Faculty of Science

Sixth Semester - Bachelor of Science (Biology)

SUBJECT: CHEMISTRY

CODE: BSCB-601A

UNIT-I

A. Amino acids: Classification, structure, stereochemistry ofaminoacids, acid base behaviour, isoelectric point, general methods of preparation and properties of _-amino acids. Proteins and peptides. Introduction to peptides linkage, end group analysis, classification, properties and structure of proteins (primary, secondary and tertiary).

B. Elementary idea of Fats, Oils & Detergents: Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils, Saponification value, iodine value, acid value.

UNIT –II

A. Organometallic Chemistry: Synthesis; structure and bonding in metal carbonyl complexes, metal olefin complexes and metal alkyne complexes. Oxidative addition reactions.

B. Organometallic Compounds: Organ magnesium Compound - Grignard Reagent and Organ lithium Compounds, methods of preparation, structure and synthetic applications.

UNIT –III

A. Magnetic properties of transition metal complexes: magnetic moment (spin only and with L-S coupling), orbital contribution magnetic moment.

B. Electronic spectra of transition metal complexes: Spectroscopic ground and excited states, types of electronic transitions, selection rules for transitions, Orgel-energylevel diagram for d1 to d9 states.

C. Water Analysis: Hardness, types of hardness, acidity and alkalinity, BOD, COD and DO.

UNIT-IV

A. Infrared spectroscopy: Statement of the Born-Oppenheimer approximation, rotational spectrum of diatomic molecules. Energy levels of a rigid rotator, selection rule, intensity of absorption bands, Maxwell- Boltzmann distribution and population of energy levels.

B. Raman Spectroscopy: concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules. Selection rules, application of Raman spectrum.

UNIT-V

A. NMR Spectroscopy Principle and Instrumentation, NMRactive nucleus, chemical shift, spin-spin coupling, spectrum of ethanol and ethanal.

B. Surface Phenomena and Catalysis: adsorption of gases and liquids on solid adsorbent, Freundlich and Langmuir adsorption isotherms, determination of surface area, characteristics and mechanism of heterogeneous catalysis.

Recommended Books

1. Physical Chemistry-Puri, Sharma and Pathania, Vikas Publications, New Delhi
2. Physical Chemistry -G.M. Barrow, International Student Edition, McGraw Hill.
3. The Elements of Physical Chemistry, P.W. Atkins, Oxford Uni v er s i t y Press
4. Organic Chemistry, Morrison and Boyd, Prentice Hall.
5. Organic Chemistry, L.G. Wade Jr. Prentice Hall
6. Fundamentals of Organic Chemistry Solomons, John Wiley.
7. Inorganic Chemistry – J.D. Lee, John Wiley
8. Inorganic Chemistry – Cotton and Wilkinson, John Wile

B.Sc. Semester VI
Chemistry
Paper: Practical

Organic Chemistry Binary mixture analysis containing two solids: Separation, identification and
Preparation of derivatives.

A. Physical Instrumentation
(i) Job's Method
(ii) Mole-ratio method

B. Inorganic Chemistry
(i). Effluent Analysis Identification of cations and anions in different water samples.

(ii). Water analysis to determine the amount of dissolved oxygen in water samples in ppm units.

(iii) Determination of Hardness of Water

Faculty of Science
Sixth Semester - Bachelor of Science (Biology)

SUBJECT: BOTANY

CODE: BSCB-602A

UNIT I

Mendeliangeneticsand its extensionMendelism: History; Principlesofinheritance; Chromosome theory of inheritance; Autosomes and sexchromosomes; Probabilityand pedigree analysis; Incomplete dominance and dominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropic, Recessive and Dominant traits, Penetrance and Expressivity, Numerical; Polygenic inheritance

UNIT II

Extra chromosomal Inheritance: Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast; Maternal effects-shell coiling in snail; Infective heredity-Kappa particles in Paramecium

UNIT III

Linkage, crossing over and chromosome mapping ,Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numerical based on gene mapping; Sex Linkage.

UNIT IV

SVariation in chromosome number and structure, Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

UNIT V

Gene mutations, Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: ClB method.Role of Transposons in mutation.DNA repair mechanisms

SUGGESTED READINGS:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th edition

2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition

3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition

4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th e

SUBJECT: BOTANY

Practical

1: Meiosis through temporary squash preparation

2. Mendel's laws through seed ratios.

Laboratory exercises in probability and chi-square analysis

3. Chromosome mapping using test cross data.

4. Pedigree analysis for dominant and recessive autosomal and sex linked traits

5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)

6. Blood Typing: ABO groups & Rh factor

7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes

8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.

9. Study of human genetic traits: Sickle cell anemia, XerodermaPigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe.

Faculty of Science
Sixth Semester - Bachelor of Science (Biology)

Subject: ZOOLOGY
CODE: BSCB-603A

UNIT I

Evidences of Evolution: Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, Molecular (universality of genetic code and protein synthesising machinery, three domains of life, neutral theory of molecular evolution

UNIT II

Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection. Genetic Drift.

UNIT III

Product of evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Adaptive radiation / macroevolution (exemplified by Galapagos finches

UNIT IV

Origin and evolution of man, Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from Dryopithecus leading to Homo sapiens, molecular analysis of human origin

UNIT V

Implications of Developmental Biology Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis

SUGGESTED READINGS:

1. Ridley,M (2004) Evolution III Edition Blackwell publishing

2. Hall, B.K. and Hallgrimson, B (2008). Evolution IV Edition. Jones and Barlett Publishers.

3. Campbell, N.A. and Reece J.B (2011). Biology. IX Edition. Pearson, Benjamin, Cummings.

4. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates. Snustad. S Principles of Genetics.

Subject: ZOOLOGY
PRACTICAL'S

1. Study of fossils from models/ pictures
2. Study of homology and analogy from suitable specimens
3. Study and verification of Hardy-Weinberg Law by chi square analysis
4. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies
5. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.
6. Study of the developmental stages and life cycle of Drosophila from stock culture
7. Study of different sections of placenta (photomicropgraph/ slides)

Project report on Drosophila culture/chick embryo development

Faculty of Science

Sixth Semester - Bachelor of Science (Biology)

SUBJECT: NURSERY AND GARDENING
CODE: BSCB-605A

UNIT I

Nursery: definition, objectives and scope and building up of infrastructure fornursery, planning and seasonal activities - Planting - direct seeding and transplants.

UNIT II

Seed: Structure and types - Seed dormancy; causes and methods of breakingdormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seedproduction technology - seed testing and certification.

UNIT III

Vegetative propagation: air-layering, cutting, selection of cutting, collecting season,treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - greenhouse - mist chamber, shed root, shade house and glass house

UNIT IV

Gardening: definition, objectives and scope - different types of gardening -landscape and home gardening - parks and its components - plant materials and design -computer applications inlandscaping - Gardening operations: soil laying, manuring,watering, management of pests and diseases and harvesting.

UNIT V

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study ofcultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes,and carrots - Storage and marketing procedures

Suggested Readings:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National _Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.37

Faculty of Science
Sixth Semester - Bachelor of Science (Biology)

SUBJECT: MEDICAL BOTANY
CODE: BSCB-605B

UNIT I

Theory, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definitionand Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha:

UNIT II

Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations.

UNIT III

Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants:

UNIT-IV

Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

UNIT V

Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.

Suggested Readings:

1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India

2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn.