SHIVAJI UNIVERSITY, KOLHAPUR.

B
Accredited By NAAC
(2009)

Syllabus For

Bachelor of Science

Part - II (Sem.-III)

to be implemented from the academic year 2011-12

(June 2011) onwards.

(Subject to the Modifications that will be made from time to time)

Syllabus of the B.Sc. Part - II Semester III to be implemented from the academic year 2011-12 onwards.

Subjects	Name of the Paper	Marks	
		Theory	Internal
Botany	Semester III Paper- V Plant Physiology	40	10
	Semester III Paper -VI Utilization of Plants	40	10
Seed Technology	Semester III Paper- V Hybird Seed Production	40	10
	Semester III Paper- VI Vegetable Seed Production	40	10
Plant Protection	Semester III PAPER - I MAJOR CROPS, METHODS OF INTEGRATED PLANT PROTECTION	40	10
	Semester III PAPER - II INTRODUCTION TO WEEDS AND NON-INSECT PESTS	40	10
Chemistry	Semester III Paper- V Physical and Inorganic Chemistry	40	10
	Semester III Paper- VI Organic and Inorganic Chemistry	40	10

Electronics	Semester III Paper- V Linear Circuits	40	10
	Semester III Paper- VI Introduction to Microproprocessor	40	10
Geology	Semester III Paper- V Mineralogy and Optics	40	10
	Semester III Paper- VI Igneous Petrology	40	10
Mathematics	Semester III Paper- V DIFFERENTIAL CALCULUS	40	10
	Semester III Paper- VI DIFFERENTIAL EQUATIONS	40	10
Microbiology	Semester III Paper- V Cytology, Physiology and Metabolism	40	10
	Semester III Paper- VI Microbial genetics	40	10
Industrial Microbiology	Semester III Paper- V INDUSTRIAL PRODUCTION OF FERMENTED FOOD	40	10
	Semester III Paper- VI QUALITY CONTROL OF FOOD PRODUCTS	40	10
Physics	Semester III Paper- V General Physics,Sound and Acousitics	40	10
	Semester III Paper- VI Electronics and Computer Programming	40	10

Astro Physics	Semester III Paper- I Elements of Astrophysics	40	10
	Semester III Paper- II The Sky and Stars.	40	10
STATISTICS	Semester III Paper- V Continuous Probability Distributions-I	40	10
	Semester III Paper- VI Bivariate Discrete Distributions and Multiple Regression Analysis	40	10
Zoology	Semester III Paper- V Animal Diversity III	40	10
	Semester III Paper- VI VI Genetics & Biological Chemistry.	40	10
Fisheries	Semester III Paper- I Fishery Biology	40	10
	Semester III Paper- II Fish Physiology	40	10
Biotechnology optional/vocational	Semester III Paper- V Immunology	40	10
	Semester III Paper- VI Molecular biology	40	10
Computer Science	Semester III Paper- V Fundamentals of Software Engineering	40	10
	Semester III Paper- VI Introduction to Object Oriented Programming Using C++	40	10

Food Science & Quality Control	Semester III Paper- V Food Preservation and Packaging	40	10
	Semester III Paper- VI Fruits and vegetable processing	40	10
Biochemistry	Semester III Paper- I Biomolecules	40	10
	Semester III Paper- II Metabolism and Nutrition	40	10
Pollution	Semester III Paper- I Ecology and Pollution	40	10
	Semester III Paper- II Water Pollution-I	40	10

[Note:- The practical examination will be conducted in annual.]

B.Sc.II Botany

Semester III

Paper V: Plant Physiology

Paper VI: Utilization of Plants

Paper V – Plant Physiology

Unit-1. Plant water relations and Mineral nutrition **08**

Sub Unit 1.1 Introduction

Sub Unit 1.2 Water potential and chemical potential

Sub Unit 1.3 Water transport process: Absorption of water – its mechanism Water transport through xylem tracheids

Sub Unit 1.4 Transpiration: Definition, types-cuticular and stomatal, mechanism of stomatal transpiration (stomatal movement), factors affecting transpiration, significance.

Sub Unit 1.5 Role of minerals: Criteria of essentiality of elements. Deficiency symptoms and disorders of micro nutrients (N,P,K,Ca,S,mg) and micir nutrients, (Cu,fe,Mn, and Mo) in plants and its recovery.

Sub Unit 1.6 Mineral nutrient uptake:

A) Passive uptake – Diffusion, cation exchange, Donnan equilibrium.

B) Active uptake – Carrier mediated uptake, Phospholipid hypothesis.

Unit 2. Photosynthesis and Respiration **16**

Sub Unit 2.1 Photo synthesis-Introduction

Sub Unit 2.2 Photosynthetic pigments

Sub Unit 2.3 Light reactions:

- Photosystems – reaction center complexes
- Photolysis of water
- Electron transport and photophosphorylation.

Sub Unit 2.4 Dark reactions:

Calvin cycle, C4 cycle and CAM pathways

Sub Unit 2.5 Significance of photosynthesis

Sub Unit 2.6 Photorespiration and its significance.

Sub Unit 2.7 Respiration-Introducation

Sub Unit 2.8 Types of respiration

Sub Unit 2.9 Glycolysis

Sub Unit 2.10 Decarboxylation – conversion of pyruvate to acetyl CoA.

Sub Unit 2.11TCA cycle

Sub Unit 2.12 ETS in mitochondria

Unit 3. Nitrogen metabolism **4**

Sub Unit 3.1 Biological nitrogen fixation

Sub Unit 3.2 Reduction of N_2 to NH_3

Sub Unit 3.3 Nitrate reduction

Sub Unit 3.4 Ammonia assimilation

Sub Unit 3.5 nif genes

Unit 4. Growth and development **12**

Sub Unit 4.1 Introduction

Sub Unit 4.2 Growth Curve

Sub Unit 4.3 Reproductive growth

Physiology of flowering – photoperiodism, florigen concept, role of hormones in flowering, vernalization.

Sub Unit 4.4 Seed dormancy and seed germination

Sub Unit 4.5 Role of ethylene in fruit ripening

Sub Unit 4.6 Phytohormones – discovery, and biochemical role of –

a) Auxins

b) Gibberellins

c) Cytokinins

d) Abscissic acid

Paper VI: Utilization of Plants

Unit 1. Domestication of plants: **18**

Sub Unit 1.1 introduction.

Sub Unit 1.2 Primary and secondary centers of origin.

Sub Unit 1.3 Legumes: Botanical name, morphology, sources and economic importance of chickpea (Bengal gram), red gram and fodder

legumes– Lucern, and *Sesbania*

Sub Unit 1.4 Vegetable oil sources: Botanical name, morphology, sources and economic importance of – Mustard, groundnut, and coconut.

Sub Unit 1.5 Plant fibers: Botanical name, morphology, sources and economic importance of – cotton, and coir.

Sub Unit 1.6 Plant perfumes and cosmetics: Botanical name, morphology, sources and economic importance of - *Citronella*, *Vetaveria*, *jasmine*, Rose, and *Lawsonia*

Unit 2 Medicinal plants: **8**

A brief account of following medicinal plants and their chief constituents used in indigenous and allopathic system and their uses.

A) Root : *Withania somnifera,*

B) Rhizome : *Zinziber officinale,.*

C) Stem : *Tinospora cordifolia.*

D) Leaf : *Aloe vera, Adhatoda zeylanica*.

E) Flower bud : *Syzygium aromaticum.*

F) Fruit : *Emblica officinalis*, Opium poppy.

Unit 3. Natural products: **8**

Sub Unit 3.1 Rubber: Plant source and economic importance

Sub Unit 3.2 Plant insecticides: Botanical name, morphology, sources and uses of – Neem, *Artemisia annua,* and *Nicotiana tabacum.*

Sub Unit 3.3 Dyes: Botanical name, morphology, sources and uses of – *Curcuma longa, Bixa orellana, Butea monosperma, Indigofera* (Indigo),

Unit 4. Ornamental plants **6**

Sub Unit 4.1: Botanical name, morphology and ornamental value of following plants.

a) Seasonals – *Aster, Celosia,*

b) Perennials – *Acalypha, Dieffenbachia*

c) Cacti and Succulents – *Opuntia, Agave*

d) Climbers – *Bougainvillea, Quisqualis*

B.Sc. II - SEED TECHNOLOGY

Semester III

Paper V : Hybrid Seed Production

Total Lecturing Periods – **40**

UNIT-1 Heterosis, Incompatibility and Environmental Sterility – (10)

1.1 Heterosis: - Definition, History, Types – Genetical, Physiological and Biochemical importance and its exploitation on Commercial Scale for seed production in cultivated crops.

1.2 Incompatibility: Definition, kinds, importance, merits, demerits, difference between sterility and incompatibility. Method for breaking incompatibility (Pollen irradiation, application of NAA, IAA) with suitable examples.

1.3 Environmental sterility: Definition, examples, exploitation in hybrid rice seed production. Role of environment in sex expression.

UNIT-2 Devices for Hybrid Seed Production - (10)

2.1 Genetic male sterility: Definition, examples, mechanism, advantages & disadvantages, role of marker gene (Castor), procedure for hybrid seed production by using GMS, seed parent maintenance (Pigeon pea).

2.2 Cytoplasmic genetic male sterility: Definition, examples, mechanism, merits & demerits, synchronization methods, seed production of CMS lines (A), maintainer line (B), restorer line (R).

2.3Functional male sterility system: Limitations & scope (eg. Jowar)

UNIT-3 Hybrid Seed Production in cereals and pulse crops with respect to floral biology, brief cultural practices, land, isolation requirements, wild pollinators maintenance of varietal purity, field inspection, Harvesting & Threshing (10)

A) Cereal Crops : - Maize, Jowar.

B) Pulse Crops : - Pigeon pea, Chick- pea

UNIT-4 Hybrid Seed Production in cash and oil seed crops with respect to floral biology, brief cultural practices, land, isolation requirements, wild pollinators

maintenance of varietal purity, field inspection, Harvesting &Threshing **(10)**

A) Cash Crops : - Cotton, Sugarcane

B) Oil Seed Crops : - Sunflower, Groundnut.

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Semester III

Paper VI: Vegetable Seed Production

Total Lecturing Periods – 40

UNIT-1 History, Classification and Reproduction - **(10)**

1.1 History: Historical account, present status, importance & future prospects of vegetable seed production, objectives of vegetable breeding.

1.2 Classification of vegetable crops -

a) Root crops b) Bulb crops c) Leafy crops d) Flowering crops e) Fruit crops.

1.3 Reproduction: Asexual reproduction : vegetative, apomixes. Artificial (Synthetic) seeds- Concept, Production, Limitations and Uses. Sexual reproduction–male & female gamete formation, fertilization

UNIT-2 Techniques in Hybridization- **(10)**

2.1 Pollination: Types, natural cross pollination, extent of it in vegetable crops, factors determining NCP, its role in vegetable seed production, pollination vectors in vegetable crops.

2.2 Hybridization: Definition, techniques, steps, equipments, use of gametocides in emasculation, methods of pollination – hand pollination, rubbing, hooking, electric bees etc, crosses between the parents – single, double, three way, back and triple cross etc.

UNIT-3 Breeding and Recent Advances- **(10)**

3.1 Introduction: Definition, collection, maintenance, evaluation, storage, role and utilization.

3.2 Selection: a) Mass selection – Definition, methods & achievements,
b) Pure line Selection - Definition, method, achievements,
c) Family breeding, d) Selfing & massing.

3.3 Recent advances in vegetable seed production : Pollen derived plants, diploid pollens, pollen based gene technology

UNIT-4 Requirements of Vegetable Seed Production- **(10)**

a) Land requirement b) Seedling/ Root production c) Nursery management d) Planting e) Cultural practices f) Breeding methods used g) Plant protection h) Seed harvesting i) Seed drying j) Seed grading k) Seed extraction (Wet – dry methods) with respect to following crops –

A) Fruit crop -Tomato,
B) Root crop -Radish
C) Bulb crop - Onion.

D) Flower crop- Cauliflower

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B. Sc. II-Plant Protection

SEMESTER III

PAPER – I

MAJOR CROPS AND METHODS OF INTEGRATED PLANT PROTECTION

Unit No. 1 Introduction of plant protection and study of crops

1.1 Introduction and importance of plant protection. (02)

1.2 Study of following major crops of Maharashtra with reference to gross morphology for crop identification, soil types, preparatory tillage, sowing, seed rate and spacing, inter culture operations, fertilizers, irrigation, intercropping, yield, major diseases and pest and economic importance. (9)

A. Cereals - Jowar, Wheat

B. Oil seed crops - Groundnut, Sunflower

C. Pulse crops - Tur, Gram

D. Cash crops - Sugarcane, Cotton

Unit No. 2 Study of crops with reference to above points in 1.2 (8)

E. Fruit crops - Mango, Grapes

F. Vegetable crops - Brinjal, Cabbage

G. Floriculture - Rose, Tuberose.

2.1 Advanced methods of Agricultural practices

A) Role of organic farming in Agriculture (01)

B) Definition and types of Bio fertilizers (01)

C) Concept of genetically modified crops (01)

Unit No. 3 General methods of plant protection.

3.1 Cultural methods – Tillage, sowing and planting dates, crop rotation, trap crops, fertilizer applications, Crop hygiene. (03)

3.2 Mechanical methods – Field sanitation - collection and destruction of diseased plant debris, Hand picking, destruction of egg masses, shaking of plants, physical barriers, light traps, use of sticky bands, tin bands, rope dragging, netting, bagging for the pests. (03)

3.3 Physical methods – Heat and soil solarisation (01)

Unit No. 4 Methods of Management

4.1 Chemical methods – Introduction, brief account and uses of Bactericides, Fungicides, Insecticides, Nematicides, Acaricides, Molluscicides and Rhodenticides (04)

4.2 Biological control – Introduction, biological control of Insect pests and diseases. (02)

4.3 Legal methods – Needs of plant quarantine, plant quarantine in India. (02)

4.4 Crop resistance – General account of use of resistant varieties (01)

Total lecture periods (38)

PAPER – II

INTRODUCTION TO WEEDS AND NON-INSECT PESTS

Unit No. 1 Introduction of weeds

1.1 Weeds – Definition and losses caused by weeds. (02)

1.2 Classification of weeds based on (03)

a) Ontogeny, b) Ecology, c) Crop association

1.3 Reproduction and mode of dispersal of weeds. (04)

1.4 Study of special weeds (02)

a) Parasatic weeds, b) Aquatic weeds, c) Poisonous weeds.

Unit No. 2 Study of following weeds with reference to (08)

a) Gross morphology b) Reproduction

c) Ecology, d) Dispersal e) Management

2.1 *Parthenium hysterophorus*

2.2 *Argemone mexicana*

2.3 *Portulaca oleracea*

2.4 *Euphorbia geniculata*

2.5 *Amaranthus spinosus*

2.6 *Alternanthera sessilis*

2.7 *Cyperus rotundus*

2.8 *Cynodon dactylon*

Unit No. 3 Methods of weed management

3.1 Cultural methods - Ploughing, Hoeing, Hand weeding, Field sanitation, Crop rotation, Mulching, Cover crops. (03)

3.2 Biological methods - Weed management by bacteria, fungi and insects (02)

3.3 Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action and range of effectiveness. (02)

3.4 Study of weedicides with reference to properties, mode of action, formulation and uses of i) 2, 4-D ii) Glyphoset iii) Gramoxane (Paraquat) iv) Alachlor (Lasso 50 E.C.) (03)

Unit No. 4 Study of non-insect pests

4.1 **Nematodes** : Phytopathogenic nematodes, mode of infestation, typical life

cycle pattern of *Meloidogyne*, symptoms and management (02)

4.2 **Snails and slugs**: Nature of damage and management (01)

4.3 **Mites :** Morphology, damages in storage and field and their management(02)

4.4 **Birds :** Nature of damage, losses and management (02)

4.5 **Rat :** Damage, losses caused by different species of Rats in storage and field and their management. (02)

(Total 38 lecture period)

B.Sc.II Chemistry

Semester - III

Paper - V

(Physical and Inorganic Chemistry)

Section – I : Physical Chemistry

Unit 1 : Electrochemistry - - - - - - [17]

1.1 : Introduction, Conduction of electricity, Types of conductors : electronic and electrolytic.

1.2 : Explanation of the terms : Specific, equivalent and molar conductance, relation between specific and equivalent conductance, variation of conductance with dilution, equivalent conductance at infinite dilution.

1.3 : Measurement of conductance basic circuit of Wheatstone bridge, Types of conductivity cells, cell constant and its determination.

1.4 : Migration of ions, Hittorf's rule, Transport number, Determination of transport number by moving boundary method, Factors influencing transport number (Nature of electrolyte, Concentration, Temperature, Complex formation, abnormal transport number, Degree of hydration.)

1.5 : Kohlrausch law and its applications: (i) Relationship between ionic conductance, ionic mobility and transport number. (ii) Determination of equivalent / molar conductance at infinite dilution for weak electrolytes. (iii) Determination of degree of dissociation. (iv) Determination of ionic product of water. (v) Determination of solubility and solubility product of sparingly soluble salts.

1.6 : Conductometric titrations : Theory of conductometric titrations, general procedure, different types of conductometric titrations : (i) Strong acid against strong base. (ii) Strong acid against weak base. (iii) Weak acid against strong base. (iv) Weak acid against weak base. Advantages of conductometric titrations.

1.7 : Numerical problems.

Unit 2 : Thermodynamics - - - - - - [8]

2.1 : Concept of entropy: Introduction, Definition, Mathematical expression, Unit, Physical significance of entropy.

2.2 : Entropy changes for reversible and irreversible processes in isolated systems.

2.3 : Entropy changes for an ideal gas as a function of V and T and as a function of P and T

2.4 : Entropy change in mixing of gases.

2.5 : Entropy change accompanying phase transitions : (i) Solid to liquid (ii) liquid to vapor (iii) one crystalline form to another.

2.6 : Third law of thermodynamics: statement, absolute entropy, determination of absolute entropy, entropy change in chemical reactions, standard entropy.

2.7 : Numerical problems.

Section – II : Inorganic Chemistry

Unit 1 : Co-ordination Chemistry - - - - - - [12]

1.1 : Definition and formation of co-ordinate covalent bond in $BF_3 \leftarrow NH_3$ and $[NH_4]^+$

1.2 : Distinction between double salt and complex salt.

1.3 : Werner's Theory – (i) Postulates, (ii) The theory as applied to Cobalt ammines viz. $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.4NH_3$, $CoCl_3.3NH_3$.

1.4 : Description of the terms – Ligand, Co-ordination number, Co-ordination sphere and Effective atomic number. Geometrical and optical isomerism in co-ordination compounds for C.N. = 4 & C.N. = 6.

1.5 : IUPAC Nomenclature of co-ordination compounds.

1.6 : Valence bond theory of transition metal complex w.r.t. C.N.4 and C.N.6. Limitations of valence bond theory.

Semester - III

Paper - VI

(Organic and Inorganic Chemistry)

Section – I : Organic Chemistry

Unit 1 : Stereochemistry - - - - - - [6]

1.1 : Introduction, Geometrical isomerism in aldoximes and ketoximes. Configuration of ketoximes–Beckmann Transformation (Mechanism and proof not expected), configuration of aldoximes.

1.2 : Conformational isomerism – Introduction, representation of conformations of ethane by using Saw-Horse, Fischer (dotted line wedge) and Newmann's projection formulae.

1.3 : Conformations and conformational analysis of ethane and n-butane by Newmann's projection formula with the help of energy profile diagrams.

1.4 : Nomenclature – D and L, R and S, E and Z systems.

Unit 2 : Alcohols and Phenols - - - - - - [8]

2.1 : Alcohols : Introduction.

1) Dihydric alcohols : Nomenclature, methods of formation of (a) Ethylene glycol – from ethylene, ethylene dibromide and ethylene oxide. Physical properties. Chemical reactions of ethylene glycol – acidic nature, reaction with hydrogen halide, Oxidation – Lead tetraacetate, HIO_4 and Nitric acid. Uses of ethylene glycol. (b) Pinacol formation, Pinacol – pinacolone rearrangement and its mechanism.

2) Trihydric alcohols : Nomenclature, methods of formation of glycerol – from fats and oils. Synthesis from elements carbon and hydrogen. Physical

properties. Chemical reactions of glycerol – reaction with electropositive metals, reaction with hydrogen halides (HCl & HI)

Reaction with conc. Nitric acid in presence of conc. Sulphuric acid.

Reactions with potassium hydrogen sulphate, Esterification and oxidation with Fenton's reagent.

Uses of glycerol.

2.2 : Phenols : Introduction, comparative acidic strength of alcohol and phenol.

Reactions of phenol (carbolic acid) : (i) Acylation and Fries rearrangement, (ii) Ether formation and Claisen rearrangement (iii) Gatterman synthesis (iv) Carboxylation – Kolbe's reaction (v) Reimer – Tiemann reaction and its mechanism.

Unit 3 : Aldehydes and Ketones - - - - - - [6]

Introduction, Nomenclature, structure and reactivity of the carbonyl group, Aldol condensation (base–catalysed) (with mechanism), Perkin reaction, Mannich reaction, Cannizzaro reaction, Knoevengel condensation, Reformatsky reaction.

Unit 4 : Ethers and Epoxides - - - - - - [5]

4.1: Ethers : Introduction, Nomenclature, methods of formation of anisole by Williamson's synthesis and from diazomethane, chemical reactions of anisole with HI, Gravimetric estimation of $-OCH_3$ group by Ziesel's method (Related problems are expected based on % of $-OCH_3$ and no. of $-OCH_3$ groups)

4.2: Crown ethers : Introduction and application.

4.3 : Epoxides : Introduction, Nomenclature, commercial method of preparation of ethylene oxide. Acid and Base catalysed ring opening of ethylene oxide. Reactions of Grignard and organolithium reagents with ethylene oxide.

Section – II : Inorganic Chemistry

Unit 1 : Inorganic qualitative analysis : - - - - - - [7]

1.1 : Theoretical principles involved in qualitative analysis..

1.2 : Applications of solubility product and common ion effect in separation of cations into groups.

1.3 : Application of complex formation in

a) Separation of II group into IIA and IIB sub-groups.
b) Separation of Copper from Cadmium.
c) Separation of Cobalt from Nickel.
d) Separation of Cl^-, Br^-, I^-.
e) Detection of NO_2^-, NO_3^- (Brown ring test)

1.4 : Application of oxidation and reduction in

a) Separation of Cl^-, Br^-, I^- in mixture
b) Separation of NO_2^- and NO_3^- in mixture.

1.5 : Spot test analysis.

Unit 2 : Water Pollution : - - - - - - [6]

2.1 : Resources of water.

2.2 : Types of water pollutants.

2.3 : Types of water pollution – physical, physiological, biological and chemical.

2.4 : Sources of water pollution.

2.5 : Treatment of water –

A) Potable water : Parameters of potability of water.

Step – I : Removal of suspended matter (a) Prolonged storage, (b) Screening, (c) Sedimentation (d) Coagulation, (e) Filteration.

Step – II : Removal of germs & bacteria by physical and chemical methods.

i) Physical methods : (a) Boiling, (b) Exposure to UV or sunlight (c) Distillation.

ii) Chemical methods : (a) Chlorination, (b) Fluorination, (c) Ozonisation, (d) Aeration (e) Use of $KMnO_4$.

B) Industrial water - Mention the names of methods. Ion exchange method in detail.

C) Municipal sewage – Meaning of sewage, mention the names of methods.

B.Sc. Part II (ELECTRONICS)
Semster III
Paper V *Linear Circuits*

UNIT 1

10

Rectifiers : Half and full wave Rectifiers, analysis of half and full wave Rectifiers (O/P voltage, efficiency, Ripple factor, TUF and PIV), working of Bridge Rectifier comparison of rectifiers, Numericals.

Filters : C, L and CLC (π) filters. Determination of ripple factor of capacitor filter only.

Clipping Circuits : Diode clippers . Clipping at two independent levels.

(Biased Clippers)

Clamping Circuits : Basic operation of diode clamper with wave form

UNIT 2

10

Resonance And Two port Networks :

Series and parallel resonance, variation of impedence, phase and admittance with frequency, Quality factor and band width, selectivity, Numericals.

Two port Networks :

Concept of two port network Z, Y and h parameter and their equivalent circuits.

T and π Networks and their interconversions, Bridge – T, Twin – T and Ladder Network.

UNIT 3

10

. ***Fourier series and Transform :***

Dirichlet conditions, Fourier spectrum (magnidude and phase spectrum). Fourier series expansion for square, sawtooh wave form, half wave and full wave rectifiers output wave forms.

Laplace Transform

Definition, Lap lace transform of standard functions, partial factor development.

Applications of Laplace transform to transient response of RL, RC and RLC circuit with step Voltage. concept of poles and zeros and its significance.

UNIT 4

10

Linear wave shaping circuits and Time base Circuits :

High pass RC. circuit, Low pass RC. circuit with step inputs, Differentiator and integrator.

Time base Circuits :

Voltage time base genrators :

General feature of Time Base Signals. Sweep circuits using transistor and UJT. Constant – Current Sweep generator(Miller integrator)

Current Time Base Generators : Definition. A simple current sweep, Transistor current time base generator. Application of sweep generators

Reference Books

1. Circuit and Networks : Analysis and Synthesis
   By A Sudhakar and S.P. Shymmohan (THH)
2. A Text Book of Applied Electronics
   By R. S. Sedha (S. Chand & Co)
3. A Course in Circuit Analysis
   By Soni and Gupta
4. Linear Circuits
   By M. E. Valkenburg an Kinariwala
5. Basic Electronics
   By Bamord Grob

B.Sc. Part II (ELECTRONICS)
Revised Syllabus (2011-12)
Semester III
Paper VI ***Introduction to Microprocessor***

UNIT 1 10

Introduction of Microprocessor 8085 :
Memory : Types of memories
(RAM,ROM,EPROM,EEPROM,FLASH) memory map.
Pin configuration of 8085.Architecture of 8085 mocroprocessor.
Clock and reset circuits.

UNIT 2 10

Instruction Set of 8085 :
Instruction format, Addressing modes , Classification of Instructions
Data Transfer, Arithmetic, Logical, Branch and Machine control instructions. Stack Related instructions, Subroutine.

UNIT 3 10

Facilities in 8085:
Stack and Stack pointer its use for CALL,RET,PUSH,POP instructions,Interrupts in 8085 , Subroutine for time delay Using single register and with register pairs.

UNIT 4 10

Programming 8085 :
Program of Addition(8 and 16 bit), Subtraction, Multiplication, Division, Block Transfer and exchange, Making Ascending and descending order.

Reference Books :

1. Microprocessor Architecture, Programming and Applications with the 8085. By. Ramesh S. Gaonkar
2. Microprocessor and its Applications - B.RAM
3. Microprocessor & Applications- Vibhute & Borole

B. Sc. Part II - GEOLOGY
SEMESTER III

Paper V: Mineralogy and Optics

Unit I: Silicate structures with examples, Isomorphism, Polymorphism, Pseudomorphism. Imperfections in growth of crystals, Twinning in crystals, Types of Twinning.

(10 Lectures)

Unit II: Study of following mineral groups - involving chemistry, physical properties, optical properties and mode of occurrence.

1. Silica Group - Crystalline - Quartz and its varieties (Crystalline, Cryptocrystalline and amorphous.
2. Pyroxene Group - Orthorhombic and Monoclinic Pyroxenes.
3. Amphibole Group - Orthorhombic and Monoclinic Amphiboles.
4. Mica Group - Muscovite, Biotite, Phlogopite, Lepidolite and Paragonite
5. Alumino-silicates – Kyanite, Sillimanite, Andalusite (10 Lectures)

Unit III

1. Feldspar Group-Alkali feldspars, Calc alkali feldspars and Barium feldspars.
2. Feldspathoid Group – Nepheline, Leucite and Analcime
3. Olivine Group- Forsterite, Olivine, Fayalite
4. Zeolite Group- Analcite, Natrolite, Scolecite, Mesolite, Stilbite ,Heulandite, Chabazite,Apophyllite.
5. Garnet Group - Pyrope, Almandine, Spessartine, Grossular, Andradite, Uvarovite, Hydrogrossular (10 Lectures)

Unit IV: Petrological Microscope, Behaviour of light in petrological microscope.

Study of optical properties of minerals as listed below.
Properties in polarised light- Form, Colour, Pleochroism and Absorption, Cleavage, Fracture, Relief, Twinkling, Inclusions, Alteration.
Properties between crossed nicols- Isotropism and Anisotropism, Extinction, types of extinction and extinction angle, Birefringence and Interference Colours, Zoning and Twinning. (10 Lectures)

Reference Books:

1. Rutley's Elements of Mineralogy - By H. H. Read, CBS Publishers, Delhi.
2. Dana's Text Book of Mineralogy - By W. E. Ford, CBS Publishers, Delhi.
3. Optical Mineralogy - By Paul Kerr, Mc Graw Hill Book Co.Inc.
4. An introduction to the Rock Forming Minerals. -W. A. Deer, R. A. Howie & J. Zussman
5. Mineralogy (2nd Edition) – Dexter Perkins, Pearson Education, Delhi

Paper VI

Igneous Petrology

Unit I: Classification of Igneous Rocks based on Mode of Occurrence, Silica Percentage, Colour index, Feldspar Content, Silica Saturation, and Alumina saturation; Reaction relations , Crystallisation process of Unicomponent magma - Formation of glass and crystals.

(10 Lectures)

Unit II : Crystallisation of Binary magma having two independent constituents, and having a Mixed crystal series. Crystallisation of Ternary magma compositions.

(10 Lectures)

Unit III: Texture – Definition and Description with respect to crystallinity, granularity,shapes of crystals and mutual relations between crystals and glass; types of textures - Porphyritic, Poikilitic, Ophitic and Graphic, Orbicular, Trachytic, Xenolithic, Spherulitic, Perlitic and

Reaction Rims Structures.

(10 Lectures)

Unit IV: Differentiation – Liquid Immiscibility, Gravitational Differentiation, Filtration Differentiation , Role of volatiles in differentiation

Assimilation- Reactions between Basaltic Magma and Acidic Igneous rocks, Basaltic Magma and Sedimentary rocks, Granitic Magma and Basic Igneous rocks, Granitic Magma and Sedimentary rocks.

(10 Lectures)

Reference Books :-

1.Principles of Petrology - By G. W. Tyrrell, B.I.Publications Pvt. Ltd. Mumbai.
2. Igneous and Metamorphic Petrology - By Turner and Verhoogen,
3. Igneous and Metamorphic Petrology - By Best M.G., CBS Publishers, Delhi
4. Igneous Petrology - By Mihir K. Bose,
5. Igneous Petrology - By Anthony Hall
6. Igneous Petrology – By Carmichael, Turner and Veerhogan
7. Principles of Igneous and Metamorphic Petrology – By Anthony Philpotts and Jay Ague

B.Sc. II Mathematics

(SEMESTER – III)

(MATHEMATICS)

Implemented from June – 2011

Paper – V (DIFFERENTIAL CALCULUS)

Unit – 1 : LIMITS AND CONTINUITY OF REAL VALUED FUNCTIONS

13 lectures

1.1 ε - δ definition of the limit of a function of one variable.

1.2 Basic properties of limits.

1.3 Continuous functions and their properties.

1.3.1 If f and g are two real valued functions of a real variables which are continuous at x = c then (a) f + g , (b) f – g, (c) f.g are continuous at x = c and

$$(d)\ \frac{f}{g}\ \textit{is continuous at}\ x = c,\ g(c) \neq 0.$$

1.3.2 Composite function of two continuous functions is continuous.

1.3.3 If a function f is continuous in a closed interval [a, b]then it is bounded in [a, b].

1.3.4 If a function f is continuous in a closed interval [a, b] then it attains its bounds at least once in [a, b].

1.3.5 If a function f is continuous in a closed interval [a, b] and if

f(a), f(b) are of opposite signs then there exists c ∈ [a, b] such that f(c) = 0.

1.3.6 If a function f is continuous in a closed interval [a, b] and if f(a) ≠ f(b) then f assumes every value between f(a) and f(b).

1.4 Classification of discontinuities (First and second kind).

1.5 Uniform continuity.

1.5.1 A Real valued continuous function on [a, b] is uniformly continuous on [a, b].

1.6 Sequential continuity.

1.6.1 A function f defined on an interval I is continuous at a point

$$c \in I \text{ if and only if for every sequence } \{C_n\} \text{ converging to } c, \lim_{n\to\infty} f(C_n) = c.$$

1.7 Differentiability at a point, Left hand derivative, Right hand derivative, Differentiability in the interval [a,b].

1.7.1 Theorem: Continuity is a necessary but not a sufficient condition for the existence of a derivative.

Unit – 2 : <u>JACOBIAN</u> 10 lectures

2.1 Definition of Jacobian and examples.

2.2 Properties of Jacobians.

2.2.1 If J is Jacobian of u, v with respect to x, y and J′ is Jacobian of x, y with respect to u, v then JJ′ = 1.

2.2.2 If J is Jacobian of u, v, w with respect to x, y, z and J′ is

Jacobian of x, y, z with respect to u, v, w then JJ′ = 1.

2.2.3 If p, q are functions of u, v and u, v are functions of x, y then prove that $\frac{\partial(p,q)}{\partial(u,v)} = \frac{\partial(p,q)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)}$.

2.2.4 If p, q, r are functions of u, v, w and u, v, w are functions of x, y, z then prove that $\frac{\partial(p,q,r)}{\partial(u,v,w)} = \frac{\partial(p,q,r)}{\partial(x,y,z)} \cdot \frac{\partial(x,y,z)}{\partial(u,v,w)}$.

2.2.5 Examples on these properties.

Unit – 3 : EXTREME VALUES 11 lectures

3.1 Definition of Maximum, Minimum and stationary values of function of two variables.

3.2 Conditions for maxima and minima (Statement only) and examples.

3.3 Lagrange's method of undetermined multipliers of three variables.

3.3.1 The extreme values of the function f(x, y, z) subject to the condition $\phi(x, y, z) = 0$.

3.3.2 The extreme values of the function f(x, y, z) subject to the conditions $\phi(x, y, z) = 0$ and $\psi(x, y, z) = 0$.

3.3.3 Examples based on Lagrange's method of undetermined multipliers of three variables.

3.3.4 Errors and approximations.

Unit – 4 : VECTOR CALCULUS

11 lectures

4.1 Differentiation of vector.

4.2 Tangent line to curve.

4.3 Velocity and acceleration.

4.4 Gradient, Divergence and Curl of a vector field.

4.5 Solenoidal vecor, Irrotational vector.

4.6 Conservative vector fields.

REFERENCE BOOKS

1. **B.S.Phadatare, U.H.Naik, P.V.Koparde, P.D.Sutar, P.D.Suryvanshi, M.C.Manglurkar, A Text Book Of Advanced Calculus Published by Shivaji University Mathematics Society (SUMS), 2005.**
2. **S.B.Kalyanshetti, S.D.Thikane, S.R.Patil, N. I. Dhanashetti, A Text Book Of Mathematics -Advanced Calculus Published by Sheth Publishers Pvt. Ltd. Mumbai.**
3. **T. M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.**
4. **R. R. Goldberg , Real Analysis, Oxford & I. B. H. Publishing Co., New Delhi, 1970.**
5. **P. K. Jain and S. K. Kaushik, An Introduction to Real Analysis, S. Chand & Co., New Delhi. 2000.**
6. **Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad.**
7. **Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York.**
8. **N. Piskunov , Differential and integral Calculus, Peace Publishers, Moscow.**
9. **Shanti Narayan, A Course of Mathematical Anlaysis, S. Chand and Company, New Delhi.**
10. **P. N. and J. N. Wartikar, Applied Engineering Mathematics.**
11. **Kulkarni, Jadhav, Patwardhan, Kubade, Mathematics- Advanced Calculus , Phadke Prakashan.**

Paper – VI (DIFFERENTIAL EQUATIONS)

Unit – 1 : HOMONOGENEOUS LINEAR DIFFERENTIAL EQUATIONS

8 lectures

1.1 General form of Homogeneous Linear Equations of Higher order and it′s solution.

1.2 Equations reducible to homogeneous linear form.

Unit – 2 : SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS

2.1 *General form* : $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R.$

17 lectures

2.2 Methods of solution:

2.2.1 Complete solution of Linear differential equation when one integral is known.

2.2.2 Transformation of the equation by changing the dependent variable (Removable of 1st order derivative) .

2.2.3 Transformation of the equation by changing the independent variable.

2.3 Method of variation of parameters.

Unit –3 : ORDINARY SIMULTANEOUS DIFFERENTIAL EQUATIONS

8 lectures

3.2 Simultaneous linear differential equations of the form

$$\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}.$$

3.3 Methods of solving simultaneous differential equations.

3.4 Geometrical Interpretation.

Unit –4 : TOTAL DIFFERENTIAL EQUATIONS 12 lectures

4.1 Total differential equations [Pfaffian differential equation]

Pdx + Qdy + Rdz = 0.

4.2 Necessary condition for integrability of total differential equations.

4.3 The condition of exactness.

4.4 Methods of solving total differential equations :

(a) Method of Inspection ,

(b) One variable regarding as a constant.

4.5 Geometrical Interpretation.

4.6 Geometrical Relation between Total differential equations and Simultaneous differential equations.

REFERENCE BOOKS

1. **T.A.Teli, S.P.Thorat, A.D.Lokhande, S.M.Pawar, D.S.Khairmode, A Text Book Of Differential Equations Published by Shivaji University Mathematics Society (SUMS), 2005.**
2. **S.B.Kalyanshetti, S.D.Thikane, S.R.Patil, N. I. Dhanashetti, A Text Book Of Mathematics - Differential Equations Published by Sheth**

   Publishers Pvt. Ltd. Mumbai.
3. **D. A. Murray, Introductory course on differential equations, Orient Longman, (India) 1967.**
4. **Diwan and Agashe, Differential equation,**
5. **Sharma and Gupta, Differential equation, Krishna Prakashan Media co., Meerut.**
6. **Kulkarni, Jadhav, Patwardhan, Kubade, Mathematics- Differentiual Equations , Phadke Prakashan.**
7. **Frank Ayres,Theory and problems of differential equations, McGraw-Hill Book company, 1972.**

Microbiology
B.Sc. Part II (Semester Pattern) 2011 – 2012
Theory Syllabus

SEMESTER-III:

Paper V

Cytology, Physiology and Metabolism

Unit – I

Ultrastructure and functions of : **9**

1. Cell wall – Composition, structure of Gram positive and Gram negative bacterial cell wall. Structures of components and structural variations.
2. Cell membrane – Chemical composition and functions. Transport across cell membrane
3. Flagella – Mechanism of movement, tactic behaviour
4. Cytoplasmic inclusions -
5. Special prokaryotic organelles – Chlorobium vesicles, gas vesicles, Magnetosomes, carboxysomes.
6. Reserve food materials – Nitrogenous and non nitrogenous
7. Bacterial endospore – Ultrastructure, Sporulation and Germination,

Unit – II

Growth **9**

1. Growth phases, measurement of growth, continuous growth, synchronous growth and diauxic growth
2. Effect of environmental factors on microbial growth.
   i) Temperature
      Mesophiles, psychrophiles, thermophiles and hyperthermophiles.
      Thermal destruction of bacteria – D, F and Z values, TDP and TDT
   ii) pH
      Neutrophiles, Acidophiles and Alkalophiles
   iii) Osmotic pressure – Isotonic, hypotonic and hypertonic environments, xerophiles and halophiles.
   iv) Heavy metals.

Unit - III

Microbial Metabolism **9**

1. Fundamental principles of energetics, high energy compounds.
2. Catabolism of glucose – EMP, TCA cycle.
3. ATP generation by :
   i) Substrate level phosphorylation.
   ii) Oxidative phosphorylation - Respiration electron transport chain aerobic and anaerobic respiration.
   iii) Bacterial Photophosporylation – Cyclic and Non-cyclic.

Unit – IV

Enzymes **9**

1. Classification
2. Factors influencing enzyme activity (Substrate concentration, temperature, pH, metal ions)
3. Regulation of enzyme activity : Concept of allosteric enzymes and pattern of feed back inhibition.
4. Applications of enzymes : Amylases, proteases and lipases

SHIVAJI UNIVERSITY, KOLHAPUR
Syllabus General Microbiology
B.Sc. Part II (Semester Pattern) 2011 – 2012
Theory Syllabus

SEMESTER-III:

Paper VI
Microbial genetics

Unit – I **9**

1. Chemical nature and structure of genetic material, forms of DNA.
2. Basic concepts – Gene, genome, genotype, phenotype, mutagen, recon, muton, cistron, operon, split genes.
3. Genetic code – definition and properties of genetic code.

Unit – II **9**

1. Basic Concepts of Mutation: Base pair substitutions, Frame shift , missense, nonsense, neutral, silent , pliotropic and suppressor mutations.
2. Spontaneous mutation – Definition and basic concepts.
3. Induced mutations – Mechanism of mutagenesis by 5-Bromouracil, hydroxylamine, alkylating agents, acridine dyes, UV light

Unit – III **9**

1. Genetic recombination in bacteria.
2. Fate of exogenote in recipient cell.
3. Transformation.
4. Conjugation
5. Transduction

Unit – IV **9**

1. Plasmids **–** Types, Structure, properties and applications
2. DNA repair : i) Photoreactivation ii) Dark repair mechanism (Excision repair)

SHIVAJI UNIVERSITY, KOLHAPUR
SYLLABUS OF INDUSTRIAL MICROBIOLOGY
FOR B.SC-II (VOCATIONAL) 2011-12
THEORY SYLLABUS

SEMISTER III

PAPER-V
INDUSTRIAL PRODUCTION OF FERMENTED FOODS

Unit-I
Industrial Production of Dairy Products: 09

1. Cheese
2. Yoghurt
3. Curd
4. Butter

Unit-II
Industrial Production of Bakery & Common fermented foods: 09

1. Bread
2. Dhokala
3. Idli
4. Jalebi

Unit-III
Industrial Production of: 09

1. Soy-sauce
2. Sauerkraut
3. Pickles- Cucumber
4. Olives

Unit-IV
Spoilage of Fermented Food & its Preservation: 09

1. Dairy product
2. Bread
3. Sauerkraut, Cucumber
4. Soy-sauce, Olives

SHIVAJI UNIVERSITY, KOLHAPUR
SYLLABUS OF INDUSTRIAL MICROBIOLOGY
FOR B.SC-II (VOCATIONAL) 2011-12
THEORY SYLLABUS

SEMISTER III

PAPER VI
QUALITY CONTROL OF FOOD PRODUCTS

Unit-I 09

A) Need of microbiological quality control of food.

B) Microbiological analysis of food products
   1. SPC
   2. Detection for the presence of
      a. *E.coli*
      b. *Staph.aureus*
      c. *Shigella*
      d. *Pseudomonas*
      e. *Salmonella*

Unit-II 09

A) Introduction to Quality Assurance of food products.

B) Basic concepts of
   1. Regulation as per PFA, FDA, FPO.
   2. Standards & Norms as per ISO, BIS, AGMARK

Unit-III 09

TQMS (Total Quality Management System) of food products
   1. Raw material acceptance.
   2. Process control with respect to milk & milk products.
   3. Packaging.
   4. Finished product storage.
   5. Transport and Distribution.

Unit-IV 09

A) HACCP (Hazard Analysis Critical Control Points)
   1. Seven principles of HACCP

B) Introduction of GMP, GLP

C) ICMSF (International Commission on the Microbiological Specification of foods)
   1. Introduction
   2. ICMSF – Sampling plans
      a. The two class plan
      b. The three class plan
   3. Microbiological limit tests as per ICMSF

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. Part – II Physics Syllabus with effect from June-2011
Semester - III
Paper - V General Physics, Sound and Acoustics

Lect.

UNIT I
Vectors:
(11)
Del operator, gradient of a scalar, divergence of a vector and their physical significance, curl of a vector, line integral, surface integral, volume integral,definitions only Gauss divergence theorem, Stoke's theorem and Green's theorem.
UNIT II
Precessional Motion:
(10)
Precession, nutation, gyroscope, Lanchester's rule, gyrostatic pendulum, motion of rolling disc & hoop, gyroscopic applications- riding on a bicycle, refilling of barrels of guns & rifles.
UNIT III
1. Elasticity:
(7)
Torsion of a wire, couple per unit twist, torsional oscillation and expression
for modulus of rigidity, flat spiral spring- expression for Y and η
2. Viscosity:
(5)
Viscosity by rotating cylinder method for liquid, Searle's viscometer, viscosity of gases by Rankine's method. [Qualitative treatment only]
UNIT IV
1. Sound :
(6)
Transducers and their characteristics, pressure microphone, moving coil loud
speaker, process of recording and reproduction of sound in compact disc.
2. Acoustics of Buildings:
(6)
Factors affecting acoustics of buildings, reverberation time, Sabine's experimental work and formula, optimum reverberation time. Requirements of good acoustics.

Semester - III

Paper - VI Electronics and Computer Programming:

Lect.

UNIT I

1. Cathode ray oscilloscope:

(5)

Principle, construction & working of CRT, block diagram of CRO. Uses of CRO.

2. Transistor amplifier:

(6)

Single stage common emitter transistor amplifier, DC & AC load line, frequency response curve of an amplifier, negative and positive feedback, effect of
negative feedback on the gain response curve.

UNIT II

1. Oscillator:

(5)

Types of wave forms, oscillations from tank circuit. Barkhausen's criterion for sustained oscillations, Phase shift oscillator, Colpitt's oscillator, Crystal Oscillator (qualitative treatment only)

2. Operational Amplifier:

(7)

Differential amplifier and its types, comparison between normal amplifier &
differential amplifier. Qualitative explanation of common mode and differential mode gains and CMRR. Op-Amp symbol. Block diagram of Op-Amp. OP-AMP
parameters-Input offset current,Input offset voltage,Input bias current, slew rate,input impedance,output impedance,open loop gain,close loop gain,power band width Characteristics of ideal Op-Amp, concept of virtual ground, Necessity of negative feedback in Op-Amp.

UNIT III

Digital electronics:

(9)

Review of basic gates, Study of NAND, NOR, Ex-OR and Ex-NOR gates. De Morgan's theorems, NAND and NOR as the universal gates, Half adder and Full adder. R-S flip flop, J-K flip-flop,race around condition, Master slave J-K flip-flop.

UNIT IV

1. C-Language fundamentals:

(8)

Algorithm, flowchart, What is C, character set, identifiers, keywords, constants, variables, data types in C, assignment statement, defining symbolic constants, operators – Arithmetic, Relational, Logical, Assignment, Conditional,
Comma, Increment and decrement and expressions.

Lect.

2. Data input-output & Control statements:
(5)

Data input and output using scanf function, printf function, if statement, if-else statement, loop structures, while statement, do-while statement, for statement, give illustrative examples for each.

Shivaji University Kolhapur
New Syllabus – B.Sc. II AstroPhysics
Implementation from: June, 2011

Semester – III
Paper – I (ELEMENTS OF ASTROPHYSICS)

Lect.

1. THE NATURE OF LIGHT:

Light as an electric vibration, the electromagnetic radiation from a heated
object, Doppler shift.
(5)

2. TOOLS OF THE ASTRONOMER:

Optical telescopes, (Gallilian, Newtonian, Cassegranian & Hubble Space
Telescope), Magnifying power & Resolving power of telescopes, UV, x-ray, IR, Radio & gravitational Astronomy, Spectroscope.
(9)

3. THE MESSAGE OF STAR LIGHT:

Atomic spectra – Emission Spectra & absorption Spectra, Stellar Spectra –
Origin of stellar spectra, classification of stars.
(7)

4. THE HERTZPRUNG – RUSSELL DIAGRAM:

The colour, Brightness or luminosity, the population of star, Variable stars.

(8)

5. NUCLEAR ENERGY SOURCES:

Nuclear fission, Nuclear fusion, condition for nuclear reaction in stars. (6)

6. STELLAR EVOLUTION:

Protostar, birth, maturity, and aging of stars (Red giant), death of small stars (Planetary nebula & white dwarfs), death of massive stars (supernova explosion, pulsars, black holes).
(10)

Semester – III

Paper – II (THE SKY & STARS)

Lect.

1. HISTORY OF ASTRONOMY:

The Ptolemaic system, The Copernican system, Tycho Brahe's observation, Netwton's Law of Gravitation, Kepler's laws of planetary motion (with derivation)

(9)

2. THE SKY AND THE CALENDER:

The moon, Sun & stars as CALENDARS, sidereal day & Sidereal time, The celestial co-ordinates, celestial sphere, Universal equatorial system, The constellations – Aries, Pisces, Auriga, Taurus & interesting objects in the sky (Summer triangle, north polaris, Big dipper, Orion, Pleiades) (12)

3. COMETS, ASTERIODS AND METEORS:

Structure, Composition and orbits.

(6)

4. APPARENT LUMINOSITY OF STARS:

Magnitude scale, measurement of apparent luminosity by (i) Visual method (ii) photographic method (iii) Photoelectric method.

(6)

5. STELLAR DISTANCES:

Measurement of terrestrial distance, distance of moon, distance of planet & Sun, Astronomical units and its measurement by abberation of star light, Trigonometric Parallaxes of stars, light year & parsec.

(7)

6. MASS AND RADIUS OF SATRS:

Kepler's third law for estimation of solar mass, Direct method of measurement of steller using Michelson Steller interferometer.

(5)

B. Sc. Part II, Semester-III: STATISTICS
Structure of the Course
To be implemented from June 2011.

Paper-V: Continuous Probability Distributions-I

Unit-1. Continuous Univariate Distributions: (15)

1.1 Definition of the continuous sample space with illustrations, Definition of continuous random variable(r.v.), probability density function(p.d.f.), and cumulative distribution function(c.d.f.), properties of c.d.f..

1.2 Expectation of r.v., expectation of function of r.v., mean, median, mode, quartiles, variance, harmonic mean, raw and central moments, skewness and kurtosis, examples

1.3 Moments generating function (m.g.f.): definition and properties (i) standardization property $M_X(0) = 1$, (ii) Effect of change of origin and scale., (iii) Uniqueness property of m.g.f., if exists, statement only. Generation of raw and central moments.

1.4 Cumulant generating function (c.g.f.): definition, properties of cgf: i) Effect of change of origin and scale, ii) additive property of cumulants, iii) relations between cumulants and central moments (up to order four).

1.5 Examples and problems.

Unit-2: Continuous Bivariate Distributions: (12)

2.1 Definition of bivariate continuous random variable(X, Y), Joint p.d.f., c.d.f with properties, marginal and conditional distribution, independence of random variables, evaluation of probabilities of various regions bounded by straight lines.

2.2 Expectation of g(X, Y), means, variances, covariance, correlation coefficient, conditional expectation, regression as conditional expectation if it is linear function of other variable and conditional variance, proof of
i) $E(X \pm Y) = E(X) \pm E(Y)$, ii) $E[E(X/Y)] = E(X)$.

2.3 If X and Y are independent r.v.s. then (i) $E(XY) = E(X)\,E(Y)$,
(ii) $M_{x+y}(t) = M_x(t)\,M_y(t)$

2.4 Examples and problems.

Unit-3. Transformations of continuous r.v.: (6)

3.1 Transformation of univariate continuous r.v.: Distribution of Y=g(X), where g
is monotonic or non monotonic using (i) Jacobian of transformation, (ii) Distribution function and (iii) m.g.f. methods.

3.2 Transformation of continuous bivariate r.v.s.: Distribution of bivariate r.v.s.
using Jacobian of transformation.

3.3 Examples and problems.

Unit-4. Uniform and Exponential Distribution: (12)

4.1 Uniform distribution: p.d.f

$$f(x) = \frac{1}{b-a}, a \le x \le b$$
$$= 0 \quad , elsewhere$$

Notation X ~ U (a, b), c.d.f., sketch of p.d.f and c.d.f. for various values
of parameters, and m.g.f., mean, variance, moments.

Distribution of (i) (X-a) / (b-a), ii) (b-X) / (b-a), (iii) Y = F, where F(x) is
c.d.f. of any continuous r.v.

4.2 Exponential distribution:

p.d.f. (one parameter)

$$f(x) = \theta e^{-\theta x}, x \ge 0, \theta > 0$$
$$= 0 \quad , o.w.$$

notation X~Exp(θ), Sketch of p.d.f for various values of parameter, c.d.f., m.g.f., c.g.f., mean, variance,C.V., moments, cumulants, median, quartiles, lack of memory property, distribution of – $(1/\theta)$ logU, $(1/\theta)$ log (1-U) where U~U (0, 1).

Paper VI: Bivariate Discrete Distributions and Multiple Regression Analysis

Unit-1: Bivariate Discrete Distribution: (14)

1.1 Definition of bivariate discrete random variable (X, Y) on (i) finite and
(ii) countably infinite sample space, Joint p.m.f., and c.d.f., Properties of c.d.f.
(without proof). Computation of probabilities of events in bivariate probability
distribution, concept of marginal and conditional probability distribution,
independence of two discrete r.v.s , Examples.

1.2 Mathematical Expectation: Definition of expectation of function of r.v. in bivariate distribution,Theorems on expectations: (i) E(X+Y) = E(X) + E(Y)
(ii) E (XY) = E(X) E(Y) when X and Y are independent, expectation and variance of linear combination of two discrete r.v.s., definition of conditional mean, conditional variance, covariance and correlation coefficient, Cov (aX+bY,

cX+dY), distinction between uncorrelated and independent variables, examples.

1.3 Definition of m.g.f. of (X, Y): $M_{x,\,y}(t_1, t_2)$, moments using m.g.f. Properties of m.g.f. (i) $M_x(t_1) = M_{x,\,y}(t_1, 0)$, (ii) If X and Y are independent r.v.s then $M_{x,\,y}(t_1, t_2) = M_x(t_1)\, M_y(t_2)$, (iii) $M_{x+y}(t) = M_{x,\,y}(t, t)$, if X and Y are dependent and (iv) $M_{x+y}(t) = M_x(t)\, M_y(t)$ if X and Y are independent.

Unit-2. Trinomial distribution: (8)

Introduce Trinomial as extension of Binomial distribution. Definition, p.m.f.

Notation: $(X, Y) \sim \text{Tri}(n, p_1, p_2)$, $0 < p_1, p_2 < 1$, $p_1 + p_2 < 1$, n is a positive Integer. m.g.f., means, variances and covariance using m.g.f., correlation coefficient. Distribution of X+Y using m.g.f. Generalization of Trinomial to Multinomial distribution. Statement of the marginal distribution of X_i. Statement of the $\text{Cov}(X_i, X_j)$ and variance – covariance matrix.

Unit-3: Multiple Linear Regression (for trivariate data only): (10)

3.1 Concept of multiple linear regression, Plane of regression, Yule's notation, correlation matrix.

3.2 Fitting of regression plane by method of least squares, definition of partial regression coefficients and their interpretation.

3.3 Residual: definition, order, properties, derivation of mean and variance, Covariance between residuals.

Unit-4: Multiple and Partial Correlation (for trivariate data only): (13)

4.1 Concept of multiple correlation. Definition of multiple correlation coefficient $R_{i.jk}$, derivation of formula for multiple correlation coefficient.

4.2 Properties of multiple correlation coefficient; i) $0 \le R_{i.jk} \le 1$, (ii) $R_{i.jk} > |r_{ij}|$, (iii) $R_{i.jk} > |r_{ik}|$ $i = j = k = 1, 2, 3$. $i \ne j$, $i \ne k$.

4.3 Interpretation of $R_{i.jk} = 1$, $R_{i.jk} = 0$, coefficient of multiple determinantion $R^2_{1.23}$.

4.4 Concept of partial correlation. Definition of partial correlation coefficient $r_{ij.k}$, derivation of formula for $r_{ij.k}$.

4.5 Properties of partial correlation coefficient (i) $-1 \le r_{ij.k} \le 1$, (ii) $b_{ij.k}.b_{ji.k} = r^2_{ij.k}$.

4.6 Examples and problems.

B.Sc. II Zoology

Semester III

Paper V - Animal Diversity-III

45

UNIT I : Study of Nonchordates

A. Salient features and Classification up to classes of the following with Suitable examples:

i. Arthropoda
ii. Mollusca
iii. Echinodermata
iv. Hemichordata

B. Amazing invertebrates:

i. Bioluminescence in Firefly**.**
ii. Parental care in mud wasp.
iii. Courtship in Praying mantis.
iv. Protective behavior in sepia
10

UNIT II : Study of phylum Arthropoda

A. Crab:

i Systematic position
ii Habits and habitat
iii. Morphology.
iv. Nervous system.

B. Cockroach:

i Systematic position
ii Habits and habitat
iii. Morphology.
iv. Study of digestive system.
v. Study of excretory system.
vi. Study of reproductive system.
vii. Cocoon formation
11

UNIT III : Study of phylum Mollusca

Pila:

i Systematic position
ii . Habits and habitat.
iii. Morphology – Shell and pallial complex.
iii. Study of digestive system.

iv. Study of respiratory system.

v. Study of nervous system, osphradium and statocyst.

vi. Study of reproductive system.

12

UNIT IV : Study of following general topics in Nonchordates

A. Mouthparts in insects:

i. Cockroach

ii. Honey bee

iii. Housefly

iv. Mosquito

v. Butterfly

B. Foot in Mollusca

C. Pedicellariae in Echinodermata

D. Affinities in Hemichordata

12

Paper – VI Genetics and Biological Chemistry

45

UNIT I : Genetics Part I

A. Linkage and Crossing over

i. Incomplete and complete Linkages.

ii. Mechanism of Crossing over.

iii. Cytological evidence of Crossing over.

iv. Significance of Linkage and Crossing over.

B. Sex determination.

i. Sex Chromosomes.

ii. Chromosomal Theory.

iii. Genic Balance Theory.

iv. Environmentally controlled sex determination (Bonelia)

C. Gynandromorphs.

i. Types of gynanders.

ii. Causes of formation of gynanders.

iii. Examples with morphological characters.

12

UNIT II : Genetics Part II

A. Interaction of genes.

i. Supplementary genes with suitable example

ii. Complementary genes with suitable example

B. Lethal Genes.

i. Fully lethal genes with suitable example

ii. Semi lethal genes with suitable example.

C. Twins in human

10

UNIT III : Biological Chemistry Part I

A. pH and Buffers.

i. Water Properties, Dissociation and Significance.

ii. pH definition , Henderson-Hasselblanch Equation.

iii. Buffers in Biological Systems.

B. Classification and Biological Significance of -

i. Carbohydrates

ii. Proteins

iii. Lipids.

10

UNIT IV : Biological Chemistry Part II

A. Nucleic Acids.

i. DNA- Structure and Biological Significance.

ii. RNA- Structure, Types and Biological Significance.

B. Enzymes.

i. Classification (outline)

ii. Characteristics of enzymes.

iii. Mechanism of enzyme action with suitable example.

iv. Factors controlling enzyme action.

v. Isoenzymes, Co-factors and Co-enzymes.

C. Significance of metal ions with reference to human body

i. Iron ii. Calcium iii. Sodium iv. Potassium v. Copper

13

List of Reference Books:

1. The invertebrates: Hyman. L. H.
2. Arthropoda, Mollusca and Echinodermata: Kotpal.R.L.
3. Mollusca: Mortan.J.E.
4. Echinodermata: Nichols, D.
5. Students Text-Book of Zoology: Sedgwick. A (Vol.I to III).
6. Invertebrate Zoology; Barnes.
7. Biology of Higher Invertebrates: Russell-Hunter.
8. Invertebrate Zoology: Jordan, E.L. and Verma, P.S.
9. The Text-Bo0ok of Invertebrate Zoology. Agarwal, V.P. and Dakeka.R.C
10. Invertebrates: Kotpal.R.C.

11. Principles of Modern Zoology: Nigam. H.C.
12. A Textbook of Invertebrate Zoology. Prasad. S.N.
13. A Textbook of Invertebrate Zoology: Srivastava.M.
14. Cell and Molecular Biology. De robertis.
15. Genetics: M.W.Strickberger, New York.
16. Principles of genetics: Sinnot, Dunn and Dobzansky.
17. Principles of genetics: Edidon Gardner.
18. Molecular Biology of the Dell. Alberts, Bray/Raff/Roberts and Watson.
19. The Molecular biology of the Gene. J.D. Watson.
20. Cell Biology: C.B.Powar.
21. Outline of Biochemistry. Conn.E.E. and Stumpf. P. Y.
22. Biochemistry: Leninger. A. L.
23. Biochemistry: Das;
24. Biochemistry Vikl I Dasgupta.S.K.
25. Textbook of Biochemistry: Rao. K.R.
26. Textbook of Biochemistry: West. E.S., Todd, W.R., Mason.H.S. And Van Bruggen, J.T.
27. Review of Physiological Chemistry: Harper. H.A.
28. Molecular Biology: Gupta. P.K.
29. Genetics: Gupta. P.K.

Revised Syllabus For

B. Sc. Part II Fisheries

[Introduced from June 2011 onwards]

Semester I

Paper I - Fishery Biology I

A) Lectures / contact hours per unit - 11

B) Contact hours per practical – 04

UNIT-I

1. An introduction to Fisheries:

4

1.1 History in brief.

1.2 Inland, marine, capture and culture fisheries.

1.3 A broad outline of fishery activity:

i. Fishing.

ii. Processing

iii. Marketing

1.4 Importance of fisheries.

2. Taxonomy of Shell-fish:

3

2.1. General characters of Crustacea and Mollusca.

3. Taxonomy of Fin-fish:

5

3.1 General outline of the classification.

3.2 Chondrichthyes and Osteichthyes.

UNIT-II

4. External Morphology of :

4

4.1 Bivalve- Unio.

4.2 Typical cartilaginous fishes - Scoliodon

4.3 Typical bony fish- Labeo

5. Internal Anatomy of Fin fish : Scoliodon

7

With reference to –

5.1 Digestive system

5.2 Circulatory system

5.3 Excretory and reproductive system

5.4 Brain

UNIT – III

6. Internal Anatomy of Fin fish : Labeo

7

With reference to –

6.1 Digestive system

6.2 Circulatory system

6.3 Excretory and reproductive system

6.4 Brain

7. Economic importance of the following:

4

Sponges, Prawn, Unio, Oyster, Scoliodon, Harpodon, Pomphret, Sardine, Labeo and Catla

UNIT – IV

8. Study of the following general topics :

11

8.1 Study of fins: Evolution of paired and unpaired fins in fishes

8.2 Swim bladder.

8.3 Migration in fishes.

8.4 Locomotion in fishes : Carangiform, Anguilliform and Ostraciform

8.5 Lung Fishes.

45

Paper – II (Fish Physiology – I)

UNIT – I

1. Nutrition:

6

1.1 Food and Feeding.
1.2 Physiology of digestion.
1.3 Assimilation.

2. Respiration:

7

2.1 Types of gills.
2.2 Mechanism of respiration.
2.3 Accessory respiratory organs- Anabas, Clarias and Saccobranchus.

UNIT- II

3. Circulation:

6

3.1 Composition and functions of blood
3.2 Structure of heart in Scoliodon and Labeo
3.3 Mechanism of circulation in Scoliodon and Labeo

4. Excretion:

6

4.1 Osmoregulation in freshwater, marine and diadromous fishes.
4.2 Structure and function of kidney.
4.3 Excretory function of gills.

UNIT- III

5. Reproduction :

10

5.1 Modes of Reproduction:
Oviparity,Viviparity, Ovo- viviparity and Hermaphroditism.

5.2 Maturity stages in gonads:

i) Resting phase (immature)
ii) Early maturing phase.
iii) Advanced maturing phase.
iv) Matured phase.
v) Spawning phase.
vi) Spent phase.

UNIT- IV

6.Sense organs :

10

6.1 Olfactory Organs:
6.2 Taste buds.
6.3 Eye.
6.4 Membranous labyrinth.
6.5 Lateral line system.
6.6 Ampullae of Lorenzini.
6.7 Weberian ossicles.

B.Sc .part –II Biotechnology (Optional /Vocational)

	Semester III Paper-V (Immunology)	
To.	Unit I	Lectures
1	Overview Of Immune system- 1.1Introduction 1.2Types of immunity-i)Innate (specific and non-specific) ii) Acquired (Active and Passive) 1.3Types of Defense-a) first line of defense (barriers at the portal of entry,physical and chemical barriers) b)second line of defense(phagocyte and mechanism of phagocytosis) c)third line of defense-specific defense mechanism	12
	Unit II	
2	Introduction to cells and organs of immune system- 2.1 cells of immune system-a)broad categories of leucocytes, their role and properties b) B-lymphocytes c) T-cells-subsets 2.2 organs of immune system-primary and secondary lymphoid organs-structure and their role	10
	UnitIII	
3	Antigen and Antibody 3.1 Antigen- defination , nature,types of antigen,factors affecting antigenicity 3.2 Antibody-defination, nature,basic structure of immunoglobulin molecule,major human immunoglobulin classes(their properties and functions)	11
	Unit IV	
4	Immune response 4.1 Immune response-Primary and secondary immune Response 4.2 Theories of Antibody production 4.3 Antigen Antibody reactions-Principle and applications Of- a) agglutination b) precipitation c) complement fixation d) ELISA 4.4 Hypersensitivity-types, role of chemical mediators Immediate hypersensitivity – Anaphylaxis Delayed hypersensitivity – Homograft rejection	12

References:

1. **Riott "Essential Immunology"**
2. **Kuby "Immunology"**
3. **Stanier "General Microbiology"**
4. **Immunology An Introduction –Tizzard 4th Edition**
5. **Medical Bacteriology – Dey & Dey**
6. **Immunology & Serology – Ashim Chakravar**

Topic No.	Semester III- Paper-VI Molecular Biology	LECT.
	Unit I	
1	1.1 Molecular basis of life 1.2 Structure of DNA and RNA (m-RNA,t-RNA and r-RNA) 1.3 DNA replication in prokaryotes and eukaryotes:- Rolling circle model &θ-model of replication. 1.4 DNA replication in eukaryotes – Mechanism of replication 1.5 Genetic code and its properties	12
	Unit II	
2	2.1 Structure of prokaryotic gene 2.2 Transcription in prokaryotes:-Initiation, Elongation and Termination 2.3 Translation in prokaryotes:- Activation of amino acids,Initiation,Elongation and termination 2.4 operon model -Lactose operon: Structure,Lac repressor, and Inducer 2.5 Insertion elements and transposons. Properties, uses , transposons as a genetic markers , transformation vectors.	12
	Unit III	
3	3.1 Structure of eukaryotic gene 3.2 Transcription in eukaryotes-Transcription factors, initiation, elongation & termination. 3.3 Translation in eukaryotes:- Initiation, Elongation and termination, 3.4Gene regulation and Expression in eukaryotes 3.5 Post-translation modification	11
	Unit IV	
4	Natural gene transfer process: 4.1 Transformation 4.2 Conjugation 4.3 Transduction	10

References:-

1) Molecular biology by Watson
2) Genetics by Strickbeger
3) Molecular Biology by Glickpastornack
4) Molecular biolage Geralad Carph
5) Cell biology By DeRobertis
6) Gene By Levin
7) Genome by T.A. Brown

SYLLABUS EQUIVALANCE
B.Sc. II Optional / Vocational Biotechnology

Sr. No.	Annual Paper Title	Semester III	Semester IV
1	Biophysics, Enzyme technology, Immunology	Immunology	Biophysics, enzyme technology
2	Molecular Biology and r- DNA technology	Molecular biology	r-DNA technology
3	Laboratory exercise in basic biotechnology II	-------	----------

B.Sc. Part – II Computer Science

(Sem-III)

Paper – V : Fundamentals of Software Engineering

Unit – I : Introduction to System Analysis: (5)

Definition of system, elements and characteristics of system, Types of system, Role and responsibilities of system analyst.

Unit – II: Software Engineering: (10)

Definition, characteristics of software, Qualities (correctness, reliability, user friendliness, robustness, efficiency, maintability, reusability, portability, productivity, visibility), System Development Life Cycle (SDLC): Classical model.

Unit – III: System Analysis: (10)

Requirement Analysis (Anticipation, Investigation, specification), Feasibility study (Economic, operational, technical), Fact finding technique (observations, record review, interviews, questionnaires, study of physical system), Analysis and Design tools (Data Flow Diagrams- guidelines, logical and physical), Entity Relationship Diagrams.

Unit–IV: System Design, implementation and testing: (15)

Input and Output Design and their types, Normalization (First, Second, Third), Database Design (File structure, File Organization, Important types of file, Database/ file operation), data dictionary, System Implementation: Hardware and software selection, manual implementation, online implementation, real-time implementation, construction of system (Traditional approach, Incremental approach), Software Testing: (White Box, Black Box, Alpha, Beta), Change Over.

References:

1. Software Engineering - R.S. Pressman
2. System Analysis & Design- AWAD E.H.
3. System Analysis and Design – V.K. Jain (Dreamtech Pub.)
4. System Analysis & Design- Parthsarthy/ Khalkar.
5. Basic System Analysis And Design-Alan Denial & Don Yeats.
6. System Analysis & Design -Edwards Perry.
7. An Integrated approach to Software Engineering – Narosa – Pankaj Jalote
8. Software Engineering - Martin L. Shooman

Paper – VI : Introduction to Object Oriented Programming Using C++

Unit – I: Concept of OOP: **(7)**

Features of OOP, Application of OOP, General Structure of C++ program, Input Output operations in C++, Managing output with manipulators.

Unit - II: Concept of class: (10)

Definition and syntax of class, various access specifiers, defining member functions- inside the class, outside the class, defining objects, array of objects.

Unit – III: Constructors and Destructors: (11)

Definition of constructor, syntax, rules and use, Types of constructors, Definition of destructors, syntax, rules and use, Friend function, Friend function to a class, passing object as parameters, common friend for two classes.

Unit – IV: Operators overloading: (12)

Defining operator overloading, overloading function, rules for operator overloading, Overloading of arithmetic operators(+,-,/,*), relational operators(<,>,==), unary operators(++,--,-), function overloading.

References:

1) OOP using C++ By E. Balagurusamy
2) Programming with C++ By D. Ravichandran
3) C++ Program By Yashavant Kanetkar
4) Let Us C++ By Yashawant Kanetkar.
5) Object Oriented Programming in C++ - By Thampi & Mantha - Dreamtech
6) Mastering C++ -By Venugopal.

B.Sc.II Food Science and Quality Control

Semester III

Paper V - Food Preservation and Packaging

Unit 1. Food and its preservation (6)

1.1 Introduction
1.2 Source of food problems
1.3 Food of plant origin
1.4 Need and benefits of industrial food preservation

Unit 2. Food preservation and processing by heat and cold (13)

2.1 Effect of heat on microorganisms
2.2 Thermal death time curve
2.3 Introduction of canning
2.4 Pasteurization
2.5 Effect of cold on microorganisms
2.6 Types of cold preservation

Unit 3. Preservation by Drying (9)

3.1 Advantages of drying

3.2 Changes during drying
3.3 Methods of drying

Unit 4. Food Packaging (10)

4.1 Definition
4.2 Functions of packaging
4.3 Types of packaging
4.4 Basic packaging materials
4.5 Effects of packaging on the nutritive value of food

References++

1) Preservation of fruits and vegetables by Siddhappa
2) Technology and Food Preservation by N. Desrosier
3) Modern Food preservation by Mc Williams
4) Food facts and principles by Shakuntala Mane
5) Food and packaging interaction by Hotchikess American Chemical society
6) Food packaging by Scicharow and Griffin
7) Painy, F.A. and Painy H.Y.1983. A Handbook of Food Packaging. Leonard Hill,Glasgow,Uk

Semester III

Paper VI - Fruits and vegetable processing

Unit 1 . Introduction of Fruits and Vegetables (7)

1.1 Definition of ripening
1.2 Changes occurring during ripening
1.3 Textural changes
1.4 Regulation of ripening and senescence

Unit2 . Jams , Jellies and Marmalades (12)

2.1 Definitions of jams ,jellies and marmalades
2.2 Methods of preparation
2.3 Role of sugar, pectin and acids in their preparation
2.4 Methods of preparation of fruit cheese

Unit3. Tomato products (10)

3.1 Introduction
3.2 Methods of preparation of Tomato juice , Cocktail , Soup, Puree, Ketchup

Unit4. Fruit and Vegetable beverages (10)

4.1 Types of beverages

4.2 Methods of preparation and preservation

4.3 Preparation of squashes, syrups, juices ,cordials and ready to serve beverages

References

1) Fruits and vegetable preservation principles and practices by Srivastav R. P. and Sanjeev Kumar
2) Preservation of fruits and vegetables by Siddhappa
3) Hamson, L.P. 1975. Commercial Processing of Vegetables. Noyes Data Corporrtion, New Jersey
4) Salunkhe, D.K. and Kadam, S.S. Ed.1995. Handbook of fruit science and technology Production,compositon, storage and processing. Marcel Dekker, NewYork
5) Seymour,G.B., Taylor,J.E. and Tucker,G.A.Ed.1993. Biochemistry of Fruit ripening
6) Food facts and principles by Shakuntala Mane
7) Food Science by Shrilaxmi
8) Chemical changes in food during processing by Richardson

B.Sc.II Biochemistry

SEMISTER - III

Paper – I (Biomolecules)

1. Carbohydrates :

(12) Definition, Classification and brief account of …

A) Monosaccharides (aldoses and ketoses) :

Trioses – Glyceraldehydes, Dihydroxyacetone
Tetroses – Erythroses, Erythrulose
Pentoses – Ribose, Xylose, Ribulose, Xylulose
Hexoses – Glucose, Galactose, Fructose
Reactions of anomeric hydroxyl group viz. Fehling test and Phenyl hydrazine test.

B) Disaccharides : Glycosidic bond, Maltose, Isomaltose, Lactose, Sucrose
Cellobiose. Emphasis must be on nature of linkage, reducing properties and
hydrolysis studies with acid and enzymes.

C) Polysaccharides : Structure and biological role of Starch, Glycogen, Cellulose.

D) Derived Monosaccharides : Deoxy sugars (B-D- deoxy ribose), sugar-acids
(L-ascorbic acid), Amino sugars (B-D-glucosamine, B-D-galactosamine, N-
acetyl glucosamine).

E) Mucopolysaccharides: Hyaluronic acid, Heparin.

2. Amino acids :

(5)

Definition, Nomenclature, Structure and classification of amino acids :

a) Neutral amino acids :

i. Hydrocarbon chain amino acids-Glycine, Alanine, Valine, Leucine, Isoleucine.
ii. Hydroxy amino acids- Serine, Threonine.
iii. Sulfur containing amino acids-Cysteine, Methionine.
iv. Aromtic amino acids-Phenylalanine, Tyrosine, Tryptophan.
v. Heterocyclic amino acids – Proline.

b) Acidic amino acids and their amides: Aspartic acid, Glutamic acid, Aspargine, Glutamine.

c) Basic aminoacids : Lysine Arginine, Histidine,

Behaviour of glycine, aspartic acid and lysine in neutral, acidic and basic solutions, Zwitter ion and isoelectric pH, Ninhydrin reaction and its significance.

3) **Proteins :**

(8)

Defination, classification (based on function), peptide bond and its nature. Structural studies of proteins - Primary structure (oxytocin), Determination of end amino acids (Sanger, Edman and Carboxypeptidase method), Secondary structure (α- helix and **β-** pleated structure), Tertiary structure (myoglobin), Quaternary structure

(hemoglobin), Forces involved in maintaining different structural levels of proteins.

4) Enzymes :
(12)

Definition, Explanation of terms – Holoenzyme, Apoenzyme, Coezyme, Prosthetic group, Cofactor. Classification of enzymes into in to six major classes with an examples of each class, Enzyme as catalyst (concept of activation energy in enzyme catalysed reaction),Units of enzyme activity, Specific activity, Turnover number.
Active site of enzyme and it's features, Enzyme specificity, Types of specificity. Theories of mechanism of enzyme action - Lock and key and induced fit theory.
Factors affecting enzyme activity - substrate concentration, pH, temperatutre. Enzyme kinetics - derivation of Michaelis-Menten equation, significance of Km and Vmax, their evaluation by Lineweaver Burk plot.
Enzyme inhibition - competitive, noncompetitive inhibition.
Isoenzymes of LDH and its clinical importance.

5) **Lipids**
(6)

Definition and classification of lipids with two examples of each class.
A brief account of structure and functions of…
Simple lipids : triglyceride and fatty acids
Compound lipids : Phospholipids, viz. lecithin, cephalin, phosphatidylserine, sphingomyelin, glycolipids(cerebrosides & gangliosides).
Derived lipids : steroids (cholesterol).
Lipid bilayer and Fluid mosaic model of membrane.

Paper –II
(Metabolism and Nutrition)

1) **Biological oxidation:**
(8)

High-energy compounds and their significance viz. ATP, PEP, 1,3-DPG.
Mitochondrial respiration: components of ETC, inhibitors of ETC, Mechanism of oxidative phosphorylation (chemiosmotic hypothesis)

2) Vitamins and coenzymes:
(8)

Definition, classification. Biochemical functions of water soluble vitamins, viz. Thiamine, Riboflavin, Niacin, Pyridoxine, Pantothenic acid.

3) **Carbohydrate metabolism**: (7)

Glycolysis and its energetics, Lactic acid and Ethanol fermentation, TCA cycle and its energetics, Glycogenesis and Glycogenolysis.

4) **Lipid metabolism**: (05)

β- oxidation of fatty acid (Palmetic acid) and its energetics. Biosynthesis of fatty acid (Palmetic acid), Synthesis and utilization of ketone bodies.

5) **Amino acid metabolism**: (07)

General reaction of amino acid metabolism viz. transamination, deamination, decarboxylation , Urea cycle, Inborn errors of amino acid metabolism viz. PKU, Alkaptonuria, Tyronosis,

6) Nutrition

(04)

Nutrition, food, nutrient definition, Balanced diet, source, requirement and nutritional aspects of carbohydrates, proteins and lipids, Brief account of vitamins and minerals in the diet.

7) Calorimetry: (04)

Caloric value of food stuffs and its measurement (bomb calorimeter).Respiratory quotient, BMR and its measurement (Douglass bag method), Factors affecting BMR and its significance.

B.Sc.II Polution
SEMESTER-III
Paper-I:
(Ecology and Pollution)

Unit 1. Ecological Concepts: Introduction to ecology and environmental science; Concept of biosphere and ecosystem, Types of ecosystems such as grassland, forest, aquatic, desert and wetland; Cycling of materials such as carbon cycle, nitrogen cycle, phosphorus cycle; Food chains, food webs and energy flow in ecosystems.

(12)

Unit 2. Ecocrisis: Global environmental problems such as resource depletion, energy crunch,pollution, radiation hazards, desertification, acid rain, ozone depletion and greenhouse effect.

(10)

Unit 3. Factors Affecting the Environment: Population explosion; Urbanization; Industrialization; Consumerism; Energy generation; Transportation, etc.

(7)

Unit 4. a) Environmental Pollution: Definition of pollution; Causes and major sources of environmental pollution such as natural and man-made like industrial, domestic, automobile, etc.

(5)

Unit 5. b) Environmental Episodes and Landmarks: Minamata; London smog; Torrey Canyon; Bhopal gas leaK; Chernobyl nuclear accident ; Silent Valley; Narmada Project; World Summit on Environment

(8)

Paper-II:
(Water Pollution-I)

Unit 1. Water and its Properties: Structure and general physical properties; Hydrological cycle and water budget on the earth; Classification of water pollutants

(8)

Unit 2. Water Resources: Distribution of water on the earth; Water resources and their management (rivers, reservoirs, groundwater, etc.)

(8)

Unit 3. Study of Water Pollutants: Organic matter; Nutrients; Heavy metals; Pesticides; Detergents; Toxic inorganic and organic chemicals; Thermal and Oil pollution

(11)

Unit 4. a) Sources of Water Pollution: Domestic sewage; Industrial wastes (characteristics of wastewater from major industries); Agricultural wastes; Natural sources of water pollution

(7)

Unit 5. b) Water Quality Parameters: Significance of pH, dissolved oxygen, BOD, COD, suspended and dissolved solids, hardness, chlorides, nitrates, ammonia and bacterial parameters like MPN of coliforms

(8)

टिपः–	1. बी.ए. भाग–2 भूगोल, व गृहशास्त्र या विषयाच्या अभ्यासक्रमांसाठी सामाजिकशास्त्रे विद्याशाखांनी निश्चित केल्याप्रमाणे प्रश्नपत्रिकेचे स्वरूप राहील.	
	2. विज्ञान विद्याशाखेअंतर्गत पदवी अभ्यासक्रमांना प्रात्यक्षिक परीक्षा वार्षिक पदधती अनुसार घेण्यात येतील व पदवी अभ्यासक्रमांच्या द्वितीय आणी तृतीय वर्षाच्या प्रात्यक्षिक परीक्षा विद्यापीठामार्फत घेण्यात येतील.	
	3. शैक्षणिक वर्ष 2011–12 पासुन विज्ञान विद्याशाखेअंतर्गत सत्र पध्दतीनुसार पदवी अभ्यासक्रमांसाठी सर्व विषयाच्या प्रश्नपत्रिकेचे समान स्वरूप खालीलप्रमाणे निश्चित करण्यात आले. (Except Chemistry)	
	Nature of Question Paper	
Q.No.1	Multiple Choice based objective type (four options for each question be given)	8 Marks
Q.No. 2	Attempt any two of the following out of three	16 Marks
Q.No. 3	Shot notes (4 out of 6)	16 Marks
	Total	40 marks

Chemistry
Nature of question papers for B.Sc. Part-II Semester Course
Semester – III & IV
Physical and Inorganic Chemistry (Paper – V & VII)

Section- I (Physical Chemistry)		
Q.1A)	**Multiple Choice Questions : 05 sub questions-all compulsory**	**Marks 05**
B)	**Solve any One out of Two: (Long answer type questions)**	**Marks 08**
Q.2A)	**Solve any Two out of Three: (Short answer type questions)**	**Marks 10**
B)	**Solve any One out of Two : (Short answer type questions)**	**Marks 04**
Section- II (Inorganic Chemistry)		
Q.3A)	**Multiple Choice Questions : 03 sub questions-all compulsory**	**Marks 03**
B)	**Solve any Two out of Three:(Short answer type questions)**	**Marks 10**
	Total -	**Marks 40**

Semester – III & IV

Organic and Inorganic Chemistry (Paper – VI & VIII)

Section- I (Organic Chemistry)		
Q.1A)	**Multiple Choice Questions : 05 sub questions-all compulsory**	**Marks 05**
B)	**Solve any One out of Two : (Long answer type questions)**	**Marks 08**
Q.2A)	**Solve any Two out of Three : (Short answer type questions)**	**Marks 10**
B)	**Solve any One out of Two : (Short answer type questions)**	**Marks 04**
Section- II (Inorganic Chemistry)		
Q.3A)	**Multiple Choice Questions : 03 sub questions-all compulsory**	**Marks 03**
B)	**Solve any Two out of Three : (Short answer type questions)**	**Marks 10**
	Total -	**Marks 40**