SARDAR PATEL UNIVERSITY
S.Y.B.Sc. BIOCHEMISTRY
SEMESTER – III (Credit – 3)
(Effect from June, 2011)
BIOCHEMISTRY (US03CBC01)

Unit-1 CARBOHYDRATE

- Biological functions of carbohydrate
- Physical and chemical properties of carbohydrates.
    1. Chiral carbon (Asymmetric carbon atom).
    2. Isomerism.
    3. D& L forms, optical activity.
    4. Simple and ring structure of monosaccharide.
    5. Killiani synthesis & derived sugar, osazone formation, action of acid & alkali on sugar.
    6. Tautomerization in sugar.
    7. Disaccharides
    8. Polysaccharides

References:

- Lehinger's principles of biochemistry by David L. Nelson and M. M. Cox CBS (4^{th} edition).
- Out line of biochemistry Conn & Stumpf.
- Text of Medical biochemistry – by Puri.
- Text of Medical biochemistry – by M.M.Chatterjea and Rana Shinde.

Unit-2 AMINO ACID

- Structure and classifications of amino acid, rare amino acid of protein, titration curve of amino acid (GLYCINE).
- Physical properties of amino acid –stereo-specificity and optical activity.
- Chemical properties of amino acids- Due to carboxyl group ester formation.
- Reduction of carboxyl group: carboxylation, and amide formation.
- Reduction due to amide group: methylation, Sanger's reaction, Edman's reaction, Dansyl chloride, Dabsyl chloride and Ninhydrine reaction.
- Essential amino acid & their importance.

References:

- Out line of biochemistry Conn & Stumpf.
- Fundamental of biochemistry –Donald Voet, Judith Voet and Charlotre W. Pratt. John Wiley Publishers.
- Principles of Biochemistry by Horton, Moran, Scimgeour, Prey, Rawn, Pearson interantional edition (4^{th} edition)

Unit-3 NUCLEIC ACID

- Introduction: biological significance nucleotides chemistry.
- Basic structure of
    1. Sugar, Nitrogen base.
    2. Chemical properties of bases, Nucleotides, Nucleosides.
- Phosphodiester bond.
- Basic chemistry: Double helix of DNA, Secondary and tertiary structure of DNA: Watson and crick model A, B, Z types of DNA.
- Physical properties of DNA(Tm & its relation with GC content & COT value)

References:

- Out line of biochemistry Conn & Stumpf.
- Lehinger's principles of biochemistry by David L. Nelson and M.M. Cox CBS (4^{th} edition).
- Text of Medical biochemistry – by Puri.

Unit-4- OVER VIEW OF METABOLISM.

- Important terminology
- Over view of metabolism.
- Metabolic reactions are inter dependent as interconnected.
- Regulation of metabolites
- Bioenergetics principles.
- Law of thermodynamics.(1^{st} , 2^{nd}, free energy, enthalpy, entropy)
- Role of ATP in cell as bioenergetics.

References:

- Lehinger's principles of biochemistry by David L. Nelson and M. M. Cox CBS (4^{th} edition).
- Text of Medical biochemistry – by Puri.

UNIT-5: VITAMINS

- Definition and classification of vitamins.
- Structure, biochemical function, dietary sources and RDA of fat soluble vitamins ADEK.
- Structure, biochemical function, dietary sources and RDA of water soluble vitamins (C(ascorbic acid),B1(thiamine),B2(riboflavin),,B3(niacin),,B9(folic acid),B12(cyanocobalamine))
- References:
- Text of Medical biochemistry – by Puri.
- Text of Medical biochemistry – by M.M.Chatterjea and Rana Shinde.

UNIT-6: MINERALS

- Definition and classification of minerals.
- dietary sources, RDA and Biochemical functions of
  Calcium, phosphorous, iron, manganese, sodium, potassium, chloride and iodine.

- References:
- Text of Medical biochemistry – by Puri.
- Text of Medical biochemistry – by M.M.Chatterjea and Rana Shinde.

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S.Y.B.Sc. BIOCHEMISTRY
SEMESTER – III (Credit – 3)
BIOPHYSICAL BIOCHEMISTRY – (US03CBC02)
(Effect from June, 2011)

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UNIT-1: WATER

Structure of water
Distribution of body water
Measurement of body water
Distribution of electrolytes in the body
Normal water balance and its regulatory mechanism
Abnormal water and electrolytes metabolism
Acid-base balance in normal health

References:

1. Text book of Medical Biochemistry by Rana Shinde & Chattergy
2. Lehninger.s principles of Biochemistry by David L. Nelson and Michael M.
Cox, CBS Publisher (4th Edition).
3. Outline of biochemistry Conn & Stumpf

UNIT-2: COLLOIDS, VISCOSITY AND SURFACE TENSION.

Colloid Definition and Classification of Colloids
Properties of Colloids (in short): Brownian movement, Tyndal effect, Dialysis, Ageing, coagulation, Electric properties
Biological significance of colloids
Definition and significance of: Viscosity, Surface tension, Osmosis, Diffusion and Donnan Membrane Equilibrium.

REFERENCES:

Biophysical Chemistry by Upadhyay, Upadhyay & Nath

UNIT: 3: SEPERATION AND PURIFICATION TECHNIQUE-1

1. Centrifuge technique:

Basic principle, factors affecting sedimentation.
Desktop centrifuge
High speed centrifuge
Ultra centrifuge(preparative and analytical)
Rotors: Vertical tube rotor, fixed angle rotor, Swinging bucket rotor.
technique:1)Differential centrifugation, Density gradient centrifugation
Rate zonal
Isotpyonic centrifuge.
Determination of mol. Wt.

UNIT-4: PHOTOMETRIC TECHNIQUES

Light electromagnetic spectrum, the laws of light absorption-Beer's , Lambert’s law, chromophore concepts, instrumentation, Principle, Instrumentation and Application of: (Colorimeter, Visible and UV Spectrophotometer)

Radiant energy sources, wave length selection, sample containers, detection devises, double beam operation, dual wave length spectrometer, application.

Principle, Instrumentation(Block diagram) and Application of flurometer

REFERENCES:

1. Biophysical Chemistry by Upadhyay, Upadhyay & Nath

.Instrumental methods in chemical analysis by B.K.Sharma

UNIT: 5- ENVIRONMENTAL BIOCHEMISTRY

Waste water:

Waste water characteristics: physical characteristics, total solids. Inorganic components, Gases

Organic components (BOD, COD & TOC)

Waste water treatment process

Solid waste disposal: Sanitary landfills, Composting.

REFERENCES:

Microbiology.: Pelczar and Reid

Biological waste water treatment system. Horan

Waste water Engineering. Eddy Metcalf

UNIT-6 CONCEPT OF BIOSTATISTICS AND ENVIROMENT

1. BIOSTATISTICS

a) Application and use of biostatistics as a science

b) Common statistical terms

c) Qualitative (discrete), Quantitative (continuous) data,Method of Presentation-Tabulation, Frequency distribution drawing (qualitative and Quantitative data)

d) Measurement of central tendency-Average, Mean, Median & Mode

2. Environment: Biochemical effect of metals on human body and their Sources Lead, Mercury.

REFERENCES:

1. Introduction of Biostatistics-Pranab K Banerje

2. Methods in biostatistics-B K Mahajan

3. Environmental chemistry by B K Sharma

4. Environmental chemistry by M M Chattergy

SARDAR PATEL UNIVERSITY
S.Y. B.Sc. (BIOCHEMISTRY)
PRACTICAL SYLLABUS
COURSE No. US03CBC03

PART:1 QUALITATIVE ANALYSIS

1. Identification of biological compound
   - Carbohydrates - Molisch.s test
   - Protein - Biuret test
   - Lipid - Saponification test
   - Starch –Iodine test.

2 Qualitative Analysis for carbohydrates.
   - Molisch.s test
   - Iodine test
   - Benedict.s test
   - Fehling.s test
   - Cole.s test
   - Barfoed.s test
   - Seliwanoff.s test
   - Rapid furfural test
   - Osazone test
   - Inversion test

PART 2: COLORIMETRIC ANALYSIS

- Verification of Beer.s law (Methylene blue and KMnO4)
- Estimation of creatinine by Jaff.s method
- Estimation of Urea by DAMO method

1.

PART: 3 TITRAMETRIC ANALYSIS

- Estimation of glucose by Cole.s method
- Estimation of urinary sugar by Benedict.s method
- Estimation of vitamin .C. by 2-6 Dichloroindophenol dye method

REFERENCES:

1. Laboratory manual in biochemistry by J.Jayaraman Willey eastern ltd.
2. Practical Biochemistry by David Plummer
3. Fundamentals of biochemistry A Practical approach by Naren Kumar Dutta KANISHKA PUBLISHERS, NEW DELHI