatidyl serine, phosphatidyl inositol, plasmalogens), sphingomyelins, glycolipids- cerebrosides, sulfolipids, gangliosides. Cholesterol and Bile acids.

Unit 3

Amino acids: Structure and classification of amino acids, stereoisomerism, zwitter ion in aqueous solutions, physical and chemical properties, titration of amino acids, Isoelectric pH, Essential amino acids.

Peptides: Peptide bond, Determination of the amino acid sequence of a polypeptide chain, chemical and enzymatic cleavage of a polypeptide chains and separation of peptides.

Classification of proteins, behaviour of proteins in solutions, salting in and salting out of proteins, Denaturation and renaturation of proteins.

Unit 4

Protein structure: Levels of structure in protein architecture, primary structure of proteins, secondary

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M. Jain
17/6/2014

R. P. Indre
17/6/2014.

structure of proteins – helix and pleated sheets, tertiary structure of proteins, forces and bonds stabilizing the structure proteins. Structure of fibrous proteins (keratins and collagen), globular proteins (hemoglobin and myoglobin).

Composition of DNA and RNA. Features of DNA double helix. Denaturation and annealing of DNA.

Secondary and tertiary structure of DNA, Watson Crick model. A, B and Z type of DNA.

Different types of RNA and their role, Secondary and tertiary structure of RNA.

Unit 5.

Important Metalloporphyrins occurring in nature. Bile pigments- chemical nature and their physiological significance.

Hormones: Structure and biological functions of Insulin, Glucagon, Epinephrine, Thyroxine, Structure, properties and role of fat soluble and water soluble vitamins, Coenzyme functions of vitamins.

LIST OF PRACTICALS FOR SEMESTER I

1. Qualitative tests for carbohydrates, proteins, amino acids and lipids.
2. Determination of saponification value and iodine number of fats.
3. Estimation of ascorbic acid.
4. Titration curve for amino acids and determination of pK value.
5. Sorenson-formol titration for amino acid estimation
6. Isolation and assay of glycogen from rat

Scheme of examination

1. Identification of given sample (10 marks).
2. Quantitative estimation of given sample (20 marks)
3. Viva (10 marks)
4. Record (10 marks)

Shakti Singh
17/6/2014

R. D. Indre
17/6/2014

B.Sc. Semester II

Paper: Analytical Biochemistry

Unit 1.

Weak acids and bases. pH. buffers. Henderson-Hasselbalch equation, physiological buffers. Measurement of pH – Glass and reference electrodes, types of electrodes, complications of pH measurement (dependence of pH on ionic strength, electrode contamination and sodium error). Sedimentation- sedimentation velocity, preparative and analytical ultracentrifugation techniques, determination of molecular weight by hydrodynamic methods. Differential and density gradient centrifugation.

Unit 2.

General principle of chromatographic separation. Technique and applications of: Column adsorption and column partition chromatography, Paper chromatography, Thin-layer Chromatography. Technique and applications of Ion-exchange chromatography, Gas chromatography, Molecular-sieve chromatography.

Unit 3

Technique and applications of: Affinity chromatography, Hydrophobic chromatography, HPLC. Basic principle and types of electrophoresis. Electrophoretic mobility. Factors affecting electrophoretic migration, Technique and uses of agarose electrophoresis, PAGE and SDS-PAGE, Two-dimensional electrophoresis and its importance. Isoelectric focussing.

Unit 4

Beer-Lambert law and its limitations, Light absorption and transmission, Extinction coefficient, Basic design of photoelectric colorimeter and spectrophotometer. Applications of uv-visible spectroscopic techniques. Flame Photometry. Atomic absorption spectrophotometry, Circular Dichroism and Optical Rotatory Dispersion, Principle and application of NMR and ESR techniques.

Unit 5

Characteristics of radioisotopes, units of radioactivity measurements, techniques used to measure radioactivity (gas ionization and scintillation counting), Autoradiography. Isotopes commonly used in biochemical studies – ^{32}P , ^{35}S , ^{14}C and ^3H , Isotopic labelling of biomolecules. Biological hazards of radiation and safety measures in handling radioisotopes. Biological applications of Radioisotopes.

Shobhagamma

An/ain
17/6/2014

R. J. Padu
17/6/2014

LIST OF PRACTICALS FOR SEMESTER II

1. Preparation of standard buffers and determination of pH.
2. Verification of Beer-Lambert's Law.
3. Estimation of carbohydrate by anthrone method.
4. Estimation of blood glucose by Folin-Wu method.
5. Estimation of amino acids by ninhydrin method.
6. Separation of amino acids and sugars using paper and thin layer chromatography.

Scheme of examination

1. Identification of given sample (10 marks).
2. Quantitative estimation of given sample (20 marks)
3. Viva (10 marks)
4. Record (10 marks)

Shatwagar

A Jain
17/6/2014

R Indre
17/6/2014