

SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

For

B.Sc. Biotechnology

(W.e.f. 2019 – 2020)



**KALINGA
UNIVERSITY**

**FACULTY OF SCIENCE
Kalinga University, Atal Nagar Raipur
Chhattisgarh**

SCHEME OF EXAMINATION

Kalinga University, Raipur
Bachelor of Science Biotechnology
(Six Semester Programme)
w.e.f 2019-20 Session

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
First Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT101	Biotechnology - Cell Biology & Genetics & Microbiology	4	30	70	100
BSCBT102A	Zoology -Invertebrate And Vertebrate	4	30	70	100
BSCBT102B	Botany - Evolution, Biochemistry, Paleobotany, Diversity of Microbes and Cryptogams				
BSCBT103	Physical Chemistry-I	4	30	70	100
BSCBT104	Fundamental of IT	3	30	70	100
BSCBT105	English-I	3	30	70	100
BSCBT101-P	Biotechnology - Cell Biology & Genetics & Microbiology- Lab	1	20	30	50
BSCBT102A-P	Zoology -Invertebrate And Vertebrate- Lab	1	20	30	50
BSCBT102B-P	Botany - Evolution, Biochemistry, Paleobotany, Diversity of Microbes and Cryptogams- Lab				
BSCBT103-P	Physical Chemistry-I- Lab	1	20	30	50
BSCBT104-P	Fundamental of IT - Lab	1	20	30	50
	Total (5 Subject)	22	210	440	700

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
Second Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT201	Biotechnology -Biochemistry & Maths	4	30	70	100
BSCBT202A	Zoology - Cell Biology & Developmental Biology	4	30	70	100
BSCBT202B	Botany - Fungi, Pteridophyta, Gymnosperms and Angiosperm.				
BSCBT203	Inorganic Chemistry-I	4	30	70	100
BSCBT204	Organic Chemistry-I	4	30	70	100
BSCBT205	Hindi -I	3	30	70	100
BSCBT201-P	Biotechnology -Biochemistry & Maths- Lab	1	20	30	50
BSCBT202A-P	Zoology - Cell Biology & Developmental Biology- Lab	1	20	30	50
BSCBT202B-P	Botany - Fungi, Pteridophyta, Gymnosperms and Angiosperm- Lab				
BSCBT203-P	Inorganic Chemistry-I - Lab	1	20	30	50
BSCBT204-P	Organic Chemistry-I- Lab	1	20	30	50
	Total	23	230	470	700

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
Third Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT301	Biotechnology - Recombinant DNA Technology	4	30	70	100
BSCBT302A	Zoology - Genetics	4	30	70	100
BSCBT302B	Botany - Cell Biology & Genetics				
BSCBT303	Physical Chemistry-II	4	30	70	100
BSCBT304	English-II	3	30	70	100
BSCBT305	Soft Skill & Personality Enhancement	3	30	70	100
BSCBT301-P	Biotechnology - Recombinant DNA Technology- Lab	1	20	30	50
BSCBT302A-P	Zoology – Genetics- Lab	1	20	30	50
BSCBT302B-P	Botany - Cell Biology & Genetics- Lab				
BSCBT303-P	Physical Chemistry-II- Lab	1	20	30	50
	Total	21	210	440	650

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
Fourth Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT401	Biotechnology - Molecular Biology & Biophysics	4	30	70	100
BSCBT402A	Zoology - Animal Physiology	4	30	70	100
BSCBT402B	Botany - Diversity, Systematic, Structure Development and Reproduction in Flowering Plant				
BSCBT403	Inorganic Chemistry-II	4	30	70	100
BSCBT404	Organic Chemistry-II	4	30	70	100
BSCBT405	Hindi-II	3	30	70	100
BSCBT401-P	Biotechnology - Molecular Biology & Biophysics- Lab	1	20	30	50
BSCBT402A-P	Zoology - Animal Physiology- Lab	1	20	30	50
BSCBT402B-P	Botany - Diversity, Systematic, Structure Development and Reproduction in Flowering Plant- Lab				
BSCBT403-P	Inorganic Chemistry-II- Lab	1	20	30	50
BSCBT404-P	Organic Chemistry-II- Lab	1	20	30	50
	Total	23	230	470	700

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
Fifth Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT501	Biotechnology - Immunology	4	30	70	100
BSCBT502A	Zoology - Applied Zoology	4	30	70	100
BSCBT502B	Botany - Plant Physiology, Biochemistry and Biotechnology				
BSCBT503	Physical Chemistry-III	4	30	70	100
BSCBT504	Communication Skills	3	30	70	100
BSCBT505	Environmental Science	3	30	70	100
BSCBT501-P	Biotechnology – Immunology- Lab	1	20	30	50
BSCBT502A-P	Zoology - Applied Zoology- Lab	1	20	30	50
BSCBT502B-P	Botany - Plant Physiology, Biochemistry and Biotechnology- Lab				
BSCBT503-P	Physical Chemistry-III- Lab	1	20	30	50
	Total	21	210	440	650

B.Sc. (BIOTECHNOLOGY) (Optional- Botany/ Zoology)					
Sixth Semester					
Code No.	Subject	Credits	Internal Marks	External Marks	Total
BSCBT601	Biotechnology - Plant, Environment and Industrial Biotechnology	4	30	70	100
BSCBT602A	Zoology - Environmental Biology and Evolution	4	30	70	100
BSCBT602B	Botany - Gene Ecology and Utilization of Plant Resources				
BSCBT603	Inorganic Chemistry-III	4	30	70	100
BSCBT604	Organic Chemistry-III	4	30	70	100
BSCBT605	Hindi -III	3	30	70	100
BSCBT601-P	Biotechnology - Plant, Environment and Industrial Biotechnology- Lab	1	20	30	50
BSCBT602A-P	Zoology - Environmental Biology and Evolution- Lab	1	20	30	50
BSCBT602B-P	Botany - Gene Ecology and Utilization of Plant Resources- Lab				
BSCBT603-P	Inorganic Chemistry-III- Lab	1	20	30	50
BSCBT604-P	Organic Chemistry-III- Lab	1	20	30	50
	Total	23	230	470	700



SEMESTER-I

RAIPUR

CELL BIOLOGY, GENETICS & MICROBIOLOGY

Unit 1:

- a. An overview of cells prokaryotic and eukaryotic cell,
- b. cell theory and precellular evolution,
- c. cell Wall, cell shape and size and structure.
- d. Structural organization and functions of plasma membrane and cell wall of eukaryotes.

Unit 2 :

- a. Structure and functions of cell organelles-Endoplasmic reticulum, Golgi complex, Mitochondria,
- b. Ribosome's, Peroxisomes, Nucleus (Nuclear envelope with nuclear pore complex, nucleolus, and chromatic),
- c. Lysosomes Vacuole, Cytosol and its function
- d. Cytoskeleton structures (Microtubules, Microfilaments)

Unit 3.

- a. **Chromosomes:** Introduction, structure and function.
- b. Pure Culture Techniques, Sterilization Techniques, different types of culture media
- c. Microbial growth and its measurement
- d. Special types of chromosome: Salivary gland and Lamp brush

Unit 4.

- a. **Microbiology** –Introduction, History, Scope and future prospects
- b. Bacteria-Size, shape and structure, types (gram positive and gram negative bacteria)
- c. Bacterial Reprodction- Transduction, Conjugation and Transduction
- d. Mycoplasma: History, classification, structure reproduction & Diseases.

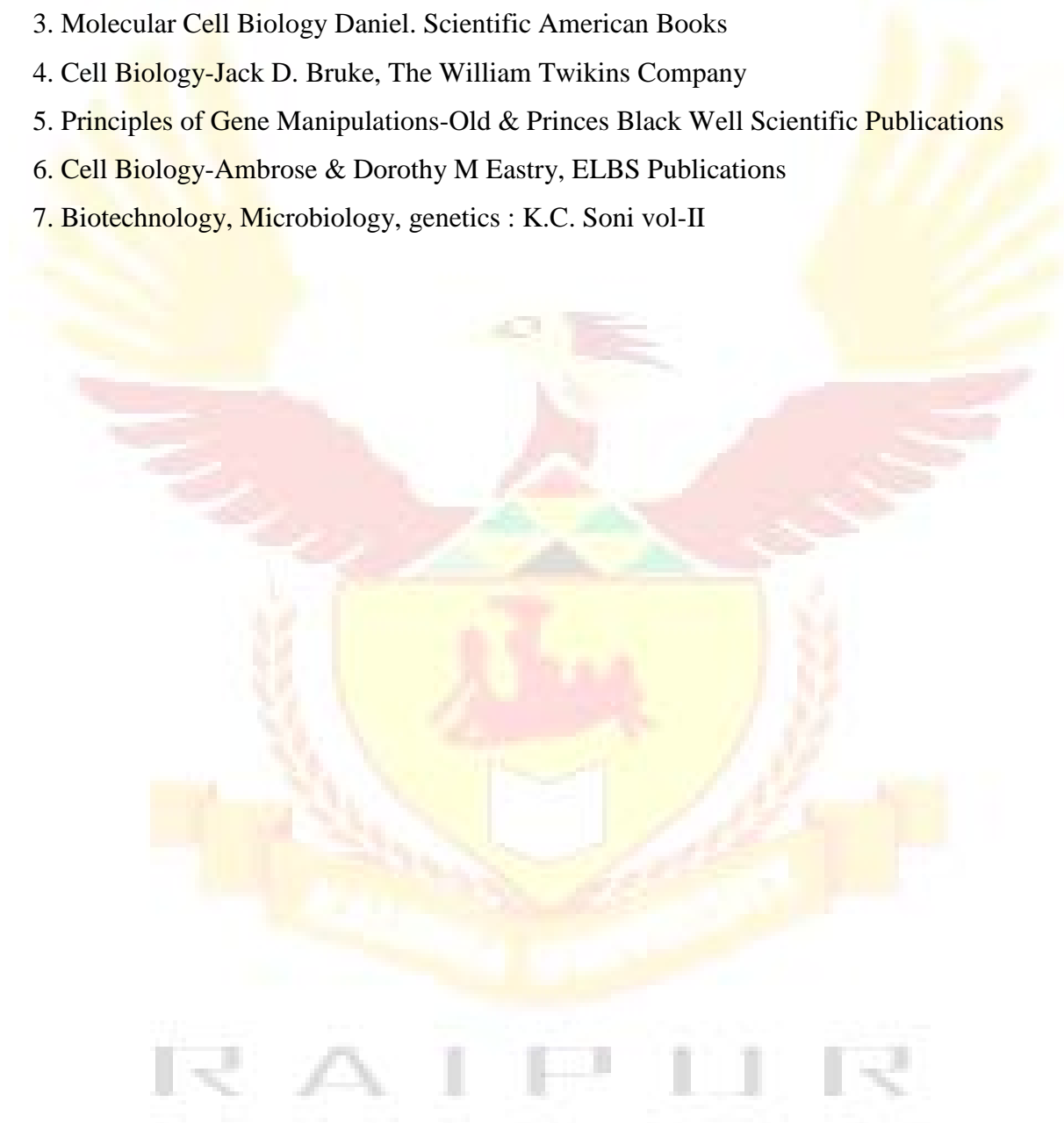
Unit5.

- a. **Genetics-** Medels law of inheritance

- b. Crossing over and linkage-types, importance, relation between linkage and crossover
- c. Mutation and types
- d. DNA damage and repair.

Text Book/Reference:

1. Molecular Biology of Cell-Bruce Albert's et.al, Garland publications
2. Animal Cytology & Evolution-MJD. White Cambridge University Publications
3. Molecular Cell Biology Daniel. Scientific American Books
4. Cell Biology-Jack D. Bruke, The William Twikins Company
5. Principles of Gene Manipulations-Old & Princes Black Well Scientific Publications
6. Cell Biology-Ambrose & Dorothy M Eastry, ELBS Publications
7. Biotechnology, Microbiology, genetics : K.C. Soni vol-II



BSCBT101-P

External Term: 30

Internal Marks: 20

Practical (BSCBT 101-P)
Cell Biology & Genetics & Microbiology

Lab Course:

1. Laboratory rules, Tools, Equipment and other requirements in Biotechnology laboratory.
2. To perform the sterilization technique for glassware for biotechnology laboratory.
3. To perform the different type media of preparation: solid and liquid media.
4. To perform the pure culture technique by serial dilution method.
5. To the isolation of microorganism by soil, air and water sample.
6. To perform the different staining method.



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Zoology- Invertebrate and vertebrate

Unit-I

1. General Characteristics & Classification of invertebrate's upto 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. Echinodermata – 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.

BSCBT102A-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)



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BSCBT102B

External Marks:70

Internal Marks: 30

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

Unit I

Origin 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 Paleocology 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 Prokaryotes General account, history, importance and characteristics of Plant and Animal Virus. General account, history, importance and characteristics of Bacteria, Mycoplasma, Actinomycetes and Cyanobacteria. 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 & Pteridophytes 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.

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



BSCBT		Total Marks: 100
Semester-I		Internal Marks: 30
Paper Code- 103		External Marks: 70
Physical Chemistry – I		No. of Hours: 60
		Total Credits: 02
Unit No.	Details	Nos. of Hours
1	<p>1.1 Mathematical Concepts</p> <p>1.1.1 Logarithmic relations,</p> <p>1.1.2 Curves stretching,</p> <p>1.1.3 Linear graphs and calculation of slopes,</p> <p>1.1.4 Differentiation of functions like Kx, ex, xn, $\sin x$, $\log x$; maxima and minima,</p> <p>1.1.5 Integration of some useful / relevant functions;</p> <p>1.1.6 Factorials,</p> <p>1.1.7 Probability,</p> <p>1.1.8 General introductions to computers, components of a computers</p> <p>1.1.9 Hardware and software,</p> <p>1.1.10 Input-output devices,</p> <p>1.1.11 Binary numbers and arithmetic;</p> <p>1.1.12 Introduction to computer languages, Programming and operating systems</p>	07
2	<p>2.1 Gaseous States</p> <p>2.1.1 Postulates of kinetic theory of gases,</p> <p>2.1.2 Deviation from ideal behaviour,</p> <p>2.1.3 Van der Waals equation of State,</p> <p>2.2 Critical phenomenon:</p> <p>2.2.1 PV isotherms of ideal gases,</p> <p>2.2.2 The isotherms of van der Waals equations,</p> <p>2.2.3 Relationship between critical constants and vander Waals constants,</p> <p>2.2.4 The law of corresponding states,</p> <p>2.2.5 Root mean square, Average and most probable velocities.</p> <p>2.2.6 Qualitative discussion of the Maxwell's distribution of molecular velocities,</p> <p>2.2.7 Collision numbers,</p> <p>2.2.8 Mean free path and collision diameter,</p> <p>2.2.9 Liquefaction of gases (based on Joule Thompson effect).</p>	09
3	<p>3.1 Liquid State</p> <p>3.1.1 Intermolecular forces,</p> <p>3.1.2 Structure of liquids (a qualitative description) Structural differences between solids,</p> <p>3.1.3 Liquids and gases.</p> <p>3.2 Liquid crystals:</p> <p>3.2.1 Difference between liquid crystal,</p>	08

	<p>3.2.2 Solid and liquid.</p> <p>3.2.3 Classification,</p> <p>3.2.4 Structure of nematic and cholestatic phases and its Application.</p> <p>3.3 Colloidal State</p> <p>3.3.1 Definition and classification of colloids,</p> <p>3.3.2 Solids in liquids (sols): properties- Kinetic,</p> <p>3.3.3 Optical and electrical;</p> <p>3.3.4 Stability of colloids,</p> <p>3.3.5 Protective action,</p> <p>3.3.6 Hardy-Schulz law,</p> <p>3.3.7 Gold number.</p> <p>3.3.8 Liquids in liquids (emulsions) types of emulsions,</p> <p>3.3.9 Preparation. Emulsifier.</p> <p>3.3.10 Liquids in solids(gels): its Classification, Preparation and properties</p> <p>3.3.11 General applications of colloids.</p>	
4	<p>4.1 Solid State</p> <p>4.1.1 Definition of space lattice,</p> <p>4.1.2 Unit cell Laws of crystallography –</p> <p>(i) Law of constancy of interfacial angles</p> <p>(ii) Law of rationality of indices</p> <p>(iii) Laws of symmetry.</p> <p>4.1.3 Symmetry elements in crystals,</p> <p>4.1.4 X-ray diffraction by crystals.</p> <p>4.1.5 Derivation of Bragg.</p> <p>4.1.6 Equation.</p> <p>4.1.7 Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method.)</p> <p>Catalysis. characteristics of catalysed reactions,</p> <p>4.1.8 Classification of catalysis miscellaneous. Examples</p>	08
5	<p>5.1 Chemical Kinetics-</p> <p>5.1.1 Chemical kinetics and its scope,</p> <p>5.1.2 Rate of a reaction,</p> <p>5.1.3 Factors influencing the rate of a reaction concentration,</p> <p>5.1.4 Temperature,</p> <p>5.1.5 Pressure,</p> <p>5.1.6 Solvent, Light,</p> <p>5.1.7 Catalyst concentration dependence of rates,</p> <p>5.1.8 Mathematical characteristics of simple chemical reactions-zero. order,</p> <p>5.1.9 Pseudo order,</p> <p>5.1.10 Half-life and mean life Determination of the order of reaction differential method,</p> <p>5.1.11 Method of integration,</p> <p>5.1.12 Method of half-life period and isolation method.</p> <p>5.2 Theories of chemical kinetics:</p> <p>5.2.1 Effect of temperature on rate of reaction Arrhenius equation,</p> <p>5.2.2 Concept of activation energy.</p>	08

	5.2.3 Simple collision theory based on hard sphere model, 5.2.4 Transition state theory (equilibrium hypothesis.) Expression for the rate constant based on equilibrium constant and thermodynamic aspects.	
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Text Books/Reference Book:

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra, Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R. McWeeny, 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



BSCBT		Total Marks: 50
Semester-I		Internal Marks: 20
Paper Code - BSCBT103-P		External Marks: 30
Practical Physical Chemistry – I		No. of Hours: 30
		Total Credits: 01
	Details	Nos. of Hours
	<ol style="list-style-type: none"> 1. Calibration of thermometer 2. Determination of melting point 3. Determination of boiling point 4. Determination of mixed melting point 5. Preparation of solutions of various concentrations, NaOH, HCl, H₂SO₄. 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 H₂SO₄ by studying the kinetics of hydrolysis of ester. 9. To study kinetically the reaction rate of decomposition of iodide by H₂O₂. 10. Determination of surface tension / percentage composition of given organic mixture using 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 .

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BSCBT		Total Marks: 100
Semester – I		Internal Marks: 30
Paper Code. (BSCBT104)		External Marks: 70
Fundamentals of IT		No. of Hours: 60
Objectives: This is a basic course for commerce students to familiarize with computer and it's applications in the relevant fields and exposes them to other related courses of IT.		Total Credits: 02
Unit No.	Details	Nos. of Hours
1	<p>1.1 Introduction to Computers:</p> <p>1.1.1 The evolution of computers – Computer Generation</p> <p>1.1.2 Classifications of Computers –</p> <p>1.1.3 Micro</p> <p>1.1.4 Mini,</p> <p>1.1.5 Mainframe</p> <p>1.1.6 Super Computers</p> <p>1.1.7 Distributed Computer System</p> <p>1.1.8 Parallel Computers</p> <p>1.1.9 Computer Hardware – Major Components of a Digital Computer</p> <p>1.1.10 Block Diagram of Computer</p> <p>1.1.11 Input devices</p> <p>1.1.12 Output devices</p> <p>1.1.13 Description of Computer IPO Cycle</p> <p>1.1.14 CPU</p> <p>1.2 Computer Memory:</p> <p>1.2.1 Memory Types,</p> <p>1.2.2 Units of memory</p> <p>1.2.3 Read Only Memory,</p> <p>1.2.4 Random Access Memory,</p> <p>1.2.5 Serial Access Memory,</p> <p>1.2.6 Physical Devices Used to construct Memories,</p> <p>1.2.7 Hard disk,</p> <p>1.2.8 Floppy Disk Drives,</p> <p>1.2.9 CD, DVD, Flash Drives,</p> <p>1.2.10 Magnetic Tape Drives.</p>	15
2	<p>2.1 Number System:</p> <p>2.1.1 Decimal,</p> <p>2.1.2 Binary,</p> <p>2.1.3 Octal,</p> <p>2.1.4 Hexa-decimal.</p> <p>2.1.5 Conversion - Decimal to all other number systems,</p> <p>2.1.6 Binary to octal and Hexa Decimal,</p> <p>3.1 Computer Software:</p> <p>3.1.1 System software,</p> <p>3.1.2 Operating System concepts,</p> <p>3.1.3 Different types of operating systems,</p> <p>3.1.4 Assemblers,</p> <p>3.1.5 Compilers,</p> <p>3.1.6 Interpreters,</p> <p>3.1.7 linkers,</p> <p>3.1.8 Application Software,</p> <p>3.1.9 Firmware Software,</p>	15

3	<p>3.1 Introduction of Internet and Objectives</p> <p>3.2 Basic of Computer Networks</p> <p>3.2.1 Local Area Network (LAN)</p> <p>3.2.2 Wide Area Network (WAN)</p> <p>3.3 Internet</p> <p>3.3.1 Concept of Internet</p> <p>3.3.2 Applications of Internet</p> <p>3.3.3 Connecting to the Internet</p> <p>3.3.4 Troubleshooting</p> <p>3.4 World Wide Web (WWW)</p> <p>3.5 Web Browsing Software</p> <p>3.5.1 Popular Web Browsing Software</p> <p>3.6 Search Engines</p> <p>3.6.1 Popular Search Engines / Search for content</p> <p>3.6.2 Accessing Web Browser</p> <p>3.6.3 Using Favorites Folder</p> <p>3.6.4 Downloading Web Pages</p> <p>3.6.5 Printing Web Pages</p> <p>3.7 Understanding URL</p> <p>3.8 Surfing the web</p> <p>3.8.1 Using e-governance website</p>	10
4	<p>4.1 Word Processor:</p> <p>4.1.1 Word Processor and its features,</p> <p>4.1.2 Editing of Text,</p> <p>4.1.3 Find and Replace,</p> <p>4.1.4 Bullets and Numbering,</p> <p>4.1.5 Spell Checker,</p> <p>4.1.6 Grammar Checker,</p> <p>4.1.7 Auto Correct,</p> <p>4.1.8 Auto Complete,</p> <p>4.1.9 Auto Text,</p> <p>4.1.10 Header and footer,</p> <p>4.1.11 tables,</p> <p>4.1.12 mail merge,</p> <p>4.1.13 border and shading,</p> <p>4.1.14 page setup,</p> <p>4.1.15 Printing.</p> <p>4.2 Spread sheet:</p> <p>4.2.1 Spread sheet and its features,</p> <p>4.2.2 Entering Information in Worksheet,</p> <p>4.2.3 Editing Cell Entry,</p> <p>4.2.4 Moving and Copying Data,</p> <p>4.2.5 deleting or Inserting Cells,</p> <p>4.2.6 Rows and Columns,</p> <p>4.2.7 Custom</p> <p>4.2.8 Numeric Formats,</p> <p>4.2.9 Using Formulas and functions,</p> <p>4.2.10 Creating charts.</p>	08
5	<p>5.1 Presentation Software</p> <p>5.1.1. Presentation Software and its uses,</p> <p>5.1.2. steps for creating PowerPoint Presentation,</p> <p>5.1.3. PowerPoint Views,</p> <p>5.1.4. Assigning Slide Transitions,</p>	12

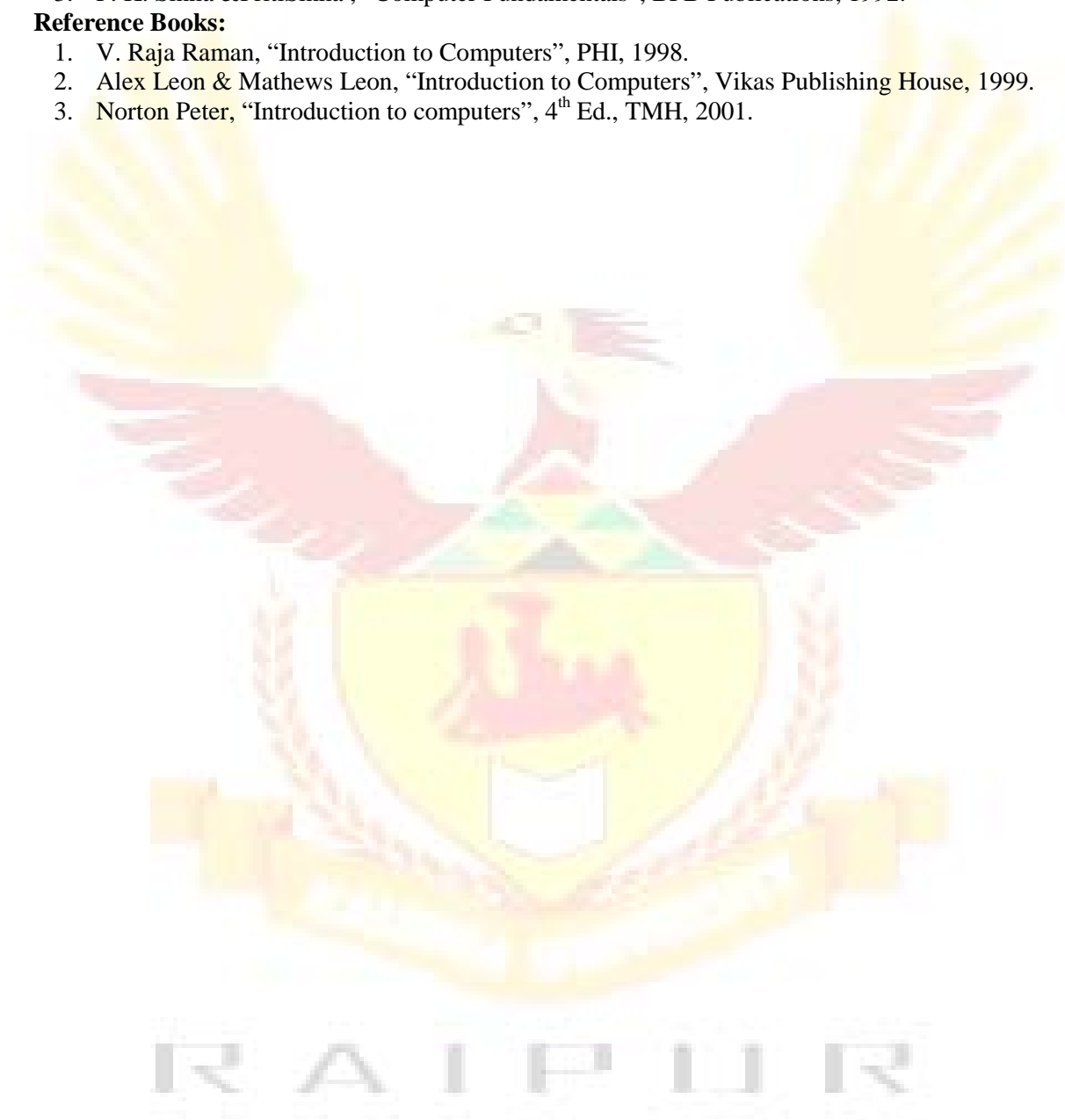
	5.1.5. Using Preset Animations, 5.1.6. Hiding Slides, 5.1.7. Slide Show, 5.1.8. Controlling the Slide Show with a Keyboard, 5.1.9. Setting Slide Show Timings.	
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Text Books:

1. Alex Leon & Mathews Leon, “Fundamentals of Information Technology”, LeonTechworld, 1999.
2. Vikas Gupta, “Comdex Computer Kit”, Wiley Dreamtech, Delhi, 2004
3. P. K. Sinha & Priti Sinha, “Computer Fundamentals”, BPB Publications, 1992.

Reference Books:

1. V. Raja Raman, “Introduction to Computers”, PHI, 1998.
2. Alex Leon & Mathews Leon, “Introduction to Computers”, Vikas Publishing House, 1999.
3. Norton Peter, “Introduction to computers”, 4th Ed., TMH, 2001.



BSCBT		Total Marks: 50
Semester – I		Internal Marks: 20
Paper Code. (BSCBT104-P)		External Marks: 30
Fundamentals of IT		No. of Hours: 30
Objectives: This is a basic course for Commerce students to familiarize with computer and it's applications in the relevant fields and exposes them to other related courses of IT.		Total Credits: 01
	Details	Nos. of Hours
	<p>MS-WORD</p> <ol style="list-style-type: none"> 1. Text Manipulations 2. Usage of Numbering, Bullets, Tools and Headers 3. Usage of Spell Check and Find and Replace 4. Text Formatting 5. Picture Insertion and Alignment 6. Creation of Documents Using Templates` 7. Creation of Templates 8. Mail Merge Concept 9. Copying Text and Picture From Excel 10. Creation of Tables, Formatting Tables 11. Splitting the Screen 12. Opening Multiple Document, Inserting Symbols in Documents <p>MS-EXCEL</p> <ol style="list-style-type: none"> 1. Creation of Worksheet and Entering Information 2. Aligning, Editing Data in Cell 3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions) 4. Changing of Column Width and Row Height (Column and Range of Column) 5. Moving, copying, Inserting and Deleting Rows and Columns 6. Formatting Numbers and Other Numeric Formats 7. Drawing Borders Around Cells 8. Creation of Charts Raising Moving 9. Changing Chart Type 10. Controlling the Appearance of a Chart <p>MS -POWER POINT</p> <p>Working With Slides</p> <ol style="list-style-type: none"> 1. Creating, saving, closing presentation 2. Adding Headers and footers 3. Changing slide layout 4. Working fonts and bullets 5. Inserting Clip art: working with clipart, 6. Applying Transition and animation effects 7. Run and Slide Show 	30

RAIPUR

English-I

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



RAIPUR

Biochemistry & Maths

Unit-I

- a. Biochemistry: Introduction, Definition, scope and application.
- b. Carbohydrate: Structure, Classification and function of mono, oligo & polysaccharides.
- c. Carbohydrate metabolism and pathway: Glycolysis, Glyoneogenesis, Gluconeogenesis
- d. Amino acids: Classification, essential & non-essential, General properties.

Unit-II

- a. Proteins: Introduction, structure, classification, physical & chemical properties
- b. Lipid: Structure, Classification, chemical properties.
- c. Biosynthesis of lipid
- d. Fatty Acids: Introduction, classification.

Unit-III

- a. Enzymes: Introduction, Definition, classification, mechanism of enzymes action
- b. Plant hormones: Introduction, Definition, structure and function of plant hormone-Auxin and Gibberellins,
- c. Animal Hormones: Introduction, Definition, structure, Animal-Pencrease and Thyroid.
- d. Vitamins, water and fat soluble, deficiency and diseases.

Unit- IV

- a. Introduction to Biostatistics: definition, scope.
- b. Measures of central tendency: Mean, Median, Mode, merit & demerit with example.
- c. Probability and basic laws. uses
- d. Variable: Introduction, types, example

UNIT V

- a. Binomial Theorem and its uses
- b. Sampling & its Techniques and uses
- c. T-Test & Chi test with biological examples.
- d. Measures of dispersion: Quartile deviation, Range, Standard Deviation, Variance

Text Book/ Reference:

1. Biochemistry: N. Arumugam & Dalsy Fatima, Saras Publication.
2. Element of Biochemistry: H.S. Srivastava, Rastogi Publication.
3. Biochemistry: U. Satyanarayana, Books & Allied (P) Ltd.
4. Biochemistry & Biophysics: N. Arumugam, Saras Publication.
5. Biostatistics & computer application & Bioinformatics: N. Arumugam, Saras Publication.
6. Biochemistry & Maths: K.C. Soni (Vol-I), Daya publisher house.



Practical (BSCBT 201-P)
(Biochemistry & Maths)

Lab Course:

1. Laboratory rules, Tools, Equipment and Other requirements in Biochemistry laboratory.
2. To measure the saponification value from different oil/ghee/butter sample.
3. To Estimation of sugar in given solution.
4. To perform protein estimation method by follen Lowry/ barfoard reagent.
5. To calculate the mean, median, mode from given leave sample.
6. To the Calculation of T- test from given value.
7. To the Calculation of Chi square test from given value.



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

Practical (BSCBT 202A-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



RAJASTHAN
UNIVERSITY
RAIPUR

Fungi, Pteridophyta, Gymnosperms and Angiosperm

Unit- I

General account and classification of Fungi. Important features and life history of Achlya, Phytophthora, 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, Heterospory 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 & Pteridophytes 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.

Fungi, Pteridophyta, Gymnosperms and Angiosperm

1. Study of the morphology, reproduction structures and anatomy of examples given in theory under fungi, bryophyte and pteridophyta (*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 monocot and dicot leaf and their identification.
8. Studying of branching patterns/plant forms.
9. Spotting
10. Project
11. Sessional



BSCBT		Total Marks: 100
Semester-II		Internal Marks: 30
Paper Code. BSCBT203		External Marks: 70
Inorganic Chemistry-I		No. of Hours: 60
		Total Credits: 02
Unit No.	Details	Nos. of Hours
1	<p>1.1 Atomic Structure</p> <p>1.1.1 Idea of de Broglie matter waves, Heisenberg uncertainty principle,</p> <p>1.1.2 Atomic orbitals, Shapes of s, p, and d orbitals</p> <p>1.1.3 Schrödinger wave equation,</p> <p>1.1.4 Quantum numbers,</p> <p>1.1.5 Aufbau and Pauli exclusion principles,</p> <p>1.1.6 Hund's multiplicity rules,</p> <p>1.1.7 Electronic configurations of the elements,</p> <p>1.2 Periodic Properties –</p> <p>1.2.1 Definition, Method of determination, Trends in periodic Table .</p> <p>1.2.2 Atomic and ionic radii,</p> <p>1.2.3 Ionization energy,</p> <p>1.2.4 Electron Affinity</p> <p>1.2.5 Electronegativity:</p>	10
2	<p>2.1 Chemical Bonding</p> <p>2.1.1 Covalent bond- valence bond theory and its limitations,</p> <p>2.1.2 Directional characteristic of covalent bond,</p> <p>2.1.3 Hybridization and shapes of simple molecules and ions.</p> <p>2.1.4 Valence Shell Electron Pair Repulsion (VSEPR) theory with example</p> <p>2.1.5 Molecular Orbital theory for homonuclear and heteronuclear (CO and NO) diatomic molecules,</p> <p>2.1.6 Bond strength and the bond energy</p> <p>2.1.7 Weak interactions - hydrogen bonding, Vander Waals forces</p>	9
3	<p>3.1 Ionic Solids</p> <p>3.1.1 Ionic structures,</p> <p>3.1.2 Radius ratio effect and coordination number,</p> <p>3.1.3 Limitation of radius ratio rule,</p> <p>3.1.4 Lattice defects,</p> <p>3.1.5 Semiconductors,</p> <p>3.1.6 Lattice energy and Born-Haber cycle,</p> <p>3.1.7 Solvation energy and solubility of ionic solids,</p> <p>3.1.8 Polarizing power and polarizability of ions. Fajan's rule,</p> <p>3.1.9 Metallic bond free electron,</p> <p>3.1.10 Valence bond and Band theories</p>	8
4	<p>4.1 p-Block Elements</p> <p>4.1.1 Comparative study (including diagonal relationship and properties) of groups 13-17 elements , Compounds like</p>	7

	4.1.2 hydrides, 4.1.3 Oxides, 4.1.4 Oxyacids 4.1.5 Halides 4.1.6 Group 13-16 Hydrides of boron-diborane and higher boranes. 4.1.7 Borazine,	
5	5.1 p-Block elements 5.1.1 Fullerenes, 5.1.2 Carbides, 5.1.3 Fluorocarbons, 5.1.4 Silicates (structural principle), 5.1.5 Interhalogens. 5.1.6 Properties of inert gases, 5.1.7 Chemistry of xenon, 5.1.8 Structure and bonding in xenon compounds.	6

Reference Book:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, 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, Harper & Row

Text Books:

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

RAIPUR

BSCBT		Total Marks: 50
Semester -II		Internal Marks: 20
Paper Code. BSCBT 203-P		External Marks: 30
Inorganic Chemistry-I		No. of Hours: 30
		Total Credits: 01
	Details	Nos. of Hours
	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 .

RAIPUR

BSCBT		Total Marks: 100
Semester-II		Internal Marks: 30
Paper Code. BSCBT204		External Marks: 70
Organic Chemistry-I		No. of Hours: 40
		Total Credits: 02
Unit No.	Details	Nos. of Hours
1	<p>1.1 I Structure and Bonding</p> <p>1.1.1 Hybridizations, 1.1.2 Bond lengths and bond angles, Bond energy 1.1.3 Resonance 1.1.4 Hyperconjugation, 1.1.5 Inductive and field effects, 1.1.6 Hydrogen bonding,</p> <p>1.2 Mechanism of Organic reactions:</p> <p>1.2.1 Homolytic and heterolytic bond breaking Electrophiles and nucleophiles. 1.2.2 Types of organic reactions. 1.2.3 Reactive intermediates- carbocations, 1.2.4 Carbanions, 1.2.5 Free radicals and carbenes. 1.2.6 Methods of determination of reaction mechanism.</p>	06
2	<p>2.1 Stereochemistry</p> <p>2.1.1 Concept of isomerism, 2.1.2 Types of isomerism, 2.1.3 Optical isomerism, 2.1.4 Elements of symmetry, 2.1.5 Molecular chirality, 2.1.6 Enantiomers, 2.1.7 Optical activity, 2.1.8 Distereoisomers, 2.1.9 Mesocompound 2.1.10 Walden Inversion 2.1.11 Relative and absolute configurations, 2.1.12 Sequence rules, D & L, R & S systems of nomenclature, 2.1.13 Nomenclature E and Z system 2.1.14 Conformational analysis of ethane and n-butane. 2.1.15 Conformations of cyclohexanes,</p>	08
3	<p>3.1 Alkanes, Cycloalkanes and Aromaticity</p> <p>3.1.1 IUPAC nomenclature, 3.1.2 Classification, 3.1.3 Isomerism in alkanes, 3.1.4 Sources, and methods of preparation (with special reference to Wurtz, Kolbe.reaction. 3.1.5 Corey.House reaction. 3.1.6 Reactions and decarboxylation of carboxylic acids, 3.1.7 Physical properties and chemical reactions of alkanes.</p> <p>3.2 Cycloalkanes:</p> <p>3.2.1 Nomenclature, 3.2.2 Methods of preparations, Chemical reaction</p>	08

	<p>3.2.3 Bayer's strain theory and its limitations</p> <p>3.2.4 Structure of benzene molecular formula and Kekule structure.</p> <p>3.2.5 Resonance structure.</p> <p>3.2.6 MO picture.</p> <p>3.2.7 Aromaticity the Huckel rule,</p> <p>3.2.8 Aromatic electrophilic substitution general pattern of the mechanism, Mechanism of nitration,</p> <p>3.2.9 Halogenation.</p> <p>3.2.10 Sulphonation.</p> <p>3.2.11 Mercuration and Friedel-Crafts reaction .</p>	
4	<p>4.1 Alkenes , Dienes and alkynes</p> <p>4.1.1 Nomenclature of alkenes,</p> <p>4.1.2 Methods of formation,</p> <p>4.1.3 Mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides,</p> <p>4.1.4 Regio-selectivity in alcohol dehydration the Saytzeff rule,</p> <p>4.1.5 Electrophilic and free radical additions,</p> <p>4.1.6 Markownikoff's rule,</p> <p>4.1.7 hydroboration-oxidation oxymercuration reduction,</p> <p>4.1.8 Epoxidation,</p> <p>4.1.9 Ozonolysis,</p> <p>4.1.10 Hydration,</p> <p>4.1.11 Hydroxylation and oxidation with KMnO₄,</p> <p>4.1.12 Polymerization of alkenes,</p> <p>4.1.13 Industrial applications of ethylene and propene</p> <p>4.2 Dienes:</p> <p>4.2.1 Structure of butadiene,</p> <p>4.2.2 Methods of formation,</p> <p>4.2.3 Chemical reactions-1,2 and 1,4 additions,</p> <p>4.2.4 Diels Alder reaction.</p> <p>4.2.5 Nomenclature,</p> <p>4.2.6 Structure and bonding in alkynes.</p> <p>4.2.7 Methods of formation.</p> <p>4.2.8 Chemical reactions of alkynes,</p> <p>4.2.9 Acidity of alkynes,</p> <p>4.2.10 Mechanism of electrophilic and nucleophilic addition reactions,</p>	10
5	<p>5.1 Alkyl and Aryl Halides</p> <p>5.1.1 Nomenclature and classes of alkyl halides,</p> <p>5.1.2 Methods of formation,</p> <p>5.1.3 Chemical reactions mechanisms of nucleophilic substitution reaction of alkyl halides,</p> <p>5.1.4 SN₂ and SN₁ reactions,with energy profile diagrams.</p> <p>5.2 Polyhalogen compounds:</p> <p>5.2.1 Chloroform,</p> <p>5.2.2 Carbon tetrachloride.</p> <p>5.2.3 Methods of formation of aryl halides,</p>	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.



BSCBT		Total Marks: 50
Year-I		Internal Marks: 20
Paper Code. BSCBT204-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. Decolouration 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 Shivrul publication.
10. Unified Practical Chemistry – I , R.P.Bhatnagar Arun publication.

TEACHERS

dfyæk fo' ofo | ky;
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Lukrd	dy val & 100
f}rh l eLVj	vlrfjd eV; kdu &30
fgUhh Hk'k&l	ckg; eV; kdu&70
lki j dM 205	

bdlbZ&1 08

हिन्दी ध्वनियों का स्वरूप—

- (क) स्वर और व्यंजन
- (ख) संज्ञा, सर्वनाम, क्रिया, विशेषण
- (ग) वाक्य संरचना

bdlbZ&2 08

हिन्दी शब्द संरचना—

पर्यायवाची, समानार्थक, विलोमार्थक, अनेकार्थक, अनेक शब्दों के स्थान पर एक शब्द, समश्रुत शब्द

bdlbZ&3 08

लिंग विधान और कारक प्रयोग—

- (क) वर्तनी
- (ख) विरामादि चिन्हों के प्रयोग
- (ग) मुहावरे और लोकोक्तियों तथा उनके रचनात्मक प्रयोग

इकाई -4 08

उपसर्ग, प्रत्यय

पत्र लेखन (अनौपचारिक एवं औपचारिक पत्र)

bdlbZ&5 08

- कविता — भारत माता (सुमित्रानंदन पंत)
- कहानी — कफन (प्रेमचंद)
- निबंध — नमामि छत्तीसगढ़ (प्रो. हीरालाल शुक्ल)

l gk d xfk—

1. राजभाषा हिन्दी — गोविन्ददास — हिन्दी साहित्य सम्मेलन, प्रयाग।
2. राष्ट्रभाषा आन्दोलन — गोपाल परशुराम — महाराष्ट्र सभा।
3. विराम चिन्ह— महेन्द्र राजा जैन— किताबघर, दिल्ली।
4. भारतीयता के अमर स्वर — प्रो. धनजय वर्मा म.प्र. हिन्दी ग्रंथ अकादमी (भोपाल)



SEMESTER-III

RAIPUR

Recombinant DNA Technology

Unit-I

Recombinant DNA Technology

- a. General concept and Application.
- b. Restriction Enzymes: Endonuclease (types, Nomenclature, Restriction Sequence, and Cleavage Pattern).
- c. Modification of cut ends
- d. Steps in gene cloning
- e. Isolation of the desired gene.
- f. DNA Library: cDNA library & Genomic Library.

Unit-II

- a. Vectors: plasmid (Ti, Ri plasmid), cosmid, phagemid, Bacteriophage vector (Lambda & M13 vector) and SV40 virus vector.
- b. Gene transfer methods: microinjection, Electroporation, Microprojectile bombardment, Lipofection, shot gun method.

Unit-III

PCR: Introduction, Definition

- a. Procedure (denaturation, annealing, extension)
- b. Types of PCR
- c. Application of PCR
- d. Advantages and limitation of PCR.

Unit-IV

- a. Monoclonal Antibodies: Structure, Production, Application.
- b. In vitro fertilization and embryo transfer.
- c. Genome map and Genome Project.
- d. Apoptosis.

Unit-V

- a. Stem cell theory
- b. Targeted Gene Transfer
- c. DNA fingerprinting
- d. Transgenic animals and Plants.

BSCBT301-P

External Marks: 30
Internal Marks: 20

Practical (BSCBT 402-P)
(Recombinant DNA Technology)

LIST:

1. Isolation of genomic DNA of bacterial cell.
2. Isolation of Plasmid.
3. Quantification of DNA by DPA method.
4. Quantification of RNA by Orcinol Method.
5. Restriction enzyme digestion.
6. Agarose gel electrophoresis of DNA.
7. Recovery of DNA form agarose gel.
8. Demostration of PCR and RT-PCR.
9. Bacterial transformation and Blue White Screening.



RAIPUR

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 differentiation. 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 (Sickle cell anaemia, Albinism and Alkaptonuria)
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. Mutagens- Classification, Types and effects
4. Gene Therapy
5. DNA finger printing

Zoology- Genetics

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

Botany-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: Golgi body, Endoplasmic reticulum Lysosomes, 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.

(Botany: 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/*Tradescantia* 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

Physical Chemistry-II

UNIT -I

Thermodynamics I

Definition of thermodynamic terms: system, surroundings etc. Types of systems, Intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. First law of thermodynamics : statement, definition of internal energy and enthalpy. Heat capacity, heat capacities 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.

UNIT II

Thermodynamics II

Second law of thermodynamics: need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature. Concept of entropy. entropy as a state function, entropy as a function of V & T , entropy as a function of P & T , entropy change in physical change, Clausius inequality; entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Third law of thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of 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 thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P , V and 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 and degrees of freedom, derivation of Gibbs phase rule, phase equilibria of one component system — water, CO_2 and S systems. Phase equilibria of two component system — solid-liquid equilibria, Solid solutions - compound formation with congruent melting point ($Mg-Zn$) and incongruent melting point with examples. Liquid — liquid mixtures « real liquid mixtures, Raoult's and Henry's law. Non-ideal system-azeotropes — $HCHO$ and ethanol = water

systems. Partially miscible liquids with example Lower and upper consolute temperature. Nernst distribution law — thermodynamic derivation, app

UNIT IV

Electrochemistry I

Electrical transport conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

UNIT V

Electrochemistry II

Types of reversible electrodes - gas-metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen: electrode-reference electrodes- standard electrode potential, sign conventions, electrochemical 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 of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions. solubility 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, Henderson-Hasselbalch equation. Hydrolysis of salts. Corrosion = types, theories and methods of combating it.

RAIPUR

PHYSICAL CHEMISTRY-II (Practical's)**Transition Temperature**

1. Determination of the transition temperature of the given substance by thermometric/dialometric method (e.g. $\text{MnCl}_2 \cdot 2\text{H}_2\text{O}$).

Phase Equilibrium

1. To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given water system.

2. To construct the phase diagram of two component (e.g. diphenylamine benzophenone) system by cooling curve method.

Thermochemistry

1. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.

2. To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.

3. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Reference Books:

1. Unified chemistry MMN Tandon, Shiv Lal Agarwal Publications.
2. Chemistry Yogbodh Prakshan.
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.

RAIPUR

BSCBT		Total Marks: 100
Semester – III		Internal Marks: 30
Paper Code-BSCBT- 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	

RAIPUR

(Subject Code-BSCBT 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

RAIPUR

Molecular Biology & Biophysics

Unit-I

- a. DNA, Structure, types and replication.
- b. RNA: Structure, types and function.
- c. Structure of gene and function.

Unit-II

- a. Genetic code: Types & Structure, Properties, codon assignment, secondary genetic code.
- b. Protein synthesis, Transcription & translation.
- c. Cancer and its mechanisms

Unit-III

- a. Gene Therapy
- b. Transposable elements
- c. DNA damage and repair
- d. Tissue engineering: General concept

Unit-IV

- a. Law of Thermodynamics
- b. Beer Lambert's law
- c. Hybridization Techniques
- d. DNA finger printing and its application

Unit-V

- a. Biophysics Introduction, scope and application
- b. Principle, structure and function of the following:
 - I. Spectroscopy
 - II. Electrophoresis
 - III. Centrifugation
 - IV. Colorimeter
 - V. Chromatography
 - VI. Elisa

Text Book/Reference:

Practical (BSCBT 401-P)
Molecular Biology & Biophysics

Lab Course:

1. Isolation of DNA from given sample.
2. Isolation of RNA from given sample.
3. Estimation of DNA from plant cells
4. Demonstration of Lab equipments:
 - (a) Laminar Air flow
 - (b) Autoclave
 - (c) Hot air oven
 - (d) Incubator
 - (e) Water bath
 - (f) Quebec colony counter
 - (g) Centrifuge
 - (h) Spectrophotometer
 - (i) Electrophoresis
 - (j) Camera lucida

Experiment (at least two) on the basis of electrophoresis

Zoology:-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

4. Osmoregulation
5. Physiology of Excretion- Urea and Urine formation
6. Thermoregulation
7. Definition and nomenclature of enzymes; classification of enzymes
8. Mechanism of enzyme action

Unit - IV: Neuromuscular Co- ordination

4. Structure and properties of nervous tissue
5. Physiology of nerve impulse conduction
6. Types of muscles and their properties
7. Ultra structure of muscles
8. 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. Goodenough. V., Genetics, New York Holt, Rinehart and Winston.
5. Gardner, Principles of Genetics, Wiley Eastern Pvt. Ltd.
6. Winchester, Genetics, Oxford IBH Publications.
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

Zoology:-Animal Physiology-(Practical)

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 .

Botany:-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 Taxometrics 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 embryo sac (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 Genetic'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



RAIPUR

BOTANY: BSCBT402B-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

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 and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT II

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, special 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 Am from 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 NH₃ and liquid SO₂.

Inorganic Chemistry-II (Practical's)

Calibration of fractional weights, pipettes and burettes. Preparation of standard solutions. Dilution- 0.1 M to 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 content 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 (dimethylglyoxime).

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, LiAlH_4 , and NaBH_4 .

UNIT IV

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

Nomenclature of ethers and methods of their formation, physical properties. Chemical reactions — cleavage and autoxidation, Ziesel'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.

RAIPUR

Organic Chemistry-II (Practical's)

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 acetanilide.

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Hindi-II

(Subject Code-BSCBT405)

LuKrd	dy val & 100
prfZl eLVj	vlrfjd eV; kdu &30
fgUhh Hk'k&u	clg; eV; kdu&70

bdkbZ&1 08

हिन्दी की उपभाषाओं का सामान्य परिचय—

1. पश्चिमी हिन्दी
2. पूर्वी हिन्दी
3. राजस्थानी
4. बिहारी
5. पहाड़ी

bdkbZ&2 08

राष्ट्रभाषा के रूप में हिन्दी का विकास—
खड़ी बोली का सम्पर्क भाषा के रूप में विकास

राजभाषा: तात्पर्य एवं महत्त्व
राष्ट्रभाषा हिन्दी की समस्याएँ

bdkbZ&3 08

देवनागरी लिपि—

- (1) विकास
- (2) नामकरण
- (3) विशेषताएँ

bdkbZ&4 08

कार्यालयीन पत्र —
परिपत्र, आदेश, अधिसूचना, ज्ञापन, अनुस्मारक

bdkbZ&5 08

पाठ संकलन—

1. कविता — पुष्प की अभिलाषा (माखनलाल चतुर्वेदी)
2. कहानी — उसने कहा था (चक्रधर शर्मा गुलेरी)
3. निबंध — लोभ और प्रीति (आचार्य रामचंद्र शुक्ल)

सहायक ग्रंथ:-

1. हिन्दी भाषा का उद्भव और विकास- उदय नारायण तिवारी
2. नागरी लिपि और उसकी समस्याएँ- नरेश मिश्र
3. नागरी लिपि और हिन्दी वर्तनी- बिहार हिन्दी ग्रंथ, अकादमी, पटना
4. राष्ट्रभाषा और राष्ट्रीय एकता- दिनकर, उदयांचल, पटना
5. राजभाषा के आन्दोलन में - राजनारायण दुबे, प्रकाशन संस्थान, दिल्ली
6. राष्ट्रभाषा और हिन्दी - राजेन्द्र मोहन भटनागर , के.ही. संस्थान, आगरा



RAIPUR



SEMESTER- V

RAIPUR

Biotechnology:- Immunology

Unit-I

- a. Immunology: general concept, Immunology: history,
- b. Organization of immune system, Antigen,
- c. Antibody and its types, Structure & function.
- d. Antigen- Antibody reaction.

Unit-II

- a. Antigen-Antibody interaction
- b. Immunohaematology general concept: (ELISA, RIA, Double Immuno Diffusion)
- c. Blood group system and its application
- d. Rh factor

Unit-III

- a. Hypersensitivity & its mechanism.
- b. Effectors mechanisms,
- c. Immunity of infectious diseases,
- d. Monoclonal antibodies

Unit-IV

- a. Vaccines: Ideal vaccines, Recombinant vaccines.
- b. Interferon
- c. Cytokines
- d. Autoimmunity: Introduction,

Unit-V

- a. Hemolytic anemia, Rheumatoid arthritis
- b. Hepatitis-A, Hepatitis-B, AIDS,
- c. Organ transplantation,
- d. Immunodeficient diseases (SCID, Reticular Dysgenesis)
- e.

Biotechnology: BSCBT501-P

Immunology

Lab Course:

1. Laboratory rule, equipment and tools for immunology laboratory.
2. To perform the Blood group detection.
3. To determine the Rh factor.
4. To perform the widal test.
5. To determine the VDRL TEST
6. To perform the double diffusion experiment.
7. To perform the ELISA test.

Zoology:-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

Applied Zoology-P

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

Botany:- 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 C₃ cycle; C₄ cycle; CAM plants; photorespiration. **Respiration:** ATP-the biological energy currency; aerobic and anaerobic respiration; Krebs'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 recombinant DNA technology; 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 Agrobacterium; 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 (4th edition). 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.

BSCBT502B-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

RAIPUR

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.

BSCBT503-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.

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BSCBT		Total Marks: 100
Communication Skill		Internal Marks: 30
Paper Code:- BSCBT504		External Marks: 70
		No. of Hours: 40
Unit No.	Details	Nos. of Hours
1	1.3 Introduction of Communication: 1.3.1 Purpose of Communication 1.3.2 Process of Communication 1.3.3 Difference between technical & General Communication 1.3.4 Types of Communication 1.3.5 Basics to Communication	8
2	2.2 Communication in Organisations: 2.2.1 Internal Communication – Stake Holders & channels in Internal Communication 2.2.2 External Communication- stake Holders & channels in External Communication 2.2.3 Communication Network- Scope & types, formal and Informal Communication Network 2.2.4 Language for Communication- General Principle, expressions & words to be avoided Grammar & usage	8
3	3.9 Writing Business Letter- 3.9.1 Importance, Structure, Format and types of Business Letters 3.10 Writing Memos, Circulars and Notice- 3.10.1 Importance, Structure, Format and Language of memo, circulars & Notice	8
4	4.3 Report Writing- 4.3.1 Features & Purpose of report Writing 4.3.2 Difference between business report & engineering report 4.3.3 Types of reports 4.3.4 Structure Format and language of report Writing	8
5	5.1 Meetings:- 5.1.10. Planning a Meeting 5.1.11. Agenda of Meeting 5.1.12. Minutes of Meeting 5.1.13. 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		

Subject Code-BSCBT505

ENVIROMENTAL SCIENCE

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, SO_x, NO_x, 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).



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SEMESTER- VI

UNIVERSITY OF RAIPUR

Biotechnology:- Plant, Environment and Industrial Biotechnology

Unit-I

- a. Plant cell and tissue culture: General introduction, history, scope, Application of tissue culture
- b. Concept of cellular differentiation
- c. Agro bacterium, Ti and Ri plasmid
- d. Bt gene and its mechanism, application

Unit-II

- a. Organogenesis, Embryogenesis, Protoplast isolation and fusion
- b. Germplasm storage and Cryopreservation
- c. Molecular marker (RFLP, RAPD),
- d. Edible vaccines

Unit-III

- a. General introduction and scope of environmental biotechnology
- b. Environmental pollution and its type
- c. Control of pollution through biotechnology
- d. Wastewater treatment: physical, chemical, and Biological

Unit-IV

- a. Bio-fertilizer, Biopesticide,
- b. Global environmental problem- General introduction, Ozone depletion, Acid rain.
- c. Green house effect
- d. IPR (Intellectual Property Right)

Unit-V

- a. Bioreactor and its type
- b. Fermentation (Lactic acid, alcohol)

- c. Maintenance of Industrial microorganisms
- d. Food technology- introduction, canning, packing and food preservation

Text Book/Reference:

1. Biotechnology: B.D. Singh, Kalyani Publication.
2. Biotechnology: U. Satyanarayan, Books & Allied Pvt.Ltd.
3. Biotechnology: V. Kumarsen, Saras Publication.
4. Plant Biotechnology: V. Kumarsen, Saras Publication.
5. Environmental Biotechnology: S.V.S. Rana, Second edition.
6. Biotechnology: K.C. Soni (Vol-V) College Book centre.
- 7.



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Biotechnology: BSCBT601-P

(Plant Environment & Industrial Biotechnology)

Lab Course:

1. Laboratory rule, equipment and sterilization technique.
2. To perform the sterilization of plant material.
3. To the Preparation of plant tissue culture media with culture technique.
4. To determine the total dissolved solid (TDS) of water sample.
5. To determine the dissolve oxygen (DO) of water sample.
6. To determine the Biological oxygen demand (BOD) of water sample.
7. To determine the Chemical oxygen demand (COD) of water sample.
8. To perform the most probable number (MPN) test from given water sample.
9. To perform the Production of citric acid by microorganisms.
10. To study the application of Biopesticide on microorganism.

Zoology:-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).

(Zoology:BSCBT602A-P)

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.

Botany:-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 (thermoperiodicity and vernalization), light (photoperiodism, halophytes and sciophytes) and salinity.

Unit 2

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

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, sanctuaries 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 (4th edition). 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. New Delhi.
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.

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

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Inorganic Chemistry-III

Unit -I

Bioinorganic Chemistry -I

Essential and trace element in biological processes, Metalloporphyrins 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, antiarthritits 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, electronegativity 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, sulphonic acids, sulphonamides and sulphaguanidine.

Reference Books:

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



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Inorganic Chemistry-III-P

List:

1. Synthesis Analysis

- a) Preparation of Sodium trioxalato ferrate (III), $\text{Na}_3[\text{Fe}(\text{COO})_3]$ and determination of its composition by Permanganometry.
- b) Preparation of Ni-DMG complex, $[\text{Ni}(\text{DMG})_2]$
- c) Preparation of copper tetraammine complex, $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$.
- d) Preparation of cis-and trans-bioxalato diaqua chromate (III) ion.

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

Organic Chemistry-III

Unit -I

Carbohydrates

Classification and Nomenclature, Monosaccharide, mechanism of osazon formation, interconversion of Glucose and Fructose, chain lengthening and chain shortening of Aldoses. Conversion of glucose into mannose. Configuration of monosaccharide, erythro and threo diastereoisomers. 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 monosaccharides. An introduction to glycosidic linkage in di- and poly-saccharides. 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. Soapnification value, iodine value, acid value. Soap and Detergents. Classification of Dyes, Chemistry and Synthesis of Methyl orange, Congo red, Malachite green, Crystal violet, Phenolphthalein, fluorescein, Alizarin and 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- Nomenclature of heterocyclic compound, Furan, pyrrole, pyridine, thiol method of preparation, properties and application.

Unit -IV

Amines : Structure and nomenclature of amines. physical properties. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity 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 ribonucleotides. 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

BSCBT604-P

External Marks: 30

Internal Marks: 20

Organic Chemistry-III- Practical

Laboratory Techniques

A Steam Distillation

Naphthalene from its suspension in water, clove oil from cloves
Separation of ortho and para-nitrophenols.

B Column Chromatography

Separation of fluorescein and methylene blue
Separation of leaf pigments from spinach leaves
Resolution of racemic mixture of (+,-) mandelic acid.

Qualitative Analysis

Analysis of an organic mixture containing two solid components using water, NaHCO_3 ,
 NaOH for separation and preparation of suitable derivatives.

Synthesis of Organic Compounds

- a) Acetylation of salicylic acid, aniline, glucose and hydroquinone. Benzoylation of aniline and phenol.
- b) Aliphatic electrophilic substitution- Preparation of iodoform from ethanol and acetone
- c) Aromatic electrophilic substitution.
- d) Nitration-Preparation of m-dinitrobenzene, p-nitroacetanilide.

- e) Halogenation- Preparation of p-bromoacetanilide, 2,4,6 tribromophenol.
- f) Diazotization/coupling- Preparation of methyl orange and methyl red.
- g) Oxidation- Preparation of benzoic acid from toluene.
- h) Reduction- Preparation of aniline from nitobenzene, m-nitroaniline from m_dinitrobenzene.



RAIPUR

(BSCBT 605) – HINDI

Lukrd	dy v& 100
"kBe~l eLVj	vkrfjd eV; kdu &30
fgUhh Hk'k&!!!	clg; eV; kdu&70

bdkbZ&1 **08**

मानक हिन्दी भाषा – मानक, अमानक, उपमानक भाषा
मीडिया के प्रमुख अंग एवं उनकी भाषा

1. समाचार पत्र
2. दूरदर्शन
3. आकाशवाणी
4. विज्ञापन

bdkbZ&2 **08**

(क) कथन की शैली – विवरणात्मक, मूल्यांकनपरक, व्याख्यापरक, विचारात्मक
(ख) विभिन्न संरचनाएँ – विनम्रतासूचक, विधिसूचक, निषेधपरक, कालबोधक,

bdkbZ&3 **08**

अनुवाद – स्वरूप , महत्व, अनुवाद प्रक्रिया, अनुवादक की विशेषताएँ हिन्दी में पदनाम,
हिन्दी अपठित

bdkbZ&4 **08**

संधि, समास एवं संक्षिप्तियाँ

bdkbZ&5 **08**

पाठ संकलन –

1. कविता – भूलगलती (गजानन माधव मुक्तिबोध)
2. कहानी – ईदगाह (प्रेमचंद)
3. निबंध – डॉ. खूबचंद बघेल (हरि ठाकुर)

R A I P U R