

SOLAPUR UNIVERSITY, SOLAPUR

B.Sc. Part I (Biotechnology)

(w.e.f. June 2010)

Semester Pattern

SEMESTER – I

Course Code	Title of Paper	Type	Marks	Periods
Bt.Eng. 101	Realms of Gold (English Comp.)	Theory	50	40
Bt 101	Basic Biochemistry-I	Theory	50	40
Bt 102	Cell Physiology I	Theory	50	40
Bt 103	Basic Biotechnology I	Theory	50	40
Bt 104	Basics of Tissue Culture I	Theory	50	40
Bt 105	Microbiology I	Theory	50	40
Bt 106	Ecology – I	Theory	50	40
Bt 107	Biometry I	Theory	50	40
Bt 108	Computers – I	Theory	50	40

B. Sc. I (Biotechnology)

Semester II

Course Code	Title of Paper	Type	Marks	Periods
Bt.Eng. 102	Realms of Gold (English Comp.)	Theory	50	40
Bt 109	Basic Biochemistry-II	Theory	50	40
Bt 110	Cell Physiology – II	Theory	50	40
Bt 111	Basic Biotechnology – II	Theory	50	40
Bt 112	Basics of Tissue Culture – II	Theory	50	40
Bt 113	Microbiology- II	Theory	50	40
Bt 114	Ecology – II	Theory	50	40
Bt 115	Biometry- II	Theory	50	40
Bt 116	Computers – II	Theory	50	40

SOLAPUR UNIVERSITY, SOLAPUR
B.Sc. -I (BIOTECHNOLOGY)
PRACTICAL COURSE.

Course Code	Title of Paper	Type	Marks	Practicals
Btp 101	Biochemistry & Cell Physiology	Practical	50	30
Btp 102	Basic Biotechnology	Practical	50	30
Btp 103	Environment and Microbes	Practical	50	30
Btp 104	Computer for Biometry & Biostatistics	Practical	50	30

Practical **Btp 101**: based on papers Bt 102, Bt 103, Bt 109 and Bt 110;

Practical **Btp 102**: based on papers Bt 104, Bt 105, Bt 111 and Bt 112;

Practical **Btp 103**: based on papers Bt 106, Bt 107 Bt 113, Bt 114;

Practical **Btp 104**: based on papers Bt 108, Bt 109, Bt 115 and Bt 116.

Bt.Eng. -101
Realms of Gold

Objective :

To make students aware of the different communicative skills, and to develop among them an ability to effectively communicate in English, both in written and spoken modes.

SEMESTER – I
Examination: Oct. 2010
Teaching: From June 2010
Text Book Prescribed

Realms of Gold : An Anthology for Degree Classes, (Orient Black Swan Pvt. Ltd., Hyderabad)

Prose Passages prescribed:

1. The Power of Prayer - Abdul Kalam
2. Rising Tide of Urban Chaos – Colin Legum
3. The Gold frame – R.K. Laxman.

Poem Prescribed :

- 1) The Village Schoolmaster – Oliver Goldsmith.

Grammar Prescribed.

- 1) Parts of Speech
- 2) Use of Articles.

Communication Skills Prescribed:

- 1) Everyday English : Part – I
- 2) Everyday English : Part – II
- 3) Preparing a CV and Writing letters of Application.

Bt. 101 Basic Biochemistry. –I

40L

UnitI: BASIC CHEMISTRY

10L

Acid, Base and Buffers, Law of Mass action, Ionic product of water, pH, Bronsted acids, ionisation of weak acids, weak base; Henderson-Hasselbatch equation, titration curves of amino acids, polyprotic acids; Physiological buffers, problems.

Unit II : Basic organic Chemistry

10 L

Definition and place of biochemistry in Natural Sciences, relevance to Biotechnology. The origin of life, unique properties of carbon, chemical evolution. The rise of living system, properties of water, its structure and interaction, physical properties of ice, water as a solvent and proton mobility.

Unit III: Carbohydrates

10L

Carbohydrates – structure and properties : Monosaccharides, isomerization of monosaccharides, cyclic structure of monosaccharides, different types of monosaccharides, compounds derived from monosaccharides, nomenclature of monosaccharides and chemical properties; Disaccharides, Trisaccharides, Oligosaccharides and Polysaccharides, structure of glycan and its importance.

Unit IV: Thermodynamics:

10L

Notions of thermodynamics, Law of thermodynamics, Gibb's free energy, applications to reactions in living organisms; Importance of ATP and other compounds of high energy potential; formation of ATP in respiratory chain, redox potential, electron carriers, spontaneity and disorder, entropy, measurement of entropy; equilibrium constant and coupled reaction, problems.

Bt102. Cell Physiology –I

40L

Unit I. Cell Structure & Organisation

04L

Introduction to generalized cell : Animal cell, plant cell.

Cell types : Prokaryotic, eukaryotic, PPLOs,

Unit II Cell wall: Ultra structure of prokaryotic and eukaryotic cell wall.

06L

Ultra structure of cell organelles and their functions: Plasma membrane, Ribosomes, Centrioles, Endoplasmic reticulum, Golgi complex, mitochondria, lysosomes, plastids, nucleus.

Unit III Organisation Cytoskeleton and cell motility: microtubules, actin filaments, intermediate filaments.

10L

Unit IV. Cell Biology

20 L

Cell growth: concept of cell growth and differentiation of division.

Cell cycle and division: Mitosis, meiosis; cell synchrony and its applications; cell senescence, apoptosis.

Chromosomes: Chromosome number, size, types. Chromosomal morphology, topography, fine structure and models; heterochromatin, euchromatin; giant chromosomes.

Genetic code and protein synthesis: Genetic code, wobble hypothesis, components of protein biosynthesis, mechanism of protein synthesis.

Bt.103 Basic Biotechnology – I

40L

Unit I. Plant breeding -

15 L

General idea - introduction to plant breeding, objectives of plant breeding, genetic variability and its role in plant breeding, methods of reproduction and breeding – in self pollinated, cross pollinated, vegetatively propagated plants, heterosis and inbreeding depression; genetic, physiological and biochemical basis of heterosis. organogenesis, factors affecting organogenesis, differentiation.

Unit II. Somatic embryogenesis

10 L

Embryogenesis – induction, development and maturation; factors, applications and synthetic seeds; molecular biology of somatic embryogenesis – induction, development, synchronizing somatic embryo development; hormonal regulation, late embryogenesis abundant (LEA).

Unit III. Euploids **10L**

Aanther, pollen and ovary culture for production of haploid plants and homozygous lines; triploid production- methods and applications.

In vitro pollination and fertilization – methods, factors affecting seed setting after in vitro pollinations, applications; embryo culture, embryo rescue.

Risks and ethics of biotechnology

Unit IV Gene expression- **05L**

Genes isolated from somatic embryos, expression of ‘non-embryonic’ genes during somatic embryogenesis; somatic embryo as a genetic system.

Bt.104-Basics of Tissue Culture – I **40L**

Unit I. Introduction to cell culture – **05L**

Totipotency, tissue culture technique to produce novel plants and hybrids; preparation and composition of tissue culture media. Callus initiation and maintenance, suspension culture : single cell clones.Cytodifferentiation

Unit II. Animal cell culture **15L**

Tissue and Organ culture – historical perspectives, development, scope; requirements for animal cell and tissue, organ culture; culture media – composition and preparation.

Cell culture – initiation, cultivation of animal cell in mass in Bioreactors; biology of cell culture, evolution of culture dynamics and maintenance of cell lines.

Media – serum and protein free media and their application.

Viability – measurement of viability and cytotoxicity

Unit III. Micromanipulation **10 L**

Cell cloning –cell synchronization, cell cloning, micromanipulation, cell transformation and applications of animal cell culture.

Hybridoma – technology, production of monoclonal antibodies.

In vitro fertilization – embryo transplant techniques and their applications.

Unit IV. Transgenic animals **10L**

Production, importance; useful proteins in transgenic animals, regulatory proteins, blood products, vaccines.

Bt. 105 MICROBIOLOGY -I

40L

Unit I: The Microbial world

20 L

Introductions to microbes: Milestones in Microbiology – introduction, Development of the microscope, discovery of microbial life, Louis Pasteur's contribution, germ theory of disease, development of medical microbiology. Introduction to applied branches in microbiology: air, aquatic, sewage, soil, food, milk, medical, industrial, pollution, agriculture, genetic engineering, geomicrobiology.

Unit II Cell structure:

Types of micro-organisms : bacteria, algae, fungi, protozoa and viruses. Prokaryotic and eukaryotic cell structure and differences. Cytology of typical bacterial cell – morphology, size and arrangement of bacteria. Structure and functions of – cell wall , cytoplasmic membrane, capsule and slime layer, flagella, pili, nuclear material, cytoplasmic inclusions, reserve food materials, spore and endospore – its formation and germination.

Unit III: Microbial growth

20 L

Microbial nutrition and culture media: Nutritional requirements – water, oxygen, hydrogen, carbon, nitrogen, sulphur, phosphorus, inorganic nutrients, growth factors. Nutritional classification on the basis of carbon and energy source.

Growth: Growth phases in a bacterial culture. Laboratory methods of determination of growth, continuous culture, synchronous growth, diauxic growth.

Unit IV: Media for cultivation of micro-organisms and Pure culture technique

Media for cultivation of micro-organisms: natural, synthetic, semi-synthetic, differential, enriched, enrichment, selective, living media, media for cultivation for algae, fungi and protozoa.

Pure culture technique: Selective methods: chemical, physical and biological methods of selection. Methods for isolating pure cultures – i) streak method, ii) pour plate, iii) spread plate.

Bt.106 Ecology-I

40L

Unit I. Basic Concepts.

05L

Our environment – Atmosphere, Lithosphere, Hydrosphere

Unit II.

15L

Ecology – Concept of Ecosystem, structure, functions, productivity & decomposition, ecological succession – types & features, energy transfer in ecosystem.

Types of ecosystem – Terrestrial-Forest, Grassland, Desert Aquatic-Marine, freshwater, estuarine

Natural Resources – Forests, water, soil, minerals; degradation of resources, their conservation & management.

Unit. III. Biodiversity & Conservation

10L

Biodiversity – Importance, uses, types, bio-geographical regions of India, biodiversity in world & India, Hot spots, endangered & threatened species.

Conservation Nature conservation – Threats to biodiversity, conservation methods-In situ & Ex situ, genetic conservation, wildlife sanctuaries, national parks, biosphere reserves, sacred grooves, project tiger, wetland conservation.

Awareness – Chipko andolan, silent valley, narmada bachao andolan, save western ghats.

Unit. IV Biogeochemical cycles –

10L

Nitrogen, carbon, phosphorus, sulphur, water, oxygen.

BT – 107

Biometry- I

40 L

Unit I: Introduction to basic mathematical concepts

10 L

Number system, classification and measurements, variables, discrete and continuous variables, rounding of data, scientific notation; relative numbers, inequalities, mean values, percentages, Algebraic law.

Unit II: Set theory.

10L

Sets and its properties, functions and relations – linear, periodic and power functions; quadratic and polynomial equations, exponential, inverse and logarithmic functions; sequences – arithmetic and geometric; basic trigonometric principals and relations; polar coordinates – conversions, limits and continuity function.

Unit III: Mathematics **10 L**

Differential and integral calculus: growth rate, differentiation, integrals and integration, second derivatives, partial derivatives – maxima and minima; differential equations, linear and non-linear.

Unit IV: Matrices: **10L**

Notation, Matrix algebra, vectors and scalars, determinant, inverse of a matrix, linear dependences, linear equations.

Bt.108 Computers Science – I **40L**

Unit I. Introduction to computers **05 L**

History of computers- Hardware, Software, Machine languages, Essentials of computer operation, application. Evolution of computer – Generation of computers,

Unit II. Computer systems **10L**

Computer systems – Basic structure, Block diagram of computer, I/O devices, Memory & Its types– RAM, ROM, etc. Secondary Storage devices – hard disc, floppy disc, CD-ROM, DVD-ROM, Virus- definition, types of virus.

Unit III. Operating System **12L**

Operating System & its functions- User Interface, I/O device management, CPU management, Memory management, Device Management. Ex. DOS, Windows, etc. Introduction to MS-Windows, Its desktop, icons, creating folders, Using Windows.- using paint- preparing flow diagrams / chart in Paint.

Algorithms and flowcharting – Definition, Properties and principles, converting algorithms to flowcharting. Comparison between programme and algorithm, use of basic programming in biology

Unit IV. MS Office (Word, Excel, Power point) **13L**

Introduction to DBMS, Introduction & Need of database, Types of Database and Introduction to Biological database. Creating Database in MS-Access, Field, Data type, field size, creation of form & report along with query with the help of Wizards.

a) Word: - Creating simple documents, letter writing, project writing tips.

b) Excel:- Creating Simple excel sheets, using formulas, functions (simple, mathematical, statistical etc)

c) PowerPoint: - Presentation of various topics for seminar.

B. Sc. I (Biotechnology)
Semester II
BtEng -102
Realms of Gold

SEMESTER – II
Examination: March 2011
Teaching: From Nov. 2010
Text Book Prescribed

Realms of Gold : An Anthology for Degree Classes, (Orient Longman, Hyderabad)

Prose Passages Prescribed

- 1) Vivekanand : The Great Journey to the West – Romain Rolland
- 2) The Scientific Point of View - J.B.S.Haldane
- 3) The Sun, The Planets and the Stars - C. Jones

Poems

- 1) Ballad of the Landlord - Langston Hughes
- 2) Ecology - A.K.Ramanujan

Grammar :

- 1) Tenses

Communication Skills :

- 1) Information Transfer and E-language communication
- 2) Note Making and Reporting
- 3) Advertisements and Business Letters.

B. Sc. I (Biotechnology)

Semester II

Bt 109 Biochemistry-II

40L

Unit I : Biomolecules

10 L

Lipids :-

structure of lipids, fatty acids, saturated and unsaturated fatty acids, branched fatty acids; prostaglandins, leukotriens and peroxides; Glycolipids, Spinoglycolipds, Cerides, Hydrocarbons, polyisoprenic lipids, polyisoprnic hydrocarbons, Sterol and carotenoideds, Isoprenic chain quinone, properties and functions.

Unit II Amino acids and proteins :

10L

Classification of amino acids, aliphatic amino acids, cyclic amino acids; physical and chemical properties; Peptides – classification and nomenclature, biologically important peptides, Glutathione, Peptide hormones, peptides with antibiotic activity. Three dimensional conformation of proteins, bonds stabilizing the proteins, primary, secondary, tertiary and quaternary structure of proteins, important properties of proteins – solubility, molecular weight, amphoteric character; classification of proteins based on molecular shape, solubility, composition, phosphoprotein, glycoproteins, lipoprotein, nucleoproteins, chemoproteins and their types.

Unit III : Nucleic Acids

10 L

Nucleic acids: Structure of nucleic acids, pentoses, nitrogen bases, nucleotides, nucleosides – monophosphates, di- and triphosphates, primary structure of nucleic acids, secondary structure of DNA and RNA, Watson and Crick model, other forms of DNA; DNA: Chargaff rule, Physico-chemical properties and biological functions of nucleic acids.

Unit IV Enzymes and Vitamins:

10L

Classification, IUB/EC nomenclature, Michaelis-Menten kinetics, L.B. Plot, Km, Vmax, definition and significance, Isoenzymes and its clinical significance, structure of vitamins, coenzyme form, biochemical function and physiological role, deficiency disorders of water soluble and fat soluble vitamins.

Bt 110 Cell Physiology -II **40L**

Unit I. Cell membranes and permeability: **13L**

molecular models of cell membrane, cell permeability; differentiation of cell membrane, intercellular communications and gap junctions; cell coat and cell recognition, cell surface and cancer cells.

Unit II. Cell differentiation: **10L**

Localization of cytoplasmic determinants in eggs, nucleoplasmic interactions, molecular mechanisms of cell differentiation.

Unit III Cell metabolism **09 L**

Protein trafficking
Membrane transport.

Unit IV **8L**

Cell signalling
Intracellular compartments

Bt.111 Basic Biotechnology – II **40L**

Unit I. Variation **10 L**

Somaclonal and gametoclonal variations- origin of somaclonal variations, mechanism underlying genetic variations, assessment of somaclonal variations; isolation of variants – disease resistant lines, herbicide resistant lines, stress tolerant lines.

Protoplast isolation – culture and fusion, selection of hybrid cells and regeneration of hybrid plants, symmetric and asymmetric hybrids, cybrids.

Unit II Cryopreservation –

Slow growth and DNA bank for germplasm conservation. **05L**

Unit III Plant Transformation – **05L**

Plant Transformation applications for productivity and performance; production of transgenic plants resistant to herbicides, pathogens (virus, fungi and bacteria), insect pests (Bt. Toxin gene) and abiotic stresses (drought, salt, chilling).

Unit IV. Genetic manipulation **20**

Genetic manipulations in plants-Flower pigments, the time of flowering, production of male sterile plants. Antisense strategy,

Molecular markers – aided breeding, RFLP maps, linkage analysis, RAPD markers, STP, microsatellites, SCAR (Sequence Characterized Amplified Regions), SSCP (Single Strand Confirmational Polymorphism), AFLP, QTL, map based cloning, molecular markers, assisted selection.

Bt.112-Basics of Tissue Culture – II **40L**

Unit I. Micro propagation – **05L**

Micro propagation shoot tip culture, production of disease free plants, acclimatization of plant transfer to soil, field transfer

Unit II. Hormones – **10L**

Hormones, Neuroendocrine principles involved in the regulation of growth, reproduction and metabolism of insects and vertebrates. Mechanism of protein and steroid hormone action, importance of hormones as a biotechnological product.

Unit III. Production of Secondary metabolites – **15L**

Application of tissue culture for synthesis of useful compounds; techniques of selecting cell lines for high yields of compounds secondary metabolism, mass cultivation of cells in bioreactors; elicitor induced accumulation of products.

Production of vaccines, antigens and antibodies from plants. Chloroplast transformation – advantages, vectors, success with tobacco and potato

Green house and green house technology.

Unit IV. Sericulture and aquaculture Gene therapy **10L**

Sericulture and aquaculture Gene therapy – Types and genetic diseases targeted for gene therapy.

Human Genome Project – brief account, applications.

Bt - 113Microbiology- II

40L

Unit I: Taxonomy of microbes

05L.

General principles of taxonomy: Approaches to bacterial classification – morphological, cultural, biochemical, antigenic and genetic characteristics.

Unit II: Stains and staining procedures:

08L

Definition of dye and stain. Classification of stains – acidic, basic and neutral. Theories, procedures and mechanisms of – simple staining, differential staining, Gram staining, acid fast staining, negative staining.

Unit III: Sterilization, & Disinfection

07L

Control of micro-organisms Definition of sterilization, disinfectant, antiseptic, germicide, antimicrobial agents. Physical and chemical agents of sterilization.

Unit IV : Microbial biotechnology

20 L

Fermentation technology: Introduction, basic concepts of fermentation – micro-organisms employed in industrial fermentation, production medium, fermenter, recovery of product. Types of fermentation. Factors affecting fermentation.

Bacterial Biotechnology- Application of microbes in agriculture with reference to : biological nitrogen fixation, biogas generation, biological control, recycling of wastes.

Microbial products - Primary and secondary metabolites, enzymes and microbial biomass, bacterial transformation and genetic improvement of industrial microbes and nitrogen fixers.

Bt - 114 Ecology – II

40L

Unit – I Air pollution

10L

Problems of pollution – definition, sources of pollution, local & global impacts of pollution, industrialization, urbanization.

Air pollution – Sources, types of air pollutants & its effects on humans & environment, acid rain, smog, ozone depletion, greenhouse effect, global warming, vehicular pollution, ambient air quality monitoring & standards.

Case study – Bhopal gas tragedy.

Unit – II Water and Soil pollution –

10L

Types of waste, sources, their composition, effects on humans & environment, marine pollution, thermal pollution, eutrophication, pathogenic diseases, BOD, COD, limits for disposal on land, water bodies. Case study – Minamata episode.

Soil/Land pollution – Soil formation, its contents, sources of pollution, soil salinity, effect of fertilizers & pesticides, impact of excessive irrigation, impact of mining.

Unit – III Nuclear pollution

10L

Nuclear pollution – Radioactivity, isotopes, uses, sources of pollution, measurement of radiation, nuclear fission-electricity, atom bomb; nuclear fusion-hydrogen bomb, treatment of nuclear wastes, effects of nuclear radiation.

Case study – Chernobyl nuclear disaster.

Problems of pollution – definition, sources of pollution, local & global impacts of pollution, industrialization, urbanization.

Unit – IV Energy Studies

10L

Energy requirements of modern society, conventional energy sources, energy crisis.

Non conventional energy sources – Solar, wind, hydel, tidal, OTEC, geothermal, hydrogen, solid waste.

Biomass energy – Non biological methods-Wood as fuel, gasification, liquefaction, pyrolysis, bagasse based co-gen power production. Biological-biogas generation, molasses fermentation for alcohol, bioethanol, biodiesel.

Energy plantation, gasohol experiment, new techniques on biological energy production.

Bt.115 Biometry II

40 L

Unit I: Statistics

05L

Importance and applications, tabulation and classification of data; frequency distribution, graphical distribution of data.

Unit II Measures of central tendencies & dispersion

10L

Measures of central tendencies: Mean median and mode, their properties.

Measures of dispersion – Range, mean deviation, variance, standard deviation, coefficient of variation; correlation and linear regression.

Unit III: Probability

15L

Definition of probability and distributions, concept and problems on probability; binomial, poisson and normal distribution and their applications. Hypothesis testing – parametric and non-parametric tests, t and χ^2 tests, run tests, significant test, median test, Wilcoxon's rank sum test. One way analysis of variance.

Unit IV: Concepts and Applications of biometry in biotechnology

05L

Bt116 Computers Science - II

40 L

Unit I. Computer Networking

10L

Computer Network – Introduction to Networking, Network Architecture, Network Topology concept and types, advantages and drawbacks of each; components of LAN, WAN, MAN.

Unit II. Internet –

10L

History and concept; architecture, application; Internet browsing, Searching biological Data with the help of Search Engines.

Unit III. Bioinformatics

15L

History – concept, sequences and nomenclature, IUPAC nomenclature, nomenclature of DNA sequences, nomenclature sequences, directionality, various applications in bioinformatics – genomics DNA, cDNA, organellar DNA, RSTs, gene sequencing tags (GSTs), other biomolecules.

Information sources – National centre for biotechnology information sources (NCBI). The GDP, data retrieval tools, sequence retrieval system (SRS), biological databased accessing of data networking.- Searching of Information sources & preparing manual.

Unit IV Applications of computer sciences –

05L

Use of computer sciences & bioinformatics tools in analysis : genes, proteins, regulatory sequences, phylogenetic relationship, prediction of function of unknown genes.

SOLAPUR UNIVERSITY, SOLAPUR
B.Sc. -I (BIOTECHNOLOGY)
PRACTICAL COURSE.

Bp 101. Biochemistry and Cell Physiology.

1. Preparation of percent Molarity, Molality and Normality solution.
2. Measurement of pH.
3. Qualitative analysis of carbohydrates, amino acids, proteins and lipids.
4. Colorimetric estimations of
 - a) Proteins by biurette method,
 - b) Phosphorus by Fiske Subbarao method,
 - c) Creatinine in urine,
 - d) Blood sugar.
5. Paper chromatography of amino acids and sugars.
6. Separation of sugars by TLC.
7. Qualitative analysis of body fluids – blood, urine.
8. Osmotic haemolysis in animal cells – RBC of frog and human blood.
9. Study of chromosomes in onion (root/bud), grasshopper testis.
10. Study of salivary gland chromosomes of Drosophila.
11. Cell counting – haemocytometer, Neubauer chamber.
12. Micrometry.
13. Isolation and characterization of subcellular components – nuclei from rat liver.
14. Isolation of mitochondria.
15. Enzyme activity – amylase, phenolase, phosphatase, SDH.
16. Cell harvesting, lysis – methodology.
17. Separation of cells – sedimentation, velocity centrifugation.

Bp 102. Basic Biotechnology & Tissue Culture

1. Sterilization and preparation of media.
2. Isolation of explant, establishment and maintenance of culture.
Subculture of callus, organogenesis and transfer of plants to soil.
3. Micropropagation by proliferation of axillary bud.
4. Micropropagation by adventitious shoot proliferation.
5. Initiation and establishment of cell suspension cultures.
6. Microspore/ anther culture for haploid production.
7. Protoplast isolation and culture.
8. Embryogenesis and embryo culture, synthetic seeds.
9. *In vitro* pollination and culture of ovary /ovule.
10. Density gradient centrifugation for isolation of chloroplast and mitochondria.
11. Isolation of DNA from chloroplast.
12. Isolation of total RNA from plant..
13. Demonstration of southern hybridization to check the plant transformation.
14. Animal cell culture : preparation of media (natural and synthetic)
15. Maintaining, rearing and safety of laboratory animals – rat, mouse and silkworm.
16. Studies on estrous cycle, fertilization, implantation, pregnancy and parturition in rat/mice.
17. Demonstration of ovariectomy, orchietomy, adrenalectomy and hysterectomy in rat/mice.
18. Demonstration of bioassay of hormones.
19. Isolation of DNA from animal tissue
20. Isolation of bovine serum albumin, role of serum in cell culture.
21. Sperm counting and sperm viability.
22. Estimation of cholesterol.
23. Visit to Research Institute to study artificial insemination, in vivo fertilization, embryo transfer technique and animal cell culture.

Bp 103. Microbiology & Ecology.

- 1) Determination of TS, TDS, TSS.
- 2) Determination of Dissolved oxygen.
- 3) Estimation of Nitrates.
- 4) Estimation of biomass from terrestrial ecosystem.
- 5) Determination of soil pH.
- 6) Estimation of Calcium & Magnesium from water.
- 7) Estimation of Oil & Grease.
- 8) Determination of Salinity of soil.
- 9) Estimation of sulphates.
- 10) Study of air microflora.
- 11) Study of biogenic methane production.
- 12) Residual chlorine
- 13) Role of microorganisms in elevation of heavy metal in induced stress in plants.
- 14) Enrichment and isolation of *Azotobacter* from soil.
- 15) Detection and isolation of *Rhizobium* from root nodules.
- 16) Study the effect of biofertilizer.
- 17) Analysis of raw and treated sewage for presence various bacteria.
- 18) Techniques for pure culture of microbes – streak plate, pour plate, spread plate and serial dilution agar plate.
- 19) Culture preservation methods – lyophilization, storage in liquid nitrogen, on glass beads at (-)60 oC to (-) 70 o C, in mineral oil and soil.
- 20) Observation of living microbes – wet mount preparation, hanging drop technique for motility.
- 21) Staining techniques – monochrome, Gram's staining, Leishman's staining, Geimsa's staining.
- 22) Study of microbial growth curve.

Bp 104. Computer for Biomaths and Biostatistics.

1. Preparing Flow diagrams by using MS-Paint
2. Basic operating commands of Windows – Creating folders, saving files in folders, copying & pasting etc.
3. Use of Application Software – MS-office2003- Word, Excel, Power point, Access
 - a. Working with MS-Word- Prearing Simple documents, Project work, Synopsis etc.
 - b. Working with MS-Excel- Preparing Sheets & Charts from obtained readings. Use of Mathematical & stastical functions.
 - c. Working with MS-PowerPoint: Preparing Presentation for seminars, Use of Multimedia in Presentation.
 - d. Working with MS-Access- Creating simple database from scientific data. Creating user interface with forms, Preparing Database from searched contents from internet. (Biological Database)
4. Use of internet, WWW, browsing.- Searching techniques, saving searched contents.
5. Searches on medline, CD/DVD, bibliographies.
6. Search and retrival of data / sequences from gene bank.
7. Pair wise / multiple sequence alignment using Claustal W /Claustal X.
8. Phylogenetic analysis of protein and DNA sequences.
9. Round-off error for minimizing in evaluating algebraic expression (using computer)
10. Computing area under a curve of regular / arbitrary shape.
11. Calculus : Differetiation and higher order differentials; application of derivatives; integration – definite and indefinite; differential equations; Application of integration.



Solapur University, Solapur

Nature of Question Paper For Semester Pattern

• **Faculty of Science**
(w.e.f. June 2010)

Time :- 2 hrs.

Total Marks-50

- Q. No.1) Multiple choice questions. (10)**
- 1) -----
a) b) c) d)
- 2)
3)
4)
5)
6)
7)
8)
9)
10)
- Q.No.2) Answer any Five of the following (10)**
- i)
ii)
iii)
iv)
v)
vi)
- Q.No.3) A) Answer any Two of the following (06)**
- i)
ii)
iii)
- B) Write the Answer/Solve/Problem/Note (04)**
- Q.No.4) Answer any Two of the following (10)**
- i)
ii)
iii)
- Q.No.5) Answer any Two of the following (10)**
- i)
ii)
iii)

1. Structure of the courses :-

- A) Each paper of every subject for Arts, Social Sciences & Commerce Faculty shall be of 50 marks as resolved by the respective faculties and Academic Council.
- B) For Science Faculty subjects each paper shall be of 50 marks and practical for every subject shall be of 50 Marks as resolved in the faculty and Academic Council.
- C) For B. Pharmacy also the paper shall be of 50 marks for University examination. Internal marks will be given in the form of grades.
- D) For courses which were in semester pattern will have their original distribution already of marks for each paper.
- E) For the faculties of Education, Law, Engineering the course structure shall be as per the resolutions of the respective faculties and Academic Council.

2. Nature of question paper:

A) Nature of questions.

“20% Marks - objectives question” **(One mark each and multiple choice questions)**

“40% Marks - Short notes / Short answer type questions / Short Mathematical type questions/ Problems. **(2 to 5 Marks each)**

“40% Marks - Descriptive type questions / Long Mathematical type questions / Problems. **(6 to 10 Marks each)**

- B) Objective type question will be of multiple choice (MCQ) with four alternatives. This answer book will be collected in first 15 minutes for 10 marks and in first 30 minutes for 20 marks. Each objective question will carry one mark **each**.
- C) Questions on any topic may be set in any type of question. All questions should be set in such a way that there should be permutation and combination of questions on all topics from the syllabus. As far as possible it should cover entire syllabus.
- D) There will be only five questions in the question paper. All questions will be compulsory. There will be internal option **(30%)** and not overall option. **for questions 2 to 5.**

3. Practical Examination for B. Sc. I. will be conducted at the end of second semester.

4. Examination fees for semester Examination will be decided in the Board of Examinations.

The structures of all courses in all Faculties were approved and placed before the Academic Council. After considered deliberations and discussion it was decided not to convene a meeting of the Academic Council for the same matter as there is no deviation from any decision taken by Faculties and Academic Council. Nature of Question Paper approved by Hon. Vice Chancellor on behalf of the Academic Council.