UNIVERSITY OF THE PUNJAB

NOTIFICATION

In continuation of this office notification No. D/3328/Acad, dated 12-05-2010. It is hereby notified that the Syndicate at its meeting held on 20-03-2010 has approved the recommendations of the Academic Council, dated 16-02-2010 regarding approval of the revised Syllabi & Courses of Reading for 2 years B.Sc. (Pass Course) Examination in Biochemistry as an elective subject which will be effective from Academic Session 2010-2012.

The revised Syllabi & Courses of Reading for 2 years B.Sc. (Pass Course) Examination in Biochemistry is attached herewith vide Annexure 'A'.

Sd/-
Prof. Dr. Muhammad Akhtar
Registrar

Admin Block,
Quaid-i-Azam Campus,
Lahore.

No. D/7552/Acad. Dated: 03/ 12 /2010.

Copy of the above is forwarded to the following for information and further necessary action: -

1. Dean, Faculty of Life Sciences.
2. Director, Institute of Biochemistry & Biotechnology
3. Principals of the Affiliated Colleges concerned
4. Members of the Board of Studies in Biochemistry & Biotechnology
5. Controller of Examinations
6. Deputy Controller (Computer)
7. Deputy Controller (Examinations)
8. Deputy Controller (Conduct)
9. Deputy Controller (Secrecy)
10. A.R. (Statutes)
11. Assistant Syllabus

3/12/2010
Additional Registrar (Academic)

Annexure - "A"

(1)

B.Sc Biochemistry Elective

Paper-A	Biochemistry-I Theory	50 Marks
Paper-B	Biochemistry-II Theory	50 Marks
Paper-C	Biochemistry-III Theory	50 Marks
Practical-A	Biochemistry-I Lab	17 Marks
Practical-B	Biochemistry-II Lab	17 Marks
Practical-C	Biochemistry-III Lab	16 Marks
	Total:	200 Marks

Paper-A: Biochemistry-I Theory

Course Contents

Introduction and principles of biochemistry, amino acids and proteins, general properties, classification, acid base properties, Proteins and their properties, covalent structure of proteins, primary structure determination. Secondary structure, fibrous proteins. Tertiary structure and globular proteins, Protein stability, Quaternary structure. Protein folding, General characteristics of enzyme reactions, enzyme nomenclature and classification, co-enzymes. Enzyme kinetics and Michaelis Menten equation. Classification of carbohydrates, structure and functions of mono, oligo and polysaccharides, sugar derivates. Structural polysaccharides, storage polysaccharides. Structure and function of bacterial cell-walls. Lipid classification, structure, properties and functions of different types of lipids, fatty acids, trigycerides, glycerophospholipids, sphingolipids, cholesterol. Micelles, bilayers and liposomes. Properties and functions of lipoproteins. Fat and water soluble vitamins. Chemical structures of nucleotides, nucleosides and bases. Structural and functional aspects of DNA and RNA.

Recommended Books

1. Principles of Biochemistry, A. L. Lehninger, D.L. Nelson, 3rd edition (2000), Worth Publishers.
2. Biochemistry, L. Stryer, 6th Edition (2006), W.H. Freeman and Co.
3. Biochemistry, D. Voet, T. G. Voet, 3rd edition (2004), John Wiley and Sons, New York.
4. Harper's Illustrated Biochemistry, 27th edition (2006), McGraw-Hill Medical.
5. Lippincott's Biochemistry, P.C. Champe, R.A. Harvey, D.R. Ferrier, 4th edition (2008), J.B. Lippincott Company.
6. Biochemistry, molecules, cells and the body, Jocelyn Dow (1995), Addison Wisley Publishing Company Cooperation.

7. Biochemistry, Mary K. Campbell and O'Farrell, 5th edition, (2005), John Wiley and Sons, New York.
8. Concepts in Biochemistry, Rodney F. Boyer, 4th edition (2006), John Wiley and Sons, New York.

Paper-A: Biochemistry-I Lab.

Course Contents

A study of general properties of amino acids. Qualitative tests for amino acids. Amino acid titration. Hydrolysis of proteins and chromatographic separation of amino acids. Isolation and solublization of proteins from plant and animal tissues. Estimation of proteins using different methods. A study of carbohydrate properties. Estimation of glucose in a mixture of monosaccharides, estimation of sucrose by polarimeter, chromatographic separation of sugars. Tests for fats, sterol and phospholipids, estimation of acid, saponification and iodine values of fat. Experiments on isolation of enzymes from various sources. Study of the effect of factors like pH, temperature and substrate concentration on the properties of enzymes, Kinetic analysis of enzymes. Isolation of DNA and RNA, Quantitative and qualitative estimation of DNA and RNA.

Recommended Books

1. An Introduction to Practical Biochemistry, D. T. Plummer, 3rd edition (1987), McGraw-Hill.
2. Handbook of Molecular and Cellular Methods in Biology and Medicines, P.B. Kaufmann, W.Wu, L.J. Creke (1995), CRC Press.
3. Modern Experimental Biochemistry, R.F. Boyer, 2nd edition (1993), Benjamin/Cumings Publishing.
4. The Basic Protein & Peptide Protocols, J.M. Walker (1994), Humana Press.

Paper-B: Biochemistry-II Theory

Course Contents

Amino acid deamination, transamination and oxidative deamination mechanisms, urea cycle and its regulation. Metabolic breakdown of ketogenic and glucogenic amino acids. Amino acids as biosynthetic precursors, heme biosynthesis and its degradation, biosynthesis of essential and non-essential amino acids. RNAs and their role in protein synthesis, transcription and translational processes. Chemical nature and synthesis of purine and pyrimidine ribonucleotides. Salvage pathway. Formation of deoxyribonucleotides, origin of thymine, nucleotide degradation. Role of ATP and other high energy compounds, glycolytic pathway and its significance, fermentation. Glycogen breakdown and synthesis pathways. Citric acid cycle, mechanism of electron transport chain. Oxidative phosphorylation and regulation of ATP production, gluconeogenesis, pentose phosphate pathway. Lipid digestion, absorption and transport. Properties and functions of lipoproteins. Fatty acid oxidation, fatty acid and triglyceride synthesis. Ketone bodies, utilization of cholesterol, prostaglandins, prostacyclines, thromboxanes and leukotrienes.

Recommended Books

1. Biochemistry, Mary K. Campbell and O'Farrell, 5th edition, (2005), John Wiley and Sons, New York.
2. Concepts in Biochemistry, Rodney F. Boyer, 4th edition (2006), John Wiley and Sons, New York.
3. Biochemistry, G.L. Zubay, 4th edition (1998), WmC Brown Publishers.
4. Lippincott's Biochemistry, P.C. Champe, R.A. Harvey, D.R. Ferrier, 4th edition (2008), J.B. Lippincott Company.
5. Biochemistry, D. Voet, J.G. Voet, 3rd (2004), John Wiley and Sons Inc.
6. Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, 3rd edition (2000), Worth Publishers.

Paper-B: Biochemistry-II Lab.

Course Contents

Iodine test for polysaccharides, Determination of chain length of polysaccharides, formation of sugar derivatives, fermentation of sugars by Baker's yeast. Isolation of amylose and amylopectin from starch, extraction of glycogen from liver, acid and enzymatic hydrolysis of glycogen. Lipid composition of wheat grain, Lipid separation from brain tissue and fractionation by TLC, Effect of UV light on vitamin A. Preparation of mitochondrial fraction from heart muscles and measurement of enzyme activities like malate dehydrogenase and monoamine oxidase.

Recommended Books

1. An Introduction to Practical Biochemistry, D. T. Plummer, 3rd edition (1987), McGraw-Hill.
2. Modern Experimental Biochemistry, R.F. Boyer, 3rd edition (2000), Pearson Education Inc.

Paper-C: Biochemistry-III Theory

Course Contents

Chromosomes, Mendelian inheritance and DNA as a carrier of genetic information, double-helical structure of DNA, forces stabilizing nucleic acid structures. DNA polymerase. DNA replication - general aspects and enzymes involved. Prokaryotic and eukaryotic replication mechanisms, repair of DNA. RNA and their role in protein synthesis, types of RNA polymerases. Transcription and regulation of transcription in prokaryotes. Post transcriptional processing. Translational process and post translational modification. Potentials of recombinant DNA technology. DNA cloning methods, cloning vectors including plasmids, bacteriophages and cosmids, restriction enzymes,. PCR, RT-PCR, Southern and Northern blotting. Human genome project; social and commercial considerations. General methods of fractionation and characterisation of proteins and nucleic acids, dialysis, ultrafiltration, lyophilisation. Principles and application of visible and UV spectroscopy. Native and SDS-polyacrylamide gel electrophoresis, isoelectric focussing, agarose gel electrophoresis, immunoelectrophoresis.

Recommended Books

1. Molecular Biology, Robert F. Weaver, 4th edition (2007), McGraw-Hill Science.
2. Molecular Biology of the Cell, B. Albert, D.Bray, 3rd edition (1994), Garland Publishing Inc. New York.
3. Gene expression in recombinant microorganisms, A. Smith (1995), Marcel Dekker, New York.
4. Gene Cloning and Manipulation, Christopher Howe, (1995), Cambridge University Press.
5. Methods for protein analysis, R.A. Copeland, (1994), Chapman and Hall.
6. Principles of Cell and Molecular Biology, L.J. Kleinsmith, V.M. Kish, 2nd edition (1995), Harper Collins Publishers, New York.
7. Basic Biochemical Methods, R.R. Alexander, J. M. Griffiths, 2nd edition (1993), Wiley Liss.
8. A Biological Guide to Principles and Techniques of Practical Biochemistry, K.Wilson, K.H. Goulding, 3rd edition (1991), ELBS.
9. Protein Methods, D.M. Bollag, M. D. Rozycki, S.J. Edelstein, 2nd Edition (1996), Wiley- Liss.

Paper-C: Biochemistry-III Lab.

Course Contents

Preparation of chromosomal DNA from blood, animal tissues and bacterial culture. Minipreparation of plasmid DNA. Agarose gel electrophoresis of DNA. Determination of integrity and purity of DNA preparation.

Dialysis, ultrafiltration, fractionation of proteins using gel filtration, ion-exchange chromatography, chromatofocussing and other chromatographic techniques. Fractionation of proteins using native and SDS gel electrophoresis.

Recommended Books

1. Short Protocols in Molecular Biology, A. Ausubel, R. Brent, 3rd Edition (1995), John Wiley and Sons.
2. Joseph Sambrook and David W. Russell (2001), Third Edition, Molecular Cloning a laboratory Manual, Cold Spring Harbor laboratory Press.
3. A Biological Guide to Principles and Techniques of Practical Biochemistry, K.Wilson, K.H. Goulding, 3rd edition (1991), ELBS.
4. Methods for Protein Analysis, R.A. Copeland, (1994), Chapman and Hall.
5. Protein Methods, D.M. Bollag, M. D. Rozycki, S.J. Edelstein, 2nd Edition (1996), Wiley-Liss.