SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

For

B.Sc. (ZBC)

FACULTY OF SCIENCE

SCHEME OF EXAMINATION

Bachelor of Science (ZBC)
(Six Semester Programme)

B.Sc. (ZBC)				
First Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC101	Zoology -Invertebrate and vertebrate	30	70	100
BZBC102	Botany - Evolution, Biochemistry, Paleobotany, Diversity of Microbes and Cryptogams	30	70	100
BZBC103	Chemistry I - Physical	30	70	100
BZBC104	Fundamental of IT	30	70	100
BZBC105	English -I	30	70	100
BZBC101-P	Practical (BSCBT101)	20	30	50
BZBC102-P	Practical (BSCBT102)	20	30	50
BZBC103-P	Practical (BSCBT103)	20	30	50
BZBC104-P	Fundamental of IT **-Lab**	**20**	**30**	**50**
		230	**470**	**700**

B.Sc. (ZBC)				
Second Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC201	Zoology - Cell Biology & Developmental biology	30	70	100
BZBC202	Botany - Fungi, Pteridophyta, Gymnosperms and Angiosperm.	30	70	100
BZBC203	Chemistry I - Inorganic	30	70	100
BZBC204	Chemistry I - Organic	30	70	100
BZBC205	Hindi -I	30	70	100
BZBC201-P	Practical (BSCBT201)	20	30	50
BZBC202-P	Practical (BSCBT202)	20	30	50
BZBC203-P	Practical (BSCBT203)	20	30	50
BZBC204-P	Practical (BSCBT204)	20	30	50
	Total	**230**	**470**	**700**

B.Sc. (ZBC)				
Third Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC301	Zoology - Genetics	30	70	100
BZBC302	Botany - Cell Biology & Genetics	30	70	100
BZBC303	Chemistry II - Physical	30	70	100
BZBC304	English -II	30	70	100
BZBC305	Soft Skill PERSONALITY ENHANCEMENT	30	70	100
BZBC301-P	Practical (BSCBT301)	20	30	50
BZBC302-P	Practical (BSCBT302)	20	30	50
BZBC303-P	Practical (BSCBT303)	20	30	50
	Total (5 Subject)	**210**	**440**	**650**

B.Sc. (ZBC)				
Fourth Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC401	Zoology - Animal Physiology	30	70	100
BZBC402	Botany - Diversity, Systematic, Structure Development and Reproduction in Flowering Plant	30	70	100
BZBC403	Chemistry II- Inorganic	30	70	100
BZBC404	Chemistry II - Organic	30	70	100
BZBC405	Hindi-II	30	70	100
BZBC401-P	Practical (BSCBT401)	20	30	50
BZBC402-P	Practical (BSCBT402)	20	30	50
BZBC403-P	Practical (BSCBT403)	20	30	50
BZBC404-P	Practical (BSCBT404)	20	30	50
	Total	**230**	**470**	**700**

B.Sc. (ZBC)				
Fifth Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC501	Zoology - Applied Zoology	30	70	100
BZBC502	Botany - Plant Physiology, Biochemistry and Biotechnology	30	70	100
BZBC503	Chemistry II - Physical	30	70	100
BSCBT504	Communication Skills –I	30	70	100
BZBC505	Environmental Science	30	70	100
BZBC501-P	Practical (BSCBT501)	20	30	50
BZBC502-P	Practical (BSCBT502)	20	30	50
BZBC503-P	Practical (BSCBT503)	20	30	50
	Total (5 Subject)	**210**	**440**	**650**

B.Sc. (ZBC)				
Sixth Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BZBC601	Zoology - Environmental Biology and Evolution	30	70	100
BZBC602	Botany - Gene Ecology and Utilization of Plant Resources	30	70	100
BZBC603	Chemistry II- Inorganic	30	70	100
BZBC604	Chemistry II - Organic	30	70	100
BZBC605	Hindi -III	30	70	100
BZBC601-P	Practical (BSCBT601)	20	30	50
BZBC602-P	Practical (BSCBT602)	20	30	50
BZBC603-P	Practical (BSCBT603)	20	30	50
BZBC604-P	Practical (BSCBT604)	20	30	50
	Total	**230**	**470**	**700**

SEMESTER-I

BZBC101

External Marks:70
Internal Marks: 30

Zoology- Invertebrate and vertebrate

Unit-I

1. General Characteristics & Classification of invertebrate's up to class with examples
2. Protozoa - type study Plasmodium & disease
3. Porifera - type study of Sycon
4. Coelenterata - type study of Obelia.

Unit-II

1. Helminthes – Type study of Liver Fluke.
2. Annelida – Type study of Earthworm.
3. Arthropoda- Type study of Prawn.

Unit-III

1. Mollusca – Type study of Pila.
2. Echinodermeta – External Features of Star Fish.
3. Hemichordata – External features and affinities of Balanoglossus.

Unit-IV

1. General characteristics of chordate up to class.
2. Fishes
3. Amphibia
4. Reptilia
5. Aves
6. Mammals

Unit-V

1. Urochordata – Type study of Herdmania (excluding Development).
2. Cephalochordata – Type study of Amphioxus.
3. Affinities of Amphioxus.

BZBC 101-P

External Marks: 30
Internal Marks: 20

(Practical- BSCBT102A-P)
Zoology- Invertebrate and vertebrate

Lab Course:

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following.

1. Museum Specimen of invertebrate and vertebrate

2. To study various types of bird feathers and histology of invertebrate organs.

3. Demonstration of major dissection - Earth worm alimentary canal and reproductive system.

4. Demonstration of minor dissection- Mouth-parts of Cockroach & typhlosole of earthworm.

5. Mounting-Setae, spermatheca, septal nephridia, ctenidium of pila, salivary gland of cockroach.

6. Osteology-Frog & Rabbit (Limb bones and girdles)

BZBC 102 External Marks:70
Internal Marks: 30

Evolutions, Biochemistry, Paleobotany, Diversity of Microbes and Cryptogams.

Unit I

Origen of cell and Emergence of evolutionary thoughts ,Origin of basic biological molecules, Concept of Oparin and Haldane, Experiment of Miller, Theories of Evolution. Paleobotany- The evolutionary time scale, Eras, periods and epoch, Fossilization process, types of fossils, General knowledge and importance in Paleoecology and evolution of fossils.

Unit- II

Biochemistry- General Introduction, Scope and importance of the subject. Water- structure, properties and its biological significance Carbohydrates- structure, classification and biological importance. Lipids - structure, classification and biological importance. Proteins- structure, classification and biological importance. Enzymes- structure, classification and biological importance.

Unit- III

Virus and ProkaryotesGeneral account, history, importance and characteristics of Plant and Animal Virus.General account, history, importance and characteristics of Bacteria, Mycoplasma, Actinomycetes and Cynobacteria. Bacteriophage and its biological importance.Transformation,Transduction and Conjugation in Bacteria.

Unit- IV

General Characters, classification and economic importance of Algae. Important Feature and Life history of *Volvox*. Important feature and Life history of *Oedogonium*.Important feature and life history of *Chara*. Important feature and life history of *Vaucheria*.Important feature and life history of *Polysiphonia*.

Unit-V

General account and classification of Bryophyta. Classification, study of morphology, anatomy and reproduction of *Riccia*, *Marchantia*, *Anthoceros*, *Sphagnum* and *Polytrichum*. Comparative study of sporophytes of Bryophyta. Economic importance of Bryophyta.

Reference Books:-

1. G.M. Smith 1971 Cryptogamic Botany-Vol-I Algae & Fungi Tata Mc Grew Hill pub. Co. New Delhi.
2. G.M. Smith 1971 Cryptogamic Botany-Vol-II Bryophytes & Pteridopjytes Tata Mc Grew Hill pub. Co. New Delhi.
3. O.P.Sharma 1990. Text book of Pteridophyta Mc. Millan India Ltd.
4. O.P.Sharma 1992. Text book of Thallophyta McGraw pub. Co. New Delhi.
5. P.D. Sharma 1991. The Fungi Rastogi & co. Meerut.
6. H.C. Dubey 1990. An introduction of Fungi, Vikas Pub. House Pvt. Ltd.
7. P. Puri 1980. Bryophyta Atma ram & sons Delhi.
8. A. Clifton 1958. Introduction to the Bacteria McGraw Hill Pub. Co. New Delhi.
9. Albert B.D.Lewis, J. Raff. M. Ruber. K. and Watson I. D. 1999. Molecular biology of Cell Garland pub. Co. Inc. New York, U.S.A.

BZBC 102-P

External Term: 30
Internal Marks: 20

Evolution, Biochemistry, Paleobotany, Diversity of Microbes and Cryptogams

Practical

1. Study of the genera include under algae.
2. Study of the genera include under fungi
3. Observation of diseases symptoms in hosts infected by, viruses and mycoplasma.
4. Section cutting of diseased material and identification of the pathogens as per the theory syllabus.
5. Gram staining of bacteria.
6. Study of electron micrographs of viruses, bacteria, cyno bacteria and eukaryotic cells for comparative cellular organization.
7. Spotting
8. Project
9. Sessional

BSCZBC	**Total Marks: 100**
Semester- 1	**Internal Marks: 30**
Paper Code- BZBC103	**External Marks: 70**
Physical Chemistry – I	**No. of Hours: 40**
	Total Credits: 02

Unit No.	**Details**	Nos. of Hours
1	**Mathematical Concepts** Logarithmic relations, Curves stretching, Linear graphs and calculation of slopes, Differentiation of functions like Kx, ex, xn, sinx, logx; maxima and minima, Integration of some useful / relevant functions; Factorials, Probability, General introductions to computers, components of acomputers Hardware and software, Input-output devices, Binary numbers and arithmetic; Introduction to computer languages, Programming and operating systems	07
2	**Gaseous States** Postulates of kinetic theory of gases, Deviation from ideal behaviour, Van der Waals equation of State, **Critical phenomenon**: PV isotherms of ideal gases, The isotherms of van der Waals equations, Relationship between critical constants and vander Waals constants, The law of corresponding states, Root mean square, Average and most probable velocities. Qualitative discussion of the Maxwell's distribution ofmolecular velocities, Collision numbers, Mean free path and collision diameter, Liquefaction of gases (based on Joule Thompson effect).	09
3	Liquid State **Intermolecular forces,** **Structure of liquids (a qualitative description)** **Structuraldifferences between solids,** **Liquids and gases.** **Liquid crystals:** **Difference between liquid crystal,** **Solid and liquid.**	08

	Classification, **Structure of nematic and cholestic phases and itsApplication.** Colloidal State **Definition and classification of colloids,** **Solids in liquids (sols): properties- Kinetic,** **Optical and electrical;** **Stability of colloids,** **Protective action,** **Hardy-Schulz law,** **Gold number.** **Liquids in liquids (emulsions) types of emulsions,** **Preparation. Emulsifier.** **Liquids in solids(gels): its Classification, Preparationand properties** **General applications of colloids.**	
4	**Solid State** Definition of space lattice, Unit cell Laws of crystallography – (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Laws of symmetry. Symmetry elementsin crystals, X-ray diffraction by crystals. Derivation of Bragg. Equation. Determination of crystal structure *of* NaCI, KC1 and CsCI (Laue'c method and powder method.) Catalysis.characteristics of catalysed reactions, Classification of catalysis miscellaneous. Examples	08
5	Chemical Kinetics- **Chemical kinetics and its scope,** **Rate of a reaction,** **Factors influencing the rate of a reactionconcentration,** **Temperature,** **Pressure,** **Solvent, Light,** **Catalyst concentration dependence of rates,** **Mathematical characteristics of simple chemicalreactions- zero. order,** **Pseudo order,** **Half-life and mean life Determination of the order of reaction differential method,** **Method of integration,** **Method of half-life period and isolation method.** **Theories of chemical kinetics:** **Effect of temperature on rate of reaction Arrhenius equation,** **Concept of activation energy.** **Simple collision theory based on hard sphere model,** **Transition state theory(equilibrium hypothesis.)Expression for the rate constant based on**	08

	equilibrium	

	constant and thermodynamic aspects.	

Text Books/Reference Book:

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistyry, A.K. Chandra, Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R.McWeen y, ELBS.
5. Chemical Kinetics. K.J. Laidler, McGraw-Hill.
6. Kinetics and Mechanism of Chemical Transformation J.Rajaraman and J. Kuriacose, Mc Millan.
7. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.
8. Chemistry Yogbodh Prakshan.
9. Chemistry Navbodh Prakshan.
10. Advance Chemistry Physical Chemistry Gurdeep Raj

Lab Course:

BSCZBC	Total Marks: 50

Semester-I	Internal Marks: 20
Paper Code - BZBC103-P	External Marks: 30
Practical Physical Chemistry – I	No. of Hours: 30
	Total Credits: 01

Unit No.	Details	Nos. of Hours
1	1. Calibration of thermometer 2. Determination of melting point 3. Determination of boiling point 4. Determination of mixedmelting point 5. Preparation of solutions of various concentrations, NaOH, HCl, H_2SO_4. 6. To determine the velocity constant (specific reaction rate)of hydrolysis of methylacetate/ethyl acetate catalyzed by hydrogen ions at room temperature. 7. To study the effect of acid strength on the hydrolysis of an ester. 8. To compare the strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ester. 9. To study kinetically the reaction rate of decomposition of iodide by H_2O_2. 10. Determination of surface tension / percentage composition of given organic mixtureUsing surface tension method. 11. Determination of viscosity / percentage composition of given organic mixture using viscosity method	

Reference Book:

1. Advanced Practical Inorganic chemistry , Gurdeep Raj.
2. College, practical chemistry , V K Ahluwalia ,Dhingra & Gulati.
3. Advance Practical chemistry , Jagdamba Singh.
4. Unified Practical Chemistry – I , Navbodh .

BSCZBC		Total Marks: 100
Semester-I		Internal Marks: 30
Paper Code. (BZBC104)		External Marks: 70
Fundamentals of I.T.		No. of Hours: 60
		Total Credits: 02
Unit No.	**Details**	**Nos. of Hours**
1	**Fundamentals** Major components of a computer (Block diagram, A brief introduction of CPU, Main Memory, I/O units, RAM, ROM, Keyboard, display, mouse, printers etc). Hardware, Software, Secondary storage devices (harddisks, optical disks, flash memory), backup devices. Bootstrapping. Representation of Information, Number Systems-binary, octal, decimal and hexadecimal,ASCII, EBDIC, BCD Gray code, Unicode. Conversion of bases.	
2	**Algorithms** Concept of algorithm and flow chart. Writing simple algorithms and drawing flow charts for simple problems like finding sum, max, min, average of alist of numbers etc.	
3	**Operating System** Evolution of OS, Types of OS, Functions of OS. DOS- Internal & external commands.	
4	**Case study on any OS.** [No questions on theory paper will be set on these topics] System features, Software features, File structure, File handling, Installation of OS, Hardware & Software requirements.	
5	**Computer Networks** Data communication, Transmission Media- Coaxial, UTP, Optical-Fiber, Wireless, Components of Computer Networks, Types of wireless communication (mobile, WiFi, WiMAX, Bluetooth, Infrared –concept and definition only)	
6	**Internet** Evolution of internet, Basic internet terms(Client, Server, MODEM, Web page,Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & Offline), Internet applications (e-mail,search engines, ftp, VOIP,Video Conferencing, Audio-Video streaming, Chatting).	

7	**Computer Security** Definition, Viruses and Worms, Antivirus, Digital Signature, Software Piracy, Firewall. Hacking andCracking (basic concepts only for these topicswill have to be given).	

8	**Applications:** Office Automation, Railways, Airlines, Banking, Inventory Control, Education.	

Paper Code. (BZBC104-P)

English-I

(Subject Code- BZBC105**)**

Unit – I **08**

(I) K.BharatIyer 'The Ideals of Indian Art'
(II) Rabindranath Tagore 'Where the mind is without fear'

Unit – II **08**

(I) Vijay Tendulkar 'Silence: The court is in session'

Unit –III **08**

(I) Meanings and importance of Etiquettes

Unit – IV **08**

(I) Sentence Structure; Subject, Predicate, SVO, SVOO
(II) Verb
(III) Noun
(IV) Pronoun
(V) Articles

Unit – V **08**

(I) Letter-Writing : Formal letters, Informal letters, elements of letter writing, format of formal letter writing. Writing skills
(II) Paragraph Writing

Reference Books: 1.English language & Indian Cultureby M P Granth Academy.

SEMESTER-II

BZBC201

External Marks:70
Internal Marks: 30

Zoology- Cell Biology & Developmental biology

Unit-I

1. The cell
2. Prokaryotic & Eukaryotic cell.
3. General organization and ultra structure of cell
4. Compound Microscopy & Electron Microscopy

Unit-II

1. Plasma membrane structure (Fluid Mosaic Model) and function.
2. Cell organelles structure and functions
3. Nuclear organization of cells
4. Cell reproduction – Amitosis, mitosis, meiosis.

Unit-III

1. Gametogenesis
2. Fertilization
3. Patterns of cleavage
4. Parthenogenesis

Unit-IV

1. Organogenesis upto formation of three germinal layers in frog.
2. Embryology of chick and formation of extra embryonic membrane.
3. Fate map
4. Concept of regeneration

BZBC 201-P **External Term: 30**
Internal Marks: 20

Practical (BZBC 201-P)
(Cell Biology & Developmental biology)

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following.

1. To study the various stages of Frog embryology.
2. Slides of Cytology.
3. Cytological preparation- Onion root-tip "Squash Preparation" for mitosis,
4. Cytological preparation- Bar bodies.
5. Demonstration of Polytene Chromosomes in Chironomous larvae

BZBC 202 External Marks:70
Internal Marks: 30

Fungi, Pteridophyta, Gymnosperms and Angiosperm.

Unit- I

General account and classification of Fungi.Important features and life history of Achlya, Phytophithora, Erysiphe, Neurospora, Peziza, Puccinia, Ustilago, Alternaria. Heterothallism, Para sexuality and Sex hormones in Fungi Mushrooms Cultivation and Edible Fungi.

Unit-II

Pteridophyta- Characteristic feature and classification.Selaginella- General characters of order Selaginellales, life history of Selaginella. Equisetum- General characters of order- Equisetales, life history of Equisetum. Stellar system in Pteridophytes Homospory, Heterosory and seed habit.

Unit- III

Gymnosperms- Characteristic features and classification Specific characters of Gymnosperms, differences to Pteridophytes in Gymnosperms and classification. Fossil Gymnosperms; e.g. Lyginopteris, Lygenostoma.Morphology, Anatomy, Reproduction and Life cycle of Cycas. Morphology, Anatomy, Reproduction and Life cycle of Pinus. Morphology, Anatomy, Reproduction and Life cycle of Ephedra.

Unit- IV

Angiosperms- System of classification- Introduction, types of classification, Classification of Bentham & Hooker and its merits and demerits, classification of Eichler, Englar and Prantl`s system. The basic body plan of flowering plants.Diversities in Annual, Biennial and Perennial Plants. The Root system. The shoot System.

Unit- V

Vasculature Organization Monopodial and Sympodial Growth Vascular cambium and its functions – Formation of secondary xylem. Characteristics of growth rings, sap wood and Heart wood. Secondary phloem, cork cambium and periderm.

Reference Books:-

1. G.M. Smith 1971 Cryptogamic Botany-Vol-I Algae & Fungi Tata Mc Grew Hill pub. Co. New Delhi.
2. G.M. Smith 1971 Cryptogamic Botany-Vol-II Bryophytes & Pteridopjytes Tata Mc Grew Hill pub. Co. New Delhi.
3. O.P.Sharma 1990. Text book of Pteridophyta Mc. Millan India Ltd.
4. O.P.Sharma 1992. Text book of Thallophyta McGraw pub. Co. New Delhi.
5. P.D. Sharma 1991. The Fungi Rastogi & co. Meerut.
6. H.C. Dubey 1990. An introduction of Fungi, Vikas Pub. House Pvt. Ltd.
7. P. Puri 1980. Bryophyta Atma ram & sons Delhi.
8. A. Clifton 1958. Introduction to the Bacteria McGraw Hill Pub. Co. New Delhi.
9. Albert B.D.Lewis, J. Raff. M. Ruber. K. and Watson I. D. 1999. Molecular biology of Cell Garland pub. Co. Inc. New York, U.S.A.
10. Bhatanagar, S.P. and Moitra 1996. Gymnosperms. New Age International Ltd. New Delhi.
11. Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperm taxonomy. Oliver and Boyd, London.
12. G; fford, E.M. and Foster, A.S. 1988. Morphology and evaluation of Vascular plants. W.H. Freeman & Co., New York.

BZBC 202-P

External Term: 30
Internal Marks: 20

Fungi, Pteridophyta, Gymnosperms and Angiosperm

1. Study of the morphology, reproduction structures and anatomy of examples given in theory under fungi, bryophyte and pteridophya (*Mucor, Rhizopus, Aspergillus, Selaginella, Equisetum*).
2. Examination of permanent slides of Gymnosperms material and their identification.
3. Sectioning and double staining glycerine mounts of *Pinus* needle.
4. Sectioning and double staining glycerine mounts of *Cycas* leaflet.
5. Sectioning and double staining of dicot stem.
6. Section cutting and staining of monocot stem.
7. Examination of permanent slides of monot and dicot leaf and their identification.
8. Studying of branching patterns/plant forms.
9. Spotting
10. Project
11. Sessional

BSCZBC	**Total Marks: 100**
Semester-2	**Internal Marks: 30**
Paper Code. BZBC203	**External Marks: 70**
Inorganic Chemistry – I	**No. of Hours: 40**
	Total Credits: 02

Unit No.	**Details**	Nos. of Hours
1	**Atomic Structure** Idea of de Broglie matter waves, Heisenberguncertainty principle, Atomic orbitals, Shapes of s, p, and d orbitals Schrödinger wave equation, Quantum numbers, Aufbau and Pauli exclusion principles, Hund.s multiplicity rules, Electronic configurations of the elements, **Periodic Properties** – Definition, Method of determination, Trends in periodic Table . Atomic and ionic radii, Ionization energy, Electron Affinity Electronegativity:	10
2	**Chemical Bonding** Covalent bond- valence bond theory and itslimitations, Directional characteristic of covalent bond, Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theorywith example Molecular Orbital theory for homonuclear andheteronuclear (CO and NO) diatomic molecules, Bond strength and the bond energy Weak interactions - hydrogen bonding, Vander Waalsforces	9

3	**Ionic Solids** Ionic structures, Radius ratio effect and coordination number, Limitation of radius ratio rule, Lattice defects, Semiconductors, Lattice energy and Born-Haber cycle, Solvation energy and solubility of ionic solids, Polarizing power and polarizability of ions. Fajan.s rule, Metallic bond free electron, Valance bond and Band theories	8
4	p-Block Elements **Comparative study (including diagonal relationship**	7

	and properties) of groups 13-17 elements , Compounds like hydrides, Oxides, Oxyacids Halides Group 13-16 Hydrides of boron-diborane and higher boranes. Borazine,	
5	**p-Block elements** Fullerenes, Carbides, Fluorocarbons, Silicates (structural principle), Interhalogens. Properties of inert gases, Chemistry of xenon, Structure and bonding in xenon compounds.	**6**

Reference Book:

1. Advanced Inorganic Chemistry, F.A. Cotton and W ilkinson, John Wiley.
2. Selected topics in inorganic chemistry, Dr.Wahid U.malik , Dr.G.D.tuli , Dr. R.D. Madan.
3. Inorganic Chemistry, J.E. Huhey, Harpes& Row

Text Books:

1. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.
2. Chemistry Yogbodh Prakshan.
3. Chemistry Navbodh Prakshan.

BSCZBC		Total Marks: 50
Semester -II		Internal Marks: 20
Paper Code. BZBC 203P		External Marks: 30
Inorganic Chemistry – I-P		No. of Hours: 30
		Total Credits: 01
Unit No.	**Details**	**Nos. of Hours**
1	**Practical** Macro/semi-micro analysis- Cations, anions (zero to VI group) with interfering radicals. 1. Separation of cations by paper chromatography. 2. Preparation of ferrous alum.	**30**

Reference Book:

1. Advanced Practical Inorganic chemistry , Gurdeep Raj.
2. College, practical chemistry , V K Ahluwalia ,Dhingra & Gulati.
3. Advance Practical chemistry , Jagdamba Singh.
4. Unified Practical Chemistry – I , Navbodh .

BSCZBC	**Total Marks: 100**
Semester-II	**Internal Marks: 30**
Paper Code. BZBC204	**External Marks: 70**
Organic Chemistry – I	**No. of Hours: 40**
	Total Credits: 02

Unit No.	**Details**	Nos. of Hours
1	**I Structure and Bonding** Hybridizations, Bond lengths and bond angles, Bond energy Resonance Hyperconjugation, Inductive and field effects, Hydrogen bonding, **Mechanism of Organic reactions**: Homolytic and heterolytic bond breaking Electrophiles and nucleophiles. Types of organic reactions. Reactive intermediates- carbocations, Carbanions, Free radicals and carbenes. Methods of determination of reaction mechanism.	06
2	**Stereochemistry** Concept of isomerism, Types of isomerism, Optical isomerism, Elements of symmetry, Molecular chirallity, Enantiomers, Optical activity, Distereoisomers, Mesocompound Walden Inversion Relative and absolute configurations, Sequence rules, D & L, R & S systems of nomenclature, Nomenclature E and Z system Conformational analysis of ethane and n-butane. Conformations of cyclohexanes,	08
3	Alkanes, Cycloalkanes and Aromaticity **IUPAC nomenclature,** **Classification,** **Isomerism in alkanes,** **Sources, and methods of preparation (with specialreference to Wurtz, Kolbe.reaction.**	08

	Corey.House reaction. **Reactions and decaroxylation of carboxylic acids,** **Physical properties and chemical reactions of alkanes.** **Cycloalkanes:** **Nomenclature,** **Methods of preparations,** **Chemical reaction** **Bayer.s strain theory and its limitations** **Structure of benzene molecular formula and Kekule structure.** **Resonance structure.** **MO picture.** **Aromaticity the Huckel rule,** **Aromatic electrophilic substitution general pattern of themechanism,** **Mechanism of nitration,** **Halogenation.** **Sulphonation.** **Mercuration and Friedel-Crafts reaction .**	
4	Alkenes , Dienes and alkynes **Nomenclature of alkenes,** **Methods of formation,** **Mechanisms of dehydration of alcohols anddehydrohalogenation of alkyl halides,** **Regio-selectivity in alcohol dehydration the Saytzeff rule,** **Electrophilic and free radical additions,** **Markownikoff.s rule,** **hydroboration-oxidation oxymercuration reduction,** **Epoxidation,** **Ozonolysis,** **Hydration,** **Hydroxylation and oxidation with KMnO4,** **Polymerization of alkenes,** **Industrial applications of ethylene and propene** **Dienes:** **Structure of butadiene,** **Methods of formation,** **Chemical reactions-1,2 and 1,4 additions,** **Diels Alder reaction.** **Nomenclature,** **Structure and bonding in alkynes.** **Methods of formation.**	10

	Chemical reactions of alkynes, Acidity of alkynes, Mechanism of electrophilic and nucleophilic additionreactions,	
5	**Alkyl and Aryl Halides** Nomenclature and classes of alkyl halides, Methods of formation, Chemical reactions mechanims of nucleophilic substitutionreaction of alkyl halides, SN2 and SN1 reactions,with energy profile diagrams. **Polyhalogen compounds:** Chloroform, Carbon tetrachloride. Methods of formation of aryl halides, Synthesis and uses of DDT and BHC, Freon.	**08**

Reference Books:

4. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.
5. Chemistry YogbodhPrakshan.
6. Chemistry NavbodhPrakshan.
7. Selected topics of organic chemistry,Morrison &Boyd.
8. Stereochemistry of organic compounds,P.S.Kalsi.

BSCZBC		Total Marks: 50
Year-I		Internal Marks: 20
Paper Code. BZBC204-P		External Marks: 30
Organic Chemistry – I		No. of Hours: 30
		Total Credits: 01
Unit No.	**Details**	**Nos. of Hours**
1	1. Distillation 2. Crystallization 3. Decolourasation and crystallization using charcoal 4. Sublimation 5. Detection of elements (N, S and halogens) 6. Functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates,amines, amides, nitro and aniline) in simple organic compounds.	

Reference Book:

5. Advanced Practical organic chemistry ,o.p .Agrawal.
6. College, practical chemistry , V K Ahluwalia ,Dhingra & Gulati.

7. Advance Practical chemistry , Jagdamba Singh.
8. Unified Practical Chemistry – I , Navbodh .
9. Unified Practical Chemistry – I , M.N.Tandon Shivlal publication.
10. Unified Practical Chemistry – I , R.P.Bhatnagar Arun publication.

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Paper Code. BZBC-205	

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SEMESTER-III

BZBC **301**

Zoology- Genetics

Unit -I: Heredity & Variation, Gene Expression

1. Chromosome: The physical basis of heredity and transmitters of heredity.
2. Types of Chromosomes: Lamp brush, Salivary gland and Beta Chromosome.
3. Nucleocytoplasmic interaction
4. Heredity and variation: Sources of variation Genotype, Phenotype and Environmental variation (Elementary idea)
5. Gene Expression: Regulation of protein synthesis, transcriptions in Prokaryotes and Eukaryotes.
6. Gene Expression: Translation, Operon model.

Unit -II: Linkage and Chromosomal Aberrations

1. Gene linkage: Kinds and Theories of linkage, significance of linkage.
2. Gene linkage: Mechanism of genetic recombination; linkage maps
3. Sex Chromosome System: Sex differntiation. Chromosome theory of sex determination.
4. Sex linked inheritance (Haemophilia, colour blindness)
5. Structural changes in chromosomes.
6. Numerical changes in chromosomes.

Unit -III: Human Genetics & Genetic Engineering

1. Human chromosomes and maps.
2. Common genetic diseases in man (Sickel cell anaemia, Albinism and Alkaptoneuria)
3. Multiple factors and blood groups.
4. Twins, physical traits, mental traits.
5. Techniques used in recombinant DNA technology.
6. Gene cloning and Polymerase chain Reaction (PCR).

Unit - IV: Cytoplasmic Inheritance, Nature and Functions of Genetic Material

1. Cytoplasmic inheritance: Material effect on Limnea (Shell Coiling), Carbondioxide sensitivity in Drosophilla and Kappa particles in Paramecium.
2. Chemistry of Gene: Nucleic Acids and their structure.
3. Concept of DNA replication.
4. Nucleosome (Solenoid model)
5. Split genes, overlapping gene and Pseudogenes.
6. Genetic Code.

Unit -V: Mutation and Applied Genetics

1. Types of mutation
2. Causes of mutation
3. Mutangens- Classification, Types and effects
4. Gene Therapy

5. DNA finger printing

BZBC301-P

External Marks: 30
Internal Marks: 20

Genetics Practical

Genetics:-

Practical-

1. Histological study of various endocrine glands, digestive organs, testis, ovary, kidney, lung, muscles, pancreas & liver.
2. Counting of RBC and WBC in blood sample.
3. Estimation of haematocrit value, bleeding time
4. Study of human salivary activity in relation to pH
5. pH determination by pH meter/pH paper
6. Use of Kymograph
7. Detection of protein, carbohydrate and lipids
8. Human blood groups
9. Detection of nitrogenous waste product in fish tank water, frog tank water, Bird excreta, mammalian kidney
10. Squash preparations of Onion root tip/ Chironomus salivary gland/Grasshopper testis
11. O2 Consumption in Fish
12. Problems on Genetics

BZBC302 External Marks:70

Internal Marks: 30

Cell Biology & Genetics

Unit I

Concept of Cell, Cell organization, Structure and function of Cell wall and Plasma Membrane, Structure and function of cell organelles: Goglibody, Endoplasmic reticulum Lzsozomes, Peroxisomes, Vacuoles, Chloroplast, Mitochondria.

Unit II

Structure and function of nucleus; Ultra structure of nuclear membrane; Nucleolus; Extra nuclear genome, Mitochondrial and plastid DNA; Plasmids, Chromosome Structure: Morphology, chemical nature. Organization: Nucleosome model; special types of chromosomes-Polytene and Lampbrush chromosome, Sex chromosome; Cell cycle: Mitosis and Meiosis.

Unit III

Variation in chromosomes structure: Deletions, duplications, translocations, inversions; Variations in chromosome number: Aneuploidy and polyploidy. DNA as a genetic material, its structure and replication; Structure and types of RNA; Satellite and repetitive DNA.

Unit IV

Structure of Gene; Genetic code; Transfer of genetic information-transcription and translation; Protein synthesis; RNA and ribosomes, Regulation of Gene-Expression in prokaryotes and eukaryotes; Protein: structure and function.

Unit V

Genetic inheritance: Mendelism-laws of segregation and independent assortment;

Linkage and crossing over; Allelic and non-allelic interactions of genes, Genetic variations: Mutation-spontaneous and induced; Transposable genetic elements; DNA damage and repair.

Reference Books:

1. G.M.Smith 1971 Cryptogunle Botany. Vol I. Algae & Fungi Tata McGraw Hill Pub. Co.New Delhi.
2. A.Clifton 1958 introduction to the Bacteria McGrew Hill Pub. Co.New Delhi.
3. Biology of Cell Garland Pub. Co.Inc. New York, USA.
4. Atherly,A.G., Girton, J.R. and McDonald, J.F. 1999 the Science of Genetics, Saunders College Pub. Fort Worth, USA.
5. P.K.Gupta 1999 A text Book of Cell and Molecular Biology, Rastogi Pub. Meerut India.
6. Kleinsmith L.J. and Kish V.M. 1995 Principles of Cell and Molecular Biology (2nd edition) Harper Collins College pub. New York USA.
7. P.K.Gupta Gentic's Rastogi Pub. Meerut.
8. Sinha & Sinha cytogenetics & plant Breeding Vikas Pub.

BZBC302-P

External Marks: 30
Internal Marks: 20

BOTANY: BZBC302-P

(Cell Biology & Genetics)

Practical

1. To study cell structure from Onion leaf peels; demonstration of staining and mounting methods.
2. Comparative study of cell structure in Onion cells, *Hydrilla* and *Spirogyra*.
3. Study of cyclosis in *Tradescantia* staminal cells.
4. Study of plastids to examine pigment distribution in plants (e.g. species of *Cassia*, *Lycopersicon* and *Capsicum*).
5. Examination of transmission electron micrographs (TEM)of eukaryotic cells with special reference to organelles.
6. Study of transmission electron micrographs (TEM) of viruses, bacteria, cyanobacteria and eukaryotic cells for comparative cellular organization.
7. Examination of various stages of mitosis in onion root tip
8. Examination of various stages of meiosis onion/*Tradeschantia* flower buds.
9. Cytological examination of special types of chromosomes: Bar body, Lampbrush and Polytene chromosomes.
10. Working out the Mendel's laws of inheritance.
11. Spotting
12. Project

13. Sessional

BZBC303

External Marks: 70
Internal Marks: 30

Physical Chemistry II

UNIT -I

Thermodynamics I

Definition of thermodynamic terms: system, surroundings etc. Types of systems, Intensiveand extensive properties. State and path functions and their differentials. Thermodynamicprocess. Concept of heat and work. First law of thermodynamics : statement, definition of internal energy and enthalpy. Heat capacity, heat capaciies at constant volume and pressure and their relationship. Joule's law, Joules - Thomson coefficient and inversion temperature. Calculation of W, q, dU and dH for the expansion of ideal gases under ideal isothermal and adiabatic conditions for reversible process. Thermochemistry : Standard state, standard enthalpy of formation, Hess' law of heat summation and its applications. Heat of reaction at constant pressure and constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchhoff's eqn.

UNITII

Thermodynamics ll

Second law of thermodynamics: need for the law, different statements of the law. Camotcycle and its efficiency, Camot thecrem, Thermodynamic scale of temperature.Concept of entropy. entropy as a state function, entropy as a function of V & T, entropy asa function of P & T, entropy change in physical change, Clauslus inequality; entropy as acriteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.Third law of thermodynamics: Nemsl heat theorem, statement and concept of residualentropy, evaluation af absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function {G} and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynarnic equilibrium and spontaneity, their advantage over entrapy change. Variation of Gand Awith P, Vand T.

UNIT III

Chemical Equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle.Reaction isotherm and reaction isochore — Clapeyron equation and Clausius -Clapeyron equation, applications.

Phase Equilibrium

Statement and meaning of the terms — phase, component und degrees of freedom,derivation of Gibbs phase rule, phase equilibria of one component system — water, CO;and S systems.Phase equilibria of two component system — solid-liquid equilibria, Solid solutions - compound formation with congruent melting point (Mg-Zn} andincongruent melting point with examples .Liquid — liquid mixtures « keal liquid mixtures, Raoult's and Henry's law. Non-idealsystem-azeotropes — HCHO and ethanol = water systems.Partially miscible liquids with example Lower and upper consolute temperature. Nernst disinbution law — thermodynamic derivation, app

UNITIV

Electrochemistry I

Electical transport conduction in metals and in electrolyte solutions, specific conductancesnd equivalent conductance, measurement of equivalent condustance, vardation ofequivalent and specific conductance with dilution.Migration of lons and Kohlrausch law, Arrhenius theory of electrolyte dissociation and fislimitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations.Dabye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only).Transport number, definition and determination by Hittorf method and moving boundarymethod.Applications of conductivity measurements: determination of degree of dissociation,determination of K, of acids, determination of solubility product of a sparingly soluble salt,conductometric titrations.

UNIT V

Electrochemistry Il

Types of reversible electrodos - gas-metal lon, metal-metal ion, metal-insoluble salt-anionand redox electrodes. Electrode reactions, Nemst equation, derivation of cell E.M.F. andsingle electrode potential, standard hydrogen: electrode-reference electrodes- standardelectrode potential, sign conventions, electrachemical series and its significance.Electrolytic and Galvanic cells — reversible and Irreversible cells, conventional representation of electrochemical cells.EMF of a cell and its measurements. Computation of cell EMF, Calculation ofthermodynamic quantities of cell reactions (AG, AH and K), polarization, over potential and hydrogen overveliage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of lans. solublity product and activity coefficient,potentiometric titrations.Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.Buffers — mechanism of buffer action, Hendarzon-Hazel equation. Hydrolysis of salts.Corrosion = types, theories and methods of combating it.

BZBC303-P

External Marks: 30
Internal Marks: 20

PHYSICAL CHEMISTRY (PRACTICALS)

Transition Temperature

1. Determination of the transition temperature of the given substance by thermometric/dialometric method (e.g. MnCl.2HQrSrBra.2H,0).

Phase Equilibrium

1. Tostudy ihe effect of a solute (8.g. NaC, succinic acid) on the critical solution temperatura of two padially miscibla liquids (0.9. phenolwater systar) and to daotarmino the concentration of that solute in the given sheral-water systam.
2, To corstrct the phase diagram of two component (e.g. diphenylamine benzophenone) system by ceoling curve method.

Thermochemistry

1, To determne the solubility of benzoic acid at different temperatures and Ic datermine 4H of the dissolution process.
2. To determine the enthalpy of neutralisation of a weak acid/weak base versLs strong base/strong avid and determine the enthalpy of ionisation of the weak avid'weak base.
3. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of caicium chloride from ts enthalpy data using Born Haber cycle.

Reference Books:

1. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.
2. Chemistry Yogbodh Prakshan.
3. 3.Chemistry Navbodh Prakshan.
4. Organic Chemistry, Bahl and Bahl, S.Chand Publication
5. Advanced Physical Chemistry, Gurdeep Raj.
6. Inorganic Chemistry by Gurdeep Raj.

BSCZBC		Total Marks: 100
Semester – III		Internal Marks: 30
Paper Code. BZBC **304**		External Marks: 70
English-II		No. of Hours: 60
		Total Credits: 02
Unit No.	**Details**	**Nos. of Hours**
I	**(I)** S.C. Dubey 'Basic Quality of Life' **(II)** Toru Dutt 'Sita'	
II	**(I)** E.L. Turnbull 'Rana Pratap'	
III	**(I)** Tense **(II)** Preposition **(III)** Adjective **(IV)** Adverb **(V)** Punctuation **(VI)** Conjunction	
IV	**(I)** Voice : Active and Passive **(II)** Direct Narration **(III)** Indirect Narration	
V	**(I)** Comprehension **(II)** Précis Writing	

Reference Books:

English Grammar and Composition – Wren & Martin

(Subject Code- BZBC**305)**

SOFT SKILLS AND PERSONALITY ENHANCEMENT

Unit – I

(I) Team Building – The magic of synergy, characteristics of an effective team, essentials of an effective team, Team Dynamics, Team Leading, Managing a Team.

(II) Art of Negotiation –To understand what is negotiation, Ways of negotiating and being successful in it, To understand the power of language and non-verbal communication.

(III) Grooming –To learn selection of proper attire as per the place, Practiced perception, How to carry one's self, How to project one's self in the positive frame and spirit.

Unit – II

(I) Organising Meetings – How to announce, call and organize a meeting in a smooth manner, How to design Agenda and prepare Minutes of Meeting

(II) Telephonic Etiquettes –Learn the tone and pitch of voice while speaking over phone, How to send a voice mail.

(III) Business Etiquettes –What does business etiquettes mean, Professional and Cultural expectations, Effective writing, Corporate Communication, Interaction with foreign clients.

Unit –III

(I) Stress Management –Types of stress, Symptoms and causes of Stress, Power of perception, Reaction to stress, Stress Management techniques.

(II) Time Management – Importance of Time Management, Prioritising Tasks, Goal setting, Barriers to Time Management , Planning Routine and Time Tables.

(III) Self Management –Self evaluation, Self discipline, Self criticism, SWOT analysis, Self Awareness, Development of the Self.

Unit – IV

(I) Presentation Skills –How to prepare a presentation, Knowing the audience and their requirements, Effective ways to deliver presentation, How to prepare Multimedia presentation.

(II) Organisational Skills – How to understand the nature and structure of organisation, To understand hierarchy and communication channel of the organisation, Clarity about the roles and responsibilities in an organisation, How to be a team member, How to draft reports

(III) Leadership Skills

Unit – V

(I) Group Discussion – Understanding the nature of discussion, Difference between debate and discussion, Ways to form and present arguments, Ways to defend your point.

(II) Personal Interview –To learn the skills of appearing in an interview and being successful in it.

(III) Public Speaking – Art of public speaking, To know the rhetoric of making a public speech, exploring rhetorical elements through various ideas..

(IV) Conference and Meeting, Participation and Technical clarity in conference and meeting, Learning to listen and respond, Final Report drafting.

Reference Books:-

1. Soft Skill for everyone –Jeff Butterfield
2. Soft Skill for-S.I. Hariharan -MJP Publications
3. Personality Development & Soft skill – Goyal Brothers Prakasan

SEMESTER-IV

BZBC401 External Marks:70
Internal Marks: 30

Animal Physiology

Unit -I: Nutrition, Metabolism

1. Physiology of Digestion
2. Metabolism of Protein
3. Metabolism of Carbohydrate
4. Metabolism of Fat

Unit -II: Respiration

1. Kinds of organs of respiration (vertebrates)
2. Mechanism of respiration
3. Physiology of respiration (transport of gases, chloride shift)
4. Properties and function of respiratory pigments

Unit -III: Regulatory Mechanism and Enzymes

1. Osmoregulation
2. Physiology of Excretion- Urea and Urine formation
3. Thermoregulation
4. Defimnition and nomination of enzymes; classificaiton of enzymes
5. Mechanism of enzyme action

Unit - IV: Neuromuscular Co- ordination

1. Structure and properties of nervous tissue
2. Physiology of nerve impulse conduction
3. Types of muscles and their properties
4. Ultra structure of muscles
5. Theory of muscle contraction and its biochemistry

Unit -V: Endocrine and Reproductive System

1. Structure and function of pituitary gland
2. Structure and function of thyroid gland
3. Structure and function of adrenal gland
4. Structure and function of parathyroid, thymus and islets of langerhan's
5. Physiology of reproduction in mammals.

List of Recommended Books:

1. Verma, P.S. and V.K. Agrawal, Genetics, S.Chand & Co.
2. Lewis,C.D. and Lewin, R., Biology of Gene, McGraw Hill, Toppan Co. Ltd.
3. Gunther S.Stent, Molecular Genetics, Macmillan Publishing Co. Inc.
4. Goodernough. V., Genetics, New York Holt, Rinchart and Winston.
5. Gardner, Principles of Genetics, Wiley Eastern Pvt. Ltd.
6. Winchester, Genetics, Oxford IBH Publicaions.
7. Stickberger, Genetics, Macmillan Publications.
8. Pai, A.C., Foundation of Genetics, McGraw Hill Publications.

9. Gupta P.K. Genetics Rastogi Publications.
10. izkf.kfoKku] izdk'ku] e- iz= fgUnh xzaFk vdknehA

BZBC401-P

External Marks:30
Internal Marks: 20

Animal Physiology:-

Practical -

1. Histological study of various endocrine glands, digestive organs, testis ,ovary ,kidney ,lung ,muscles, pancreas, liver.
2. Detection of gramnegative and gram positive bacteria.
3. Blood group detection (A,B,AB,&O)
4. Counting of RBC and WBC in blood sample.
5. Detection of protein, carbohydrate and lipids.
6. Detection of nitrogenous waste products in fish tank water ,frog tank water ,bird excreta.
7. Squash preparation of onion root tip ,chironomous salivary gland .
8. osmoregulation in fish .

BZBC402 External Marks:70

Internal Marks: 30

Diversity, Systematic, Structure Development and Reproduction in Flowering Plant

Unit I

Origin and Evolution of Angiosperms, Taxonomic concepts, Processes and principles, Botanical Nomenclature Taxonomic ranks.

Unit II

Modern trends in Taxonomy – Cytology, Phytochemistry Embryology Taximetrics etc. Systematic Institutions - Taxonomic literature, Herbarium, Botanical garden.

Unit III

Leaf Origin, development, arrangement and diversity in size and shape; internal structure in Relation to Photosynthesis and water loss; adaptations to water stress; senescence and abscission. Flower: Concept of flower as a modified shoot, structure of anther, Microsporogenesis, formation of pollen grains (male gametophyte), structure of pistil, ovules, Megasporogenesis, Study of different types of embryosac (female gametophyte).

Unit IV

Diagnostic characteristic and economic importance of Ranunculaceae Brassicaceae, Malvaceae, Rutaceae, Apiaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphoricaceae and Liliaceae.

Unit V

Attraction and rewards for pollinators, pollen pistil interactions. Mechanism and agencies of pollination, pollen germination and pollen tube growth self incompatibility, Double fertilization, Development of endosperm and embryo in monocotyledons and dictyledons, Fruit development and maturation.

Seed: Significance of seed dormancy, ecological adaptation, dispersals strategies, vegetative reproduction, vegetative propagation, grafting, economic aspects.

Reference Books:-

1. G.M.Smith 1971 Cryptogunle Botany. Vol I. Algae & Fungi Tata McGraw Hill Pub. Co.New

Delhi.
2. G.M.Smith 1971 Cryptogunle Botany. Vol II. Bryophytes & Pteridophytes. Tata McGrew Hill Pub. Co.New Delhi.
3. O.P.Sharma 1992 Text book of Thallophytea. McGrew Hill Pub. Co.
4. O.P.Sharma 1990 Text book of Pteridophyta. Mcmillan India ltd.
5. P.D.Sharma 1991. The Fungi Rastogi & Co.Meerut.
6. H.C.Dubey 1990 Anintroduction of fungi. Vikas Pub.house pvt.
7. P.Puri 1980 Bryophyta Atma Ram & Sons ,Delhi.
8. A.Clifton 1958 introduction to the Bacteria McGrew Hill Pub. Co.New Delhi.
9. Alberts B.D.Lewis, J.Raff, M.Ruberts, K. and Watson I.D. 1999 Molecular
10. Biology of Cell Garland Pub. Co.Inc. New York, USA.
11. Atherly,A.G., Girton, J.R. and McDonald, J.F. 1999 the Science of Genetics, Saunders College Pub. Fort Worth, USA.
12. P.K.Gupta 1999 A text Book of Cell and Molecular Biology, Rastogi Pub. Meerut India.
13. Kleinsmith L.J. and Kish V.M. 1995 Principles of Cell and Molecular Biology (2nd edition) Harper Collins College pub. New York USA.
14. P.K.Gupta Gentic's Rastogi Pub. Meerut.
15. Sinha & Sinha cytogenetics & plant Breeding Vikas Pub.
16. Heywood, V.H. and Moore, D.M.(eds) 1984. Current concepts in plant taxonomy. Academic press London.
17. Jeffery, C.1982. An Introduction to plant taxonomy. Cambridge University Press Cambridge, London.
18. Jones,S.B.Jr. and Luchsinger, A.E.1986. plant systematics (td edition). McGraw Hill Book Co. New York.
19. Maheshwari,J.K.1963 Flora of Delhi, CSIR, New Delhi.
20. Radford,A.E.1986. Fundamentals of plant systematics. Harper and Row, New York.
21. Singh G.1999. Plant systematics: Theory and Practice. Oxford and IBH pvt.Ltd.New Delhi.
22. Sporne, K.R.1965 The Morphology of Gymnosperms. Hutchinson & Co. pub. Ltd., London.
23. Stewart, W.m. 1983. Paleobotany and the evolution of plants. Cambridge University Press Cambridg

BZBC402-P

External Marks: 30
Internal Marks: 20

BOTANY: BZBC**402-P**

Diversity, Systematic, Structure Development and Reproduction in Flowering Plant

1. Study of representative plants of family Ranunculaceae, Brassicaceae, Malvaceae.
2. Study of representative plants of family Rutaceae, Apiaceae, Asclepidaceae,
3. Study of representative plants of family Solanaceae, Limiaceae, Euphorbiaceae and Liliaceae.
4. Study of different types of leaves.
5. Study Arrangement of leaves.

6. Internal structure of monocot and dicot leaves.
7. Study of Pollen-grains of different species.
8. Study dehiscence mechanism in anthers of various seasonal flowers.
9. Study of different types of fruits.
10. Vegetative propagation, grafting, layering etc.
11. Spotting
12. Project
13. Sessional

BZBC403

External Marks: 70
Internal Marks: 30

Inorganic Chemistry —II

UNIT I

Chemistry of Elements of First Transition Series
Characteristic properties of d-block elements.Properties of the elements of the first transition series, their binary compounds andcomplexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT lI

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation sates, magnetic behaviour, speciral properties and stereochemistry

UNIT III

Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

Oxidation and Reduction

Use of redox potential data — analysis of redox cycle, redox stability in water — Frost,Latimer and Pourbaix diagrams. Principles Involved in the extraction of the elements,

UNIT IV

Electronic structure, oxidation states and ionic radii and lanthanide contraction, Complex formation, occurrence and isolation, lanthanide compounds.

Chemistry of Actinides

General features and chemistry of actinides, chemistry of separation of Np, Pu and Amtrom U, similarities between the later actinides and the later lanthanides

UNIT V

Acids and Bases

Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Non-aqueous Solvents

Physical properties of a solvent. types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NHs and liquid SQ,.

BZBC403-P

External Marks: 30
Internal Marks: 20

INORGANIC CHEMISTRY (PRACTICALS)

Calibration of fractional weights, pipettes and bureties. Preparation of standard solutions.Dilution- 0.1 M lo 0.001 M solutions.

Quantitative Analysis

Volumetric Analysis

{a} Determination of acetic acid in commercial vinegar using NaOH

{b) Determination of alkali content - antacid tablet using HCL.

(c) Estimation of calcium contant in chalk as calcium oxalate by permanganometry.

{d) Estimation of hardness of water by EDTA.

(e} Estimation of ferrous and ferric by dichromate method.

{f) Estimation of copper using thiosulphate.

Gravimetric Analysis

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime).

BZBC 404

External Marks: 70
Internal Marks: 30

Organic Chemistry —II

UNIT I

Electromagnetic Spectrum: Absorption Spectra 10 Hrs

Ultraviolet (UV) absorption spectroscopy — absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophores and auxochrome. Bathochromic, hypsochromic,hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy — molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT II

Alcohols 6 Hrs

Classification and nomenclature. Monohydric alcohols --- nomenclature, methods of formation by reduction of aldehydes,ketones, carboxylic acids and esters. Hydrogen bonding, Acidic nature. Reactions of alcohols. Dihydric alcohols — nomenclature, methods of formation, chemical reactions of vicinal glycols and pinacol-pinacolone rearrangement.Trihydric alcohols — nomenclature and methods of formation, chemical reactions of glycerol.

Phenols 6 Hrs

Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution, acylation and carboxylation, Fries rearrangement, Claisen rearrangement,Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manashe reaction and Reimer-Tiemann reaction.

UNIT III

Aldehydes and Ketones 10 Hrs

Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, Synthesis of aldehydes and ketones using 1.3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties.

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, MPV, Clemmensen, Wolf-Kishner reaction, LIAIH4, and NaBH.

UNITIV

Carboxylic Acids . 4 Hrs

Nomenclature, structure and bonding, physical properties. acidity of carboxylic acids,effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-

Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation.Methods of formation and chemical reactions of halo acids. Hydroxy acids: malic, tartaric and citric acids.

Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

Carboxylic Acid Derivatives 4 Hrs

Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides. Relative stability of acyl derivatives. Physical properties, Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).

UNIT V

Ethers and Epoxides 6 Hrs

Nomenclalure of ethers and methods of their formation, physical properties. Chemical reactions — cleavage and autoxidation, Ziesal's method. Synthesis of epoxides, acid and base catalysed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Organic compounds of Nitrogen

Preparation of Nitroalkanes and Nitroarenes, chemical reactions of nitroalkanes, mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, basic and neutral medium. Picric acid.

BZBC404-P

External Marks: 30
Internal Marks: 20

ORGANIC CHEMISTRY (PRACTICALS)

Chromatography method of separation:

01. Separation and identification of amino acids by thin layer chemistry.
02. To study the separation of amino acids by column method chromatography.

Detection of organic functional group and preparation of suitable solid derivative

03. To identify the functional group in the given unknown organic compound and to prepare its derivative (Alcohol and Phenol)
04. To identify the functional group in the given unknown organic compound to prepare its derivative (aldehyde).
05. To identify the functional group in the given unknown organic compound to prepare its derivative (carboxylic acid)
06. To identify the functional group in the given unknown organic compound to prepare its derivative (aniline)
07. To identify the functional group in the given unknown organic compound to prepare its derivative (nitro benzene)
08. To identify the functional group in the given unknown organic compound to prepare its derivative (urea)

Preparation of some organic compounds:

09. Preparation of acetyl salicylic acid from salicylic acid.
10. Preparation of para bromoaniline from acetanalide.

(Subject Code- BZBC**405)**

Lukrd	**dy vd & 100**
prFk lseLVj	**vkrfjd eY;kdu &30**
fgUnh Hkk"kk&2	**ckg; eY;kdu&70**

bdkbZ &1 **08**

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1- if'peh fgUnh 2- iwohZ fgUnh

3- jkt LFkkuh 4- fcgkjh 5- igkMh

bdkbZ &2 **08**

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bdkbZ &5 **08**

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1- fgUnh Hkk"kk dk mnHko vkSj fodkl& mn; ukjk;.k frokjh

2- ukxjh fyfi vkSj mldh leL;k,¡& ujh'k feJ

3- ukxjh fyfi vkSj fgUnh oruh& fcgkj fgUnh xzFk] vdkneh] iVuk

4- jk"VHkk"kk vkSj jk"Vh; ,drk& fnudj] mn;kpy] iVuk

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6- jk"VHkk"kk vkSj fgUnh & jktUn eksgu HkVukxj] d-gh- lLFkku] vkxjk

SEMESTER- V

BZBC 501

External Marks:70
Internal Marks: 30

Applied Zoology

Unit -I Aqua Culture:

1. Definition, scope and significance of aquaculture.
2. Prawn culture.
3. Pearl culture.
4. Edible Oyster culture.
5. Frog culture.

Unit -II Pisciculture

1. General account of freshwater edible fishes.
2. Carp culture.
3. Maintenance of aquarium.
4. Plankton and their role in fisheries.
5. Elementary knowledge of poly-culture.

Unit -III Economic

General account of:-

2 Sericulture
3 Apiculture
4 Lac culture
5 Common pests of oil seeds, vegetables and stored grains.
6 Biological control of insect-pests.

Unit -IV Toxicology

3. Toxicology: Basic concept.
4. Toxicity testing LC50, LD50 acute and chronic toxicity.
5. Heavy metal toxicity (mercury, cadmium and lead).
6. Pesticides and their toxicological effects.
7. Occupational health hazards and their control.

Unit -V Lab Techniques

1. Study of pH meter and chromatography.
2. Microtomy.
3. Preparation of fixatives, stains and regents.

Museum keeping - Preservation and skeleton preparation, taxidermy

BZBC 501-P

External Marks: 30
Internal Marks: 20

Applied Zoology

Practical Work

1,Study of specimen on the theory paper.
2,study of prepared slides histological.
3,study of aquaculture ,aquarium maintenance.
4,study of sericulture and apiculture.
5, elements of pest control:-chemical control and biological control.
6,study of toxicity elements (Hg,Pd)
7,study of pH meter ,chromatography, microtomy

BZBC502

External Marks: 70
Internal Marks: 30

Plant Physiology, Biochemistry and Biotechnology

Unit 1

Plant-water relations: Importance of water to plant life; physical properties of water; diffusion and
osmosis; absorption, transport of water and transpiration; physiology of stomata.

Mineral nutrition: Essential macro-and micro-elements and their role; mineral uptake; deficiency
and toxicity symptoms.

Transport of organic substance: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

Unit 2

Photosynthesis: Significance: historical aspects; photosynthetic pigments; red drop and enhancement effect; concept of two photosystems; Z-scheme; photophosphorylation C3cycle; C4 cycle; CAM plants; photorespiration. **Respiration:** ATP-the biological energy currency; aerobic and anaerobic respiration; Kreb's cycle; electron transport mechanism (chemi-osmotic theory); redox potential; oxidative phosphorylation; phosphogluconate pathways.

Unit 3

Nitrogen and lipid metabolism: Biology of nitrogen fixation; nitrate reduction and its regulation; ammonium assimilation; structure and function of lipids; fatty acid biosynthesis; Beta-oxidation; storage and mobilization of fatty acids. **Basics of Enzymology**: Discover, classification and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and cofactors; mechanism of action.

Unit 4

Growth and Development: Definitions; phases of growth and development; kinetics

of growth; seed dormancy, seed germination and factors of their regulation; physiology of flowering; florigen concept; biological clocks; physiology of senescence, fruit ripening biosynthesis and mechanism of action; Photomorphogenesis; phytochromes and cryptochromes, their discovery, physiological role and mechanism of action

Unit 5

Genetic Engineering: Tools and techniques of recombinate DNA techonology; cloning vectors; genomic and cDNA library; transposable elements; gene mapping and chromosome walking.

Biotechnology: Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis biology of Agro bacterium; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.

Reference Books:-

1. Hopkins W.G. 1995 Introduction of plant physiology Pub. John Wiley and sons New York.
2. Salisbury F.D. and Ross C.W. 1992 plant physiology (4thedition). Wadsworth Pub. Co. California, U.S.A.
3. Taiz & Zeiger, E.1998 plant physiology (2nd ed.) Sinauer associates, inc. Pub, Massachusetts, U.S.A.
4. V.K.Jain Fundamentals of plant physiology, S.Chand & company.

BZBC502-P

External Marks: 30
Internal Marks: 20

(Plant Physiology, Biochemistry and Biotechnology)

LIST:

1. To prepare the standard curve of protein and determine the protein content in unknown samples.
2. To study the rate of transpiration using Farmer photometer.
3. To study process of fermentation through Kuhne tubes.
4. To study the process of osmosis in potato tubers.
5. Test for enzymes-amylase, catalase, protease etc.
6. Test of lipid, carbohydrate and proteins.
7. Demonstration of the technique of micropropagation by using different explants, e.g. axillary buds, shoot meristems.
8. Field visits: To study sources of firewood (10 plants), timber-yielding trees (10 trees) and bamboos. A list to be prepared mentioning special features.
9. Preparation of an illustrated inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy: Write their botanical and common names, parts used and disease/disorders for which they are prescribed.
10. Spotting
11. Project

12. Sessional

BZBC503 External Marks: 70

Internal Marks: 30

Physical Chemistry-III

Unit -I

Spectroscopy -I

1. Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born Oppenheimer approximation, degree of freedom.

2. Rotational spectrum of diatomic molecules, Energy levels of a rigid rotator (Semi classical principles), Selection Rules, Spectral intensity, distribution using Population distribution (Maxwell -Boltzmann distribution) Determination of bond length, Qualitative description of non-rigid rotator, Isotope effect.

3. Raman Spectrum, Concept of Polarizability, Pure Vibrational and pure rotational Raman Spectra of diatomic molecules, Application of Raman Spectrum.

Unit -II

Spectroscopy -II

2. UV Spectroscopy: Electronic Excitation, elementary idea of instrument used, Application to structure determination of organic molecules. Woodward- fieser rule for determining λ max of α, β- unsaturated Carbonyl Compounds.

3. Infrared Spectrum: Energy levels of simple harmonic oscillator, selection rule, pure Vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of enharmonic motion and Isotope on the spectrum, Idea of Vibrational frequencies of different functional groups.

Unit -III
Photochemistry-I

Interaction of radiation with matter, difference between thermal and photochemical processes. Law of Photochemistry: Grothus-Draper law, Stark constant of Unimolecular reactions.

Photochemistry -II

Electronic transitions, Jablonski diagram depicting various process occurring in the excited state, Qualitative description of fluorescence, Phosphorescence, non-radiative Processes (Internal Conversion, Intersystem Crossing), Quantum Yield, Photosensitized reactions-energy transfer Processes.

Unit -IV

Physical Properties and Molecular structure optical activity, polarization- (Clausius- Mossotti equation), Orientation of dipole in electric field, dipole moment, induced dipole moment. Measurement of dipole moment- Temperature and refractivity method, dipole moment and structure of molecules.

Magnetic properties -Para magnetism, diamagnetism and ferromagnetism.

Unit-V
Solutions, Dilute and Colligative Properties- I

Ideal and non- ideal solutions, method of expressing concentrations of solutions, Activity and activity coefficient. Dilute solutions, colligative properties, Raoult's law, relative lowering of vapor pressure, molecular weight determination, osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure solutions, Dilute solutions and Colligative properties -II Elevation of boiling point and depression of freezing point. Thermodynamics derivation of relation between molecular weight and elevation of boiling point and depression in freezing point.

Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

BZBC503-P External Marks: 70

Internal Marks: 30

Physical Chemistry-III Practical

List of Practicals:

1. To estimate the amount of HCl present in the given solution conductometrically.
2. To determine the dissociation constant of weak electrolyte by conductivity method.
3. To estimate the concentration of ferrous ion using standard potassium dichromate from EMF measurements.
4. To verify Beer-Lamberts law for Potassium permanganate colorimetrically.
5. To estimate the amount of Copper present in the given cupraammonium sulphate by colorimetric method.
6. To estimate the amount of amino acid present in the given sample using spectrophotometry.
7. Estimation of Ferrous ion by using 1,10 Phenanthroline by colorimetric method.
8. To determine the saponification value of given sample of Oil.

BSC(ZBC)		**Total Marks: 100**
Communicatio n Skill		**Internal Marks: 30**
Paper Code:- BZBC504		**External Marks: 70**
		No. of Hours: 40
Unit No.	**Details**	Nos. of Hours
1	**Introduction of Communication:** Purpose of Communication Process of Communication Difference between technical & General Communication Types of Communication Basics to Communication	8
2	**Communication in Organisations:** Internal Communication – Stake Holders & channels in Internal Communication External Communication- stake Holders & channels in External Communication Communication Network- Scope & types, formal and Informal Communication Network Language for Communication- General Principle, expressions & words to be avoided Grammar & usage	8
3	**Writing Business Letter-** Importance, Structure, Format and types of Business Letters **Writing Memos, Circulars and Notice-** Importance, Structure, Format and Language of memo, circulars & Notice	8
4	**Report Writing-** Features & Purpose of report Writing Difference between business report & engineering report Types of reports Structure Format and language of report Writing	8
5	**Meetings:-** Planning a Meeting Agenda of Meeting Minutes of Meeting Structure and format of Agenda and minutes of meeting	8

Reference Book:-

1. **Adais, John. Effective Communication London, Pan Macmillan LTd. 2003**
2. **Guffoy, Mary rller Essentials of Business Writing Ohio: Saouth – western College pub. 2000**
3. **Hassan, Gill Brilliant Communication Skill Great Britain , Pearson Education ,2012**

ENVIROMENTAL SCIENCE

(Subject Code- BZBC**505)**

UNIT – I

General: Environmental segments, environmental degradation, environmental impact assessment.

Concept of Ecosystem: Fundamental of Ecology and Ecosystem, components of ecosystem, food-chain, food-web, trophic levels, energy flow, cycling of nutrients, major ecosystem types (forest, grass land and aquatic ecosystem).

UNIT – II

Air Pollution: Atmospheric composition, energy balance, classification of air pollutants, source and effect of pollutants – Primary (CO, SOx, NOx, particulates, hydrocarbons), Secondary [photochemical smog, acid rain, ozone, PAN (Peroxy Acetyl Nitrate)], green house effect, ozone depletion, atmospheric stability and temperature inversion, Techniques used to control gaseous and particulate pollution, ambient air quality standards.

UNIT – III

Water Pollution: Hydrosphere, natural water, classification of water pollutants, trace element contamination of water, sources and effect of water pollution, types of pollutants, determination and significance of D.O., B.O.D., C.O.D. in waste water, Eutrophication, methods and equipment used in waste water treatment preliminary, secondary and tertiary.

UNIT – IV

Land Pollution & Noise Pollution: Lithosphere, pollutants (agricultural, industrial, urban waste, hazardous waste), their origin and effect, collection of solid waste, solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting).

Noise Pollution: Sources, effect, standards and control.

UNIT – V

Environmental Biotechnology: Definition, current status of biotechnology in environmental protection, bio-fuels, bio-fertilize, bio-surfactants, bio-sensor, bio-chips, bio-reactors.

Pollution Prevention through Biotechnology: Tannery industry, paper and pulp industry, pesticide industry, food and allied industry.

Text Books

1. Environment and Ecology by Piyush Kant Pandey and Dipti Gupta (Sum India Publication)

2. A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company)

Reference Books:

1. Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India).
2. Environmental Chemistry by A.K. Dey (Eastern Ltd.).

3. Environmental Chemistry by B.K. Sharma (Krishna Prakashan).
4. Nebel B.J. Environmental Science (Prentice Hall of India-1987).
5. Environmental Biotechnology by S.N. Jogdand (Himalaya Publishing House).
6. Introduction to Environmental Biotechnology by A.K. Chatterji (Prentice Hall of India).

SEMESTER- VI

BZBC601

External Marks: 70
Internal Marks: 30

Environmental Biology and Evolution

Unit -I Basic concept of ecology

1. Concept of Ecosystem- Biotic and Abiotic factors, energy flow in ecosystem -food chain and food web.
2. Biogeochemical cycles of CO2, N and P.
3. Population concept -characteristics of population.
4. Community concept - Succession, periodicities, indicators.

Unit -II Habitat Ecology

Characteristics of the following habitats-

1. Fresh water
2. Terrestrial
3. Marine
4. Ecological divisions of India
5. Natural resources and their conservation.

Unit -III Man and Environment

1. Wild life conservation and sanctuaries of Madhya Pradesh.
2. Environmental degradation and pollution.
3. Pesticide, metal, thermal and noise pollution.
4. Global warming, green house effect and radiation ecology.
5. Urbanization and effects of human population on environment.

Unit -IV Origin of life and Evolution

1. Origin and life- Theories and concepts.
2. History of evolutionary thought.
3. Lamarckism and Darwinism, Neo-Darwinism.
4. Natural selection -Basic concept of variation, mutation, isolation and speciation.
5. Adaptations and mimicry.
6. Concept of micro, macro and mega evolution.

Unit -V Palaeontology and Distribution of Animals

1. Palaeontology:-Formation of fossils.
2. Determination of age of fossils.
3. Study of extinct forms: - Dinosaurs and Archaeopteryx.
4. Evolution of man.
5. Zoogeographical distribution of animals.

Reference Books:

1. Environment and Ecology by Piyush Kant Pandey and Dipti Gupta (Sum India Publication)
2. Nebel B.J. Environmental Science (Prentice Hall of India-1987).

BZBC**601-P**

External Marks: 30
Internal Marks: 20

Environmental Biology and Evolution:-

Practical:

1. Collection and study of Local Insects, Molluses, Fresh water fishes.
2. Study of life history of Silk worm, Honey bee & Lac Insect.
3. Study of Pests- Vegetable and fruit pest, stored grain pest and crop pest.
4. Study of animal adaptations-Aquatic, Desert, Cave, Volant etc. Mounting of unio gills, Fish scales & gills, sting apparatus of honey bee and mouth parts of Insects.
5. Study of pond Ecosystem.
6. Water analysis -O2, Chloride, Co2, alkalinity, Soil pH.
7. Components and working of Instruments -Microtome, Microscope, pH meter.
8. Spectrometer and centrifuge.

BZBC602

External Marks: 70
Internal Marks: 30

Gene Ecology and Utilization of Plant Resources.

Unit 1

Ecosystems: Structure; abiotic and biotic components; food chain, food web, ecological Pyramid, energy flow; biogeochemical cycles of carbon, nitrogen and phosphorus.

Morphological, anatomical and physiological responses of plants: to water (hydrophytes and xerophytes), temperature (themoperiodicity and vernalization), light (photoperiodism, halophytes and sciophytes) and salinity.

Unit 2

Population ecology: Growth curves; ecotypes; ecads, population intvachious

Community ecology: Community characteristics, frequency, density, cover, life forms. Biological spectrum; ecological succession types of succession, concept of climate.

Unit 3

Plants and environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature.Soil (development soil profiles, physico-chemical properties), and biotic factors.

Unit 4

Phytogeographical regions of India: vegetation types of Madhya Pradesh, Biosphere reserves, sancturies and national parks of Madhya Pradesh. Pollution: Definition, Types and causes, Global warming and climate change and Ozone holes/layer depletion.

Unit 5

Food plants: Rice, Wheat, Maize, Potato, Sugarcane. **Fibers:** Cotton and Jute. **Vegetables:** Groundnut, Mustard and Coconut. General accounts of sources of firewood, timber and bamboos. **Spices:** General account. **Medicinal plants:** General account.**Beverages:** Tea and Coffee.

Reference Books:-

1. Hopkins W.G. 1995 Introduction of plant physiology Pub. John Wiley and sons New York.
2. Salisbury F.D. and Ross C.W. 1992 plant physiology (4thedition). Wadsworth Pub. Co. California, U.S.A.
3. Taiz & Zeiger, E.1998 plant physiology (2nd ed.) Sinauer associates, inc. Pub, Massachusetts, U.S.A.
4. Odum, E.P.1983. Basic Ecology, Saunders, Philadelphia.
5. Kormondy, E.J. 1996 Concepts of Ecology. Prentice-hall of India pvt. Ltd.
6. New Delhi.
7. Kochhar, S.L. 1998 Economic Botany in Tropics 2nd edition. McMillan India Ltd. New Delhi.
8. V.K.Jain Fundamentals of plant physiology, S.Chand & company.

BZBC 602-P

External Marks: 30
Internal Marks: 20

(Gene Ecology and Utilization of Plant Resources)Practical

1. To determine the minimum size of the quadrat by species area-curve method.
2. To study communities by quadrat method and to determine % Frequency, Density and Abundance.
3. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkair's Standard Frequency Diagram.

4. To estimate Importance Value Index (IVI) for forest species on the basis of relative frequency, relative density and relative biomass in protected and grazed forest.
5. To determine Simpson index of diversity in grazed and protected grassland.
6. To determine Shannon-Wiener index of diversity of a grazed and protected grassland.
7. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
8. Food Plants: Study of the morphology, structure and simple microchemical tests of the food storing tissues in rice, wheat, maize, potato and sugarcane.
9. Fibres: Study of cotton flowers, sectioning of the cotton ovules.
10. Vegetable oils: Study of hand sections of groundnut, mustard.
11. Spices: Examine black pepper, cloves, cinnamon (hand sections) and opened fruits of cardamom and describe them briefly.
12. Spotting
13. Project
14. Sessional

BZBC603 External Marks:70

Internal Marks: 30

Inorganic Chemistry-III

Unit -I

Bioinorganic Chemistry -I

Essential and trace element in biological processes, Metalloporphyrims with special reference to hemoglobin and myoglobin, Biological role of alkali and alkaline earth metal ions with special reference of Ca^{2+} , Nitrogen Fixation, Bioinorganic Chemistry -II, Role of metal ions in biological process, Na/K Pump, Metal Complex as therapeutic agents- anticancer agents, antiarthirits drug and Relation therapy.

Unit -II

Hard and Soft Acids and Bases (HSAB) Classification of acids and bases as hard and soft, Pearson's HSAB Concept, Acid-base Strength and hardness and softness, symbiosis, theoretical basis of hardness and softness, elecronegativity and hardness and softness.

Gravimetric Analysis- Principles of gravimetric estimation, super saturation, co-precipitation, post- precipitation and Ash treatment with respect to the estimation of Ba, zn and cu, water analysis. Hardness, types of hardness- Temporary, Permanent and total hardness, acidity and alkalinity, BOD, COD and DO.

Unit -III

Inorganic Polymers

Introduction and Scope of inorganic polymers: Special characteristics, classification, homo and hetero atomic polymers and their applications.

Silicon's and Phosphazenes- Silicones and Phosphazenes as example of inorganic Polymers, nature of bonding in triphosphazenes.

Unit -IV

Organometallic Chemistry I

Definition, nomenclature and classification of organometallic compound, Preparation, properties, bonding and applications of alkyls and aryls of Li, Al.

A brief account of metal-ethylenic complexes and homogenous hydrogenation, mononuclear carbonyls and the nature of bonding in metal Carbonyls. Transition metal organometallic compounds with bonds to hydrogen and boron.

Unit –V

Organometallic Chemistry II

The Grignard's reagents- formation, structure, and synthetic applications. Organozinc compound: Formation and chemical reactions. Organ lithium compound: Formation and Chemical reactions. Nomenclature, structure features, method of formation and chemical reactions of thiols, thioethers, sulhonic acids, sulphonamides and sulphaguanidine.

Reference Books:

Unified inorganic chemistry
Chemistry Yogbodh Prakshan.
Chemistry Navbodh Prakshan.
Inorganic chemistry Z. Lee.

BZBC603-P External Marks: 30

Internal Marks: 20

Inorganic Chemistry-III

List:

1. Synthesis Analysis

a) Preparation of Sodium trioxalato ferrate (lll), $Na_3[Fe(COO)_3]$ and determination of its composition by Permanganometry.

b) Preparation ol N|-DMG complex, $[Ni(DMG)_2]$

c) Preparation ot copper tetraammine complex, $[Cu(NH_3)_4]SO_4$.

d) Preparation of cis-and trans-bioxalalo diaqua chromate (lll) ion.

2. Gravimetric Analysis- Analysis of Cu as CuSCN or CuO, Ni as $Ni\{DMG)_2$, Ba as $BaSO_4$ and Fe as Fe_2O_3

BZBC604 External Marks: 70

Internal Marks: 30

Organic Chemistry-III

Unit -I

Carbohydrates

Classification and Nomenclature, Monosaccharide, mechanism if osazon formation, interconversion of Glucose and Fructose, chain lengthening and chain shortening of Aldoses. Conversion of glucose into mannose. Configuration of monosaccharide, erytho and threo diasterioisomers. Conversion of glucose into mannose. Formation of glucosides, ethers and esters, determination of ring size of monosaccharide, cyclic structure of D(+) glucose, mechanism of Mutarotation. Structure of Ribose and deoxyribose. Stereochemistry of monosachharides. An introduction to glycosidic linkage in di-and poly- saccharids. Reducing and non reducing sugars. Structure determination of maltose, sucrose, starch and cellulose.

Unit -II

Elementary Idea of fats, oils, Detergents and Dyes-

Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Soapnificationvalue, iodine value, acid value. Soap and Detergents. Classification of Dyes, Chemistry and Synthesis of Methyl orange, Congo red,Malachite green, Crystal violet, Phenolphthalein, fluorescein, Alizarinand Indigo.

Unit -III

Organic synthesis via Enolates- Organic synthesis via Enolates. Acidity of α-hydrogen, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate, the claisen condensation. Keto-enol tautomerism of ethyl acetoacetate, Alkylation of 1,3-dithianes, Alkylation and acylation of enamines.

Heterocyclic compounds- Nomeclature of heterocyclic compound, Furan, pyrrole, pyridine, thiol method of preparation, properties and application.

Unit –IV

Amines : Structure and nomenclature of amines. physical proparties.Sterecchemisiry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicily of amines. Amine salts as phase-transfer catalysis. Preparation of alkyl and aryl amines (reduction of nitro compounds. nitrites),reductive amination of aldehydic and ketonic compounds. Gabriel phthalimide reaction,Hoffmann bromamide reaction.Reactions of amines, electrophilic aromatic substitution In aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Unit –V

Amino acids- Classification, structure and stereochemistry of amino acids, acid-base behavior, iso-electric point, general method of preparations and properties of α-amino acids. Protein and Peptides- Introduction to peptides linkage, synthesis and end group analysis of Peptides. Solid Phase synthesis, classification, properties and structure of proteins (Primary, secondary and tertiary). Nucleic Acids- Nucleic Acid- Introduction, Constituents of Nucleic acids. Ribonucleosides and ribonodeotides. The double helical structure of DNA.

Reference Books:

Unified chemistry MMN Tandon , Shiv lal Agarwal Publications.
Chemistry Yogbodh Prakshan.
Chemistry Navbodh Prakshan.
Organic chemistry Vol. I & II by I.L.Finar

BZBC604-P External Marks: 30

Internal Marks: 20

Organic Chemistry Practical

Laboratory Techniques

A Steam Distillation

Napthalene from its suspension in water, clove oil from cloves

Separation of ortho and para-nitrophenols.

B ColumnChromatography

Separation of fluorescein and methylene blue

Separation of leaf pigments from spinach leaves

Resolution of recemic mixlure of (+,-) mandelic acid.

Oualitative Analysis

Analysis of an organic mixture containing two solid components using water, $NaHCO_3$,

NaOH tor separation and preparation of suitable derivatives.

Synthesis of Organic Compounds

a) Acetylation of salicylic acid, aniline, glucose and hydroquinone. Benzoylation of anlline

and phenol.

b) Aliphatic electrophilic substitution- Preparation of iodoform from ethanol and acetone

c) Aromatic electrophilic substitution.

d) Nitration-Preparation of m-dinitrobenzene, p-nitroacelanilide.

e) Halogenation- Preparation ol p-bromoacetanilide, 2,4,6 tribromophenol.

f) Diazotization/coupling- Preparation of metyl orange and methyl red.

g) Oxidation- Preparation of benzoic acid from toluene.

h) Reduction- Preparation of aniline from nitobenzene, m-nitroaniline from m_dinitrobenzene.

SEMESTER-VI

(BZBC 605) – HINDI

Lukrd	dy vd & 100
'k"Be lseLVj	vkrfjd eY;kdu &30
fgUnh Hkk"kk&3	ckg; eY;kdu&70

bdkbZ &1 **08**

ekud fgUnh Hkk"kk & ekud] vekud] miekud Hkk"kk
ehfM;k d izes[k vx ,oa mudh Hkk"kk
1. lekpkj i= 2. njn'kUk 3. vkdk"kok.kh 4. foKkiu

bdkbZ &2 **08**

¼d½ dFku dh "kyh & fooj.kkRed] eY;kduijd] 0;k[;kijd] fopkjkRed
¼[k½ fofHkUu Ujpuk,¡ & fouerklwpd] fof/kUpd] fu"k/kijd] dkyck/kd]

bdkbZ &3 **08**

vuokn & Lo:Ik] egRo] vuokn izfØ;k] vuoknd dh fo'k"krk,¡ fgUnh e inuke] fgUnh vifBr

bdkbZ &4 **08**

laf/k] lekl ,oa laf{kfIr;k

bdkbZ &5 **08**

ikB ladyu &

1. dfork & Hkyxyrh ¼xtkuu ek/ko efDrck/k ½
2. dgkuh & bZnxkg ¼izepn½
3. fuca/k & Mk. [kcpn c?ky ¼gfj Bkdj½