

KANNUR UNIVERSITY

(Abstract)

B.Sc Biochemistry-Scheme & syllabus of Core (I &II Semesters) and Complementary Courses under Choice Based Credit Semester System for Under Graduate Programme- implemented with effect from 2009 admission-Orders Issued.

ACADEMIC BRANCH

No.Acad/C2/754/2007(3)

Dated, K.U.Campus. P.O ,10- 07-2009.

- Read: 1.Minutes of the meeting of the Board of Studies in Chemistry (UG) held on 25-05-2009.
2. Minutes of the meeting of the Faculty of Science held on 16-06-2009.
3. U.O No.Acad/C2/3838/2008 (i) dated 07-07-2009.
4. Letter dated 03-07-2009 from the Chairman, BOS Chemistry (UG).

ORDER

1.The Board of Studies in Chemistry (UG) vide paper read(1) above has prepared,finalised and recommended the Scheme and Syllabus of Core(I &II Semesters only) and Complementary Courses of Biochemistry Programme under Choice Based Credit Semester System for implementation from 2009 admission.

2. The recommendations of the Board in restructuring the syllabus is considered by the Faculty of Science vide paper read (2) and recommended for the approval of the Academic Council.

3. The Regulations for Choice based Credit Semester System is implemented in this University vide paper read (3).

4. The Chairman, BOS in Chemistry (UG) vide paper read (4) above, forwarded the restructured Scheme and Syllabus of Core(I &II Semester only) and Complementary Courses of B.Sc Biochemistry Programme under Choice Based Credit Semester System, prepared by the Board of Studies in Chemistry (UG) for implementation with effect from 2009 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the scheme and syllabus of Core(I &II Semester only) and Complementary Courses of B.Sc Biochemistry Programme restructured in line with Choice Based Credit Semester System,with effect from 2009 admission, subject to ratification by the Academic Council.

6. The restructured scheme and syllabus of Core (I &II Semesters only) and Complementary Courses of B.Sc Biochemistry Programme under Choice Based Credit Semester System, implemented with effect from 2009 admission is appended.

7. The Scheme and Syllabus of Complementary Courses offered for this Programme will be available along with the syllabus of Core Courses of the Complementary subject.

8. The affiliated Colleges are not permitted to offer Complementary Courses in violation to the provisional/permanent affiliation granted by the University. Changes in Complementary Courses are permitted with prior sanction /revision in the affiliation order already issued in this regard.

9. If there is any inconsistency between the Regulations for CCSS and its application to the Scheme & Syllabus prepared, the former shall prevail.

10. Orders are issued accordingly.

To:

Sd/-
REGISTRAR

1. The Principals of Colleges offering B.Sc Biochemistry Programme.
2. The Examination Branch (through PA to CE)

Copy To:

1. The Chairman, BOS Chemistry (UG)
2. PS to VC/PA to PVC/PA to Regr
3. DR/AR I Academic
4. The Central Library
5. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER



KANNUR UNIVERSITY

COURSE STRUCTURE

&

SYLLABUS

FOR

UNDERGRADUATE PROGRAMME

IN

BIOCHEMISTRY

CORE COURSES

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

w.e.f 2009 ADMISSION

Preface

Science is pivotal to the development of any modern society. However, the creation of a scientific temper in society necessitates proper education and guidance. An effective science education can be imparted at the undergraduate level only by revamping the present curriculum. To achieve this goal, the curriculum should be restructured, giving emphasis to various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environment impacts due to the development of science and technology, and the skills essential for handling equipment and instruments in laboratories and industries.

The Higher Education Council has taken the initiative to reformulate the undergraduate syllabi by introducing choice based credit and semester system. This is to cope with the internationally followed curricula and mode of evaluation. This approach has necessitated the revision of the present curriculum.

This curriculum is prepared to give sound knowledge and understanding of chemistry to undergraduate students. The goal of the syllabus is to make the study of chemistry stimulating, relevant and interesting. The syllabus is prepared with a view to equipping the students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields in chemistry and develop interest in related disciplines. Chemistry, being a border science to biology, physics and engineering, has a key role to play in learning these disciplines. The new and updated syllabus is based on an interdisciplinary approach with vigour and depth. Care has been given to ensure that the syllabus is not very heavy while remaining compatible to the syllabi of other universities at the same level. Chemistry being an experimental science, sufficient emphasis is given in the syllabus for training in laboratory skills and instrumentation.

The syllabus has been prepared in a participatory manner, after discussions with a number of faculty members in the subject and also after evaluating the existing syllabi of B.Sc Part-III, the new syllabi of XIth & XIIth standards and U.G.C. model curriculum and the syllabi of

other Universities. The units of the syllabus are well defined and the scope of each is given in detail. The number of contact hours required for each unit is also given. A list of reference books is provided at the end of each course.

Broad objectives

To enable the students

- To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop interest in the study of chemistry as a discipline.
- To acquire the knowledge of terms, facts, concepts, processes techniques and principles of the subject.
- To develop the ability to apply the principles of Chemistry.
- To be inquisitive towards advanced chemistry and developments therein.
- To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society.
- To develop problem solving skills.
- To be familiarised with the emerging areas of Chemistry and their applications in various spheres of Chemical sciences and to apprise the students of its relevance in future studies.
- To develop skills in the proper handling of apparatus and chemicals.
- To be exposed to the different processes used in industries and their applications.

COURSE STRUCTURE FOR UG PROGRAMME BIOCHEMISTRY

SEMESTER 1

No	Title of the Course	Hours /week	Credits
1	Common Course I (English)	5	4
2	Common Course II (English)	4	3
3	Common Course I (Additional Language)	5	4
4	Core Course 1	3	3
5	Complementary 1 (Course I)	4	3
7	Complementary 2 (Course I)	4	3

SEMESTER 2

No	Title of the Course	Hours/week	Credits
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1	Common Course III (English)	5	4
2	Common Course IV (English)	4	3
3	Common Course II (Additional Language)	5	4
4	Core Course 2	3	3
6	Complementary 1 (Course II)	4	3
8	Complementary 2 (Course II)	4	3

SEMESTER 3

No	Title of the Course	Hours/week	Credits
1	Common Course (General)	4	4
2	Common Course (General)	4	4
3	Core Course 3	3	3
4	Core Course 4 Practical	2	*
5	Core Course 5 Practical	2	*
6	Complementary 1 (Course III)	5	3
7	Complementary 2 (Course III)	5	3

SEMESTER 4

No	Title of the Course	Hours/week	Credits
1	Common Course (General)	4	4
2	Common Course (General)	4	4
3	Core Course 6	3	3
4	Core Course 3 Practical	2	2
5	Core Course 4 Practical	2	2
6	Complementary 1 (Course IV)	5	3
7	Complementary 2 (Course IV)	5	3

SEMESTER 5

No	Title of the Course	Hours / week	Credit
1	Open Course 1	2	2
2	Core Course 7	5	4
3	Core Course 8	4	4
4	Core Course 9	4	4
5	Core Course 10-14 Practical	10	*
6	Core Course 15 Project	*	*

SEMESTER 6

No	Title of the Course	Hours / week	Credit
1	Open Course 2	2	2
2	Core Course 16	5	4
3	Core Course 17	4	4
4	Core Course 18(Elective)	4	4

5	Core Course 10-14 Practical	10	10
6	Core Course Project	*	4

The distribution of Hour/Credit for Theory/Practical shall be decided by the Board of Studies concerned.

Scheme Common Courses (Biochemistry)

No	Semester	Course Code	Title of the Course	Hours / week	Credit
1	III	3A05BCH	Common Course Biochemistry I	4	4
2	III	3A06BCH	Common Course Biochemistry I	4	4
3	IV	4A09BCH	Common Course Biochemistry I	4	4
4	IV	4A10BCH	Common Course Biochemistry I	4	4

Scheme Biochemistry(core)

No	Semester	Course Code	Title of the Course	Contact Hr/week	Credits
1	I	1B01BCH	Methodology of Biochemistry as Discipline of Science	3	3
2	II	2B02BCH	Physical Aspects in Biochemistry	3	3
3	III	3B03BCH	Core Course Biochemistry	3	3
4	III	3B04BCH	Core Course Practical Biochemistry	2	-
5	III	3B05BCH	Core Course Practical Biochemistry	2	-
6	IV	4B06BCH	Core Course Biochemistry	3	3
7	IV	4B03BCH	Core Course Practical Biochemistry	2	2
8	IV	4B04BCH	Core Course Practical Bio chemistry	2	2
9	V	5B07BCH	Core Course Biochemistry	5	4

10	V	5B08BCH	Core Course Bio chemistry	4	4
11	V	5B09BCH	Core Course Biochemistry	4	4
12	V	5B10-14BCH	Core course Practical Biochemistry	10	-
13	V	5B15BCH	Project /Industrial visit	-	-
14	VI	6B16BCH	Core Course Biochemistry	5	4
15	VI	6B17BCH	Core Course Biochemistry	4	4
16	VI	6B18BCH/CHE	Elective	4	4
17	VI	6B10-14BCH	Core Course Practical Biochemistry	10	10
18	VI	6B16BCH	Project work	-	4

Scheme(Elective)

No	Semester	Course Code	Title of the course	Contact Hr/week	Credits
1	VI	6B19CHE	A. Environmental chemistry	4	4
2	VI	6B19CHE	B. Food chemistry	4	4
3	VI	6B19BCH	C. Industrial Bio chemistry	4	4
4	VI	6B19CHE	D. Analytical chemistry	4	4

Scheme Biochemistry(Complementary)

No	Semester	Course Code	Title of the Course	Contact Hr/week	Credits
1	I	1CO1BCH	Biochemistry I	2	2
2	II	2CO2BCH	Biochemistry II	2	2
3	III	3CO3BCH	Biochemistry III	3	2
4	IV	4CO4BCH	Biochemistry IV	3	2
5	I-IV	4CO5BCH	Biochemistry Practical	8	4

Scheme Open Courses

No	Semester	Course Code	Title of the Course	Contact Hr/week	Credits
1	V	5D01CHE	Chemistry in service to Man	2	2
2	V	5D02CHE	Chemistry in everyday life	2	2
3	V	5D03CHE	Environmental Studies	2	2
4	VI	6D04CHE	Drugs-Use & Abuse	2	2
5	VI	6D05CHE	Food Science	2	2

1B01BCH – Methodology of Biochemistry as a Discipline of Science

Credits-3

(54

hrs)

Aim: To illustrate the methodology of science in chemistry

Objectives :

- To have a broad outline of the methodology of science in general and Chemistry in particular.
- To understand the important analytical and instrumental tools used for practicing chemistry.
- To learn computer based presentation and statistical analysis of data using spreadsheet software.
- To apply these skills in the analysis of experimental data in chemistry practical.
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Module - 1 Chemistry as a discipline of science

(9 hrs)

What is Science? Scientific statements, Scientific methods – observation – posing a question – formulation of hypothesis – experiment theory – law. Falsification (disproving) of hypothesis, inductive and deductive reasoning, revision of scientific theories and laws.

Methods of Science as illustrated through the following:

i) Laws of chemical combination – Faradays laws of electrolysis – Daltons atomic theory – atom models – J.J.Thomson, Rutherford, Bohr model and quantum mechanical model of atom.

ii) n-P-V-T relation of gases-gas laws – kinetic molecular theory.

Role of concepts and models in Science.

Evolution of Chemistry – ancient speculations on the nature of matter, early form of chemistry – alchemy, origin of modern chemistry. Structure of chemical science: scope of chemical science, theory and experiment, branches of chemistry. Role of Chemistry as a central science connecting Physics, Biology and other branches of science. Interdisciplinary areas involving Chemistry – Nanotechnology, Biotechnology.

Chemical science in the service of man: Drugs, food, flavouring agents, sweeteners, cosmetics, soaps and detergents, paints, varnishes, textiles, dyes, fertilizers, insecticides, fuels etc. – examples in each.

Methodology of chemistry: Symbols, formulae, Chemical equations, classification (periodic classification of elements, classification of organic compounds into homologous series), Analysis (qualitative and quantitative), preparation, synthesis, manufacture.

References

1. J.A.Lee, Scientific Endeavor, Addison Wesley Longman (chapters 1 and 2)
2. C.N.R. Rao, University Chemistry, Universities Press (India) Pvt. Ltd (Chapters 1 and 2)

Module –2. Research in Science (9 hours)

Selecting a topic – hypothesis – design of experiment: variables, correlation and causality, sampling, use of controls, experimental bias, analysis, results, discussion of results, models. Summary of the scientific methods. Writing Science.

Reference

J.A.Lee, Scientific Endeavor, Addison Wesley Longman (chapters 3, 9 and Appendix 3)

Module-3. Analytical and synthetic methodologies in Chemistry (9 hours)

Titrimetric analysis : Fundamental concepts – mole, molarity, molality, ppm and ppb primary standard – secondary standard, quantitative dilution – problems. Acid base titrations – titration curves – pH indicators. Redox titrations – titration curve – titrations involving MnO_4^- and $\text{Cr}_2\text{O}_7^{2-}$ - redox indicators. Complexometric titrations – EDTA

titrations – titration curves – indicators – **Gravimetric analysis**: Unit operations in gravimetric analysis illustrations using iron and barium estimation. **Synthetic methodologies** – condensation – addition – examples. Separation and purification techniques – Filtration, Crystallization and precipitation – concept of solubility product as applied in group separation of cations – problems. Fractional distillation, Solvent extraction.

References

1. B.R.Puri, L.R. Sharma, Kalia, Principles of Inorganic Chemistry, Milestone Publishers, New Delhi (Chapter 40).
2. D.A.Skoog, D.M.West and S.R. Crouch, Fundamentals of Analytical Chemistry 8th edn, Brooks/Cole Nelson Chapters 12-17).
3. Vogel's Text book of Quantitative Chemical Analysis 6th edn, Pearsons Education Ltd (Chapters 10, 11).
4. G.D.Christian, Analytical Chemistry, John Wiley and Sons (Chapters 5, 7, 8, 16, 17)

Module-4. Data Analysis

(9

hours)

Units, significant digits, rounding, scientific and prefix notation, graphing of data – Precision and accuracy – Types of errors – Ways of expressing precision – Ways to reduce systematic errors – reporting analytical data, Statistical treatment of analytical data – population and samples – Mean and standard deviation – distribution of random errors – confidence limits – tests of significance – Correlation and regression – linear regression analysis, calculation of regression coefficients (slope, Intercept) using scientific calculator – methods of least squares.

The following section is non-evaluative for theory examination

Familiarization of software packages for analysis and graphical representation of data – MS Excel, Origin, Open office calc (Physical Chemistry experiments using software packages are included in the 5th and 6th semesters), simulations, virtual experiments, drawing molecular structures using Chems sketch, ISIS Draw.

References

1. B.R. Puri, L.R. Sharma, Kalia, Principles of Inorganic Chemistry, Milestone Publishers, New Delhi (Chapter 40)
2. J.A.Lee, Scientific Endeavor, Addison Wesley Longman (Appendices 1, 2 and 4)
3. D.A.Skoog, D.M.West and S.R.Crouch, Fundamentals of Analytical Chemistry 8th edn, Brooks/Cole Nelson (Chapters 5-8)
4. Vogel's Text book of Quantitative Chemical Analysis 6th edn, Pearsons Education Ltd (Chapters 4).
5. G.D.Christian, Analytical Chemistry, John Wiley and Sons (Chapters 2)

6. R.Crouch and F.J.Holler, Applications of Microsoft Excel in Analytical S.Chemistry, Brooks/Cole.

Further Reading

1. J.Mills and P.Evans, Core Chemistry, Foundation books Pvt. Ltd, New Delhi (2004)
2. T.F.Gieryn,Cultural boundaries of science, University Chicago Press, 1999.
3. H.Collins and T.Pinch, The Golem, What everyone should know about science, Cambridge University Press, 1993.
4. Hewitt, Paul G, S.Lyons, J.A.Suchocki and J.Yeh, Conceptual Integrated Science, Addison Wesley, 2007.
5. Methods for Teaching Science as Inquiry, Allyn and Bacon, 2009.
6. K.V.S. Sarma, Statistics made simple, Prentice – Hall of India, New Delhi.
7. R.Crouch and F.J.Holler, Applications of Microsoft Excel in Analytical S.Chemistry, Brooks/Cole.
8. R.D.Jarrard, Scientific Methods, jarrad@mines.utah.edu,2001.
9. R.Sangenburg D.K.Moser, History of Science (5 Volumes), Universities Press (India) Ltd.

Module 5 : Areas of study in Biochemistr

(18 Hrs)

Definition-Branches in Biochemistry, Historical resume-Lavoisier, Fohler, Mechevreul, Emil Fisher, Louis Pasteur, krebs, Sanger, Waston, Crick, Michaels, Menton etc.

Biochemistry as a molecular logic of living organism-role and scope of Biochemistry, inter disciplinary areas involving biochemistry-nano technology and biotechnology.

Biochemistry in service to Man- drugs flavorings agents, soaps and detergents, enzymes, nutritional suppliments, GM food.

References

1. J.L Jain Text book of biochemistry, S. chand and Company Ltd. New Delhi.

2B02BCH : Physical Aspects in Biochemistry

Credits-3

(54

Hrs)

Module 1 : Chemical Bonding

(15 Hrs)

Ionic Bond-nature of ionic bond-properties of ionic compounds- factors favoring the formation of ionic compounds-lattice energy-Born-Haber cycle and its applications. Covalent bond. Concept of resonance, resonance energy. Polarization of covalent bond, polarizing power and polarizability of ions. Fajan's rule. Dipole moment and molecular structure. Weak chemical forces-hydrogen bond, inter and intramolecular hydrogen bonds, effects of hydrogen bonding, van der Waals forces.

Module 2 : Nuclear Chemistry

(10 Hrs)

Natural Radio activity, modes of decay, decay constant half life period, average life, radio active equilibrium, Geiger-Nuttall rule, units of radioactivity radiation dosage. Induced radio activity, nuclear reactions induced by charged projectiles, Biological effect of radiation emitted by isotopes.

Module 3 : Solutions

(10 Hrs)

Colligative properties. Lowering of vapour pressure and Raoult's law. Elevation of boiling point, depression of freezing point – Osmotic pressure, laws of osmotic pressure-Van't Hoff equation-Calculation of molar mass abnormal molar mass-Van't Hoff factor-degree of dissociation and their calculation from colligative properties.

Module 4 : Water, Acids, Bases and Buffers

(10 Hrs)

Dissociation of water, concepts of pH and pOH, simple numerical problems of pH. Elementary study of methods to determine pH(a) theoretical calculations(b) using indicators(c) using pH meters. Dissociation of strong and weak electrolytes. Henderson – Hesselbalch equation with derivation, simple numerical problems involving application of this equation. Shapes of titration curves of strong and weak acids and bases. Meaning of K_a and pK_a values. Buffers, buffer capacity and factors affecting buffer capacity.

Module 5 : Colloids and Membranes

(9 Hrs)

True solutions, colloidal solutions and coarse suspension. Distinction between lyophilic and lyophobic colloids. Methods of preparation of colloidal solutions. Elementary study

of charge on colloids. Brownian movement and tyndal effect, membrane permeability. Dialysis, fundamental study on Donnan equilibrium, application of colloidal chemistry. Elementary study of emulsion and emulsifying agent.

Reference

1. J.L Jain. Text book of Biochemistry, S. Chand and Company.
2. David T Plummer 3rd edition (1998) An Introduction to practical Biochemistry

**Sd/-
Dr.K.Pradeep Kumar,
Chairman, BOS Chemistry(UG).**



KANNUR UNIVERSITY

COURSE STRUCTURE

&

SYLLABUS

FOR

BIOCHEMISTRY

(COMPLEMENTARY)

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

w.e.f 2009 ADMISSION

Scheme Biochemistry(Complementary)

No	Semester	Course Code	Title of the Course	Contact Hr/week	Credits
1	I	1CO1BCH	Biochemistry I	2	2
2	II	2CO2BCH	Biochemistry II	2	2
3	III	3CO3BCH	Biochemistry III	3	2
4	IV	4CO4BCH	Biochemistry IV	3	2
5	I-IV	4CO5BCH	Biochemistry Practical	8	4

1C01BCH Biochemistry –I

Hours/week:2

Credits:2

UNIT 1(5 hrs)

General properties of organic and inorganic compounds

UNIT 2(15 Hrs)

Chemical bonds: ionic, covalent, co-ordinate, covalent, metallic and hydrogen bond

Hydrophilic interaction, Vander vaal forces-ionization of water-ph and poh-weak acids

and week bases.equilibrium constant-buffer buffering against ph changes in biological

systems. Henderson and hasselblach equation –ph meter and measurement of ph

UNIT 3(5 Hrs)

Chemical reactions: Chemical equation-oxidation reduction reaction-redox potential and

its role in biological reaction

UNIT 4(3hrs)

Solutions: normality molarity molality.simple numerical problems

UNIT 5(8Hrs)

Introductory organic chemistry-concept of chirality and handedness in biological

molecules-D forms and L forms-optical rotation reactions of OH and –CHO and carbonyl

group

2C02BCH Biochemistry –II

Hours/week:2

Credits:2

Unit I (5 Hrs)

Biomolecules :-Carbohydrates-Classification, Occurrence; Structure and function of mono sacchrides, oligosacchrides and polysacchrides.

Unit II (5 Hrs)

Amino acids:-Classification based on polarity, Structure, amphoteric property of amino acids-peptide formation

Unit III (3 Hrs)

Protein:-Classification based on function, Based on physical and chemical properties.

Unit IV (5 Hrs)

Lipids:-Classification of lipids-Fatty acids, Fats, Waxes, Phospho lipids, Sphingo lipids, terpenes, and steroids.

Unit V (8 Hrs)

Nucleic acids:-Purines and Pyrimidines-Their structure-Nucleosides and nucleotides-Classes of DNA, Watson and Crick model of DNA. RNA-An account of their structure and function.

Unit VI(5 Hrs)

Bio organic chemistry: - Metal ions in biological system. Role of iron in myoglobin and cytochrome. Magnesium in chlorophyll, Cobalt in vitamin B12 and molybdenum metalloenzyme.

Unit VII (5 Hrs)

Separation techniques:-Chromatography-General principle- Adsorption, TLC, partition, Paper. Electrophoresis, centrifugation and ultra centrifugation.

3CO3BCH Biochemistry –III

Hours/week:2

Credits:2

UNIT 1(15 Hrs)

Principles of bioenergetics-bioenergetics and thermodynamics. Entropy-standard free energy change and equilibrium constant-phosphorylated compounds and thioesters-ATP energetics.active transport across membrane-biological oxidation-flow electrons-dehydrogenation

UNIT 2(15 Hrs)

Glycolysis: biosynthesis and degradation of major carbohydrates-role of insulin and glycogen –gluconeogenesis .citric acid cycle-energetics-major enzymes and coenzymes involved

UNIT 3(10 Hrs)

Major amino acids synthesis and breakdown.denovo synthesis oxidation and production of urea

UNIT 5(14 Hrs)

Biosynthesis and breakdown of nucleotides. Salvage pathway

4C04BCH Biochemistry –IV

Hours/week:2

Credits:2

UNIT 1(15 HRS)

Enzymes general account-apoenzymes-coenzymes-classification and nomenclature of enzymes according to IUB .Cofactors and coenzymes-mechanism of enzyme action-lock and key model. Enzyme specificity.allosteric enzymes-activation and inhibition of allosteric enzymes. Enzyme assay.

UNIT 2(20HRS)

Enzyme kinetics. Reaction rate –the MM equation-types of inhibition and change in enzyme kinetics reference to inhibition. Single and biosubstrate kinetics. Mechanism of chymotrypsin, myoglobin, hemoglobin.enzymes other than proteins ELISA.

UNIT 3(10 HRS)

Oxidative phosphorylation-ETC.Photophosphorylation-pigment system-assimilatory powers, cyclic and non cyclic phosphorylation.

UNIT 4(9 HRS)

Fatty acids biosynthesis and its degradation-cholesterol synthesis. Physiological functions of steroid hormones.

Biochemistry (Practical)-I

Hours/week:2

Credits:0

1. Determination of pH of a solution by using pH paper and pH meter.
2. Preparation of different buffers-phosphate buffer, citrate buffer tris buffer glycine-HCL buffer
3. To prepare molar,molal and percentage solution.
4. Qualitative analysis of carbohydrates.

General reaction of carbohydrates – molisch's test, benedict's test alkaline picrate, barfoeds.

test selivanoff's nylandar's test fehling's test and osazone test.

5. Qualitative analysis of proteins and amino acids- Ninhydrin, xanthoproteic test, millon's test glyoxilic acid test, nitroprusside test, folin-phenol test sakaguchi's test. General color reactions of proteins, isoelectric precipitation test. Heat and acetic acid test biuret test full saturation and half saturation test.

6. Paper chromatography and TLC of amino acids and sugars (ascending, descending and circular)
7. separation of sugar by TLC.
8. Kunhene's fermentation experiment(demo).
9. Experiment to show anaerobic respiration(demo).

Biochemistry (Practical)-II

Hours/week:2

Credits:0

1. Quantitative analysis of sugars in given solution.
2. Quantitative analysis of blood sugars.
3. Determination of A/G ratio in serum.
4. Estimation of proteins by biuret and Lowry's method.
5. Assay of salivary enzymes.
6. Kinetic study of salivary enzymes-effect Of temperature ,ph,enzyme concentration, substrate concentration.
7. Determination of blood sugars, Uria, and Creatin .
8. Determination of hemoglobin in blood.
9. Estimation of ascorbic acid in orange juice.
10. Estimation of reducing sugar in honey.

Sd/-

**Dr.K.Pradeep Kumar,
Chairman,BOS Chemistry(UG)**