



MADHYANCHAL

PROFESSIONAL UNIVERSITY

Draft Rules & Syllabus for the
Bachelor of Science in Biology
(B.Sc. life science) Course

Semester I

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week.			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS101	Botany-I	60	20	20	100	20	10	20	50	3	1	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS102	Chemistry-I	60	20	20	100	20	10	20	50	3	1	2	6	
3	BSCLS103	Zoology-I	60	20	20	100	20	10	20	50	3	1	2	6	
4	BSCFC104	Communicative English	60	20	20	100	-	-	-	-	4	-	-	4	
5	BSCFC105	Communicative Hindi	60	20	20	100					4	-	-	4	
		Total	300	100	100	500	60	30	60	150	17	3	6	26	650

Semester II

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week.			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem.	Quiz, Assignmen	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS201	Botany-II	60	20	20	100	20	10	20	50	3	1	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS202	Chemistry-II	60	20	20	100	20	10	20	50	3	1	2	6	
3	BSCLS203	Zoology-II	60	20	20	100	20	10	20	50	3	1	2	6	
4	BSCFC204	Environmental Science	60	20	20	100	-	-	-	-	4	-	-	4	
5	BSCFC205	Enterprenureship Development	60	20	20	100					4	-	-	4	
		Total	300	100	100	500	60	30	60	150	17	3	6	26	650

Scheme for Semester-III

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS301	Botany-III	60	20	20	100	20	10	20	50	4	0	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS302	Chemistry-III	60	20	20	100	20	10	20	50	4	0	2	6	
3	BSCLS303	Zoology-III	60	20	20	100	20	10	20	50	4	0	2	6	
4	BSCFC304	Aptitude –I	60	20	20	100	-	-	-	-	3	1	-	4	
5	BSCFC305	Computer Application	60	20	20	100	-	-	-	-	3	1		4	
Total			300	100	100	500	60	30	60	150	18	2	6	26	650

Scheme for Semester-IV

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS401	Botany-IV	60	20	20	100	20	10	20	50	4	0	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS402	Chemistry-IV	60	20	20	100	20	10	20	50	4	0	2	6	
3	BSCLS403	Zoology-IV	60	20	20	100	20	10	20	50	4	0	2	6	
4	BSCFC404	Internet Fundamentals And Web Tools	60	20	20	100	-	-	-	-	3	1	-	4	
5	BSCFC405	Aptitude-II	60	20	20	100	-	-	-	-	3	1	-	4	
		Total	300	100	100	500	60	30	60	150	18	2	6	26	650

SEMESTER-V

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem	Total Marks					
1	BSCLS 501	Botany-V	60	20	20	100	20	10	20	50	4	0	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS 502	Chemistry V	60	20	20	100	20	10	20	50	4	0	2	6	
3	BSCLS 503	Zoology -V	60	20	20	100	20	10	20	50	4	0	2	6	
4	BSCLS 504	Hindi Language (Bhasha Kaushal aur Sanchar Sadhan)Botany-V	60	20	20	100	-	-	-	-	3	1	-	4	
5	BSCLS 505	Computer & Information Technology Basics-I	60	20	20	100	-	-	-	-	3	1	-	4	
Total			300	100	100	500	60	30	60	150	18	2	6	26	650

SEMESTER –VI

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								Hours per week			Total Credits	Remarks
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem	Total Marks					
1	BSCLS601	Botany -VI	60	20	20	100	20	10	20	50	4	0	2	6	One credit refers to one hour teaching in theory, Tutorial
2	BSCLS602	Chemistry -VI	60	20	20	100	20	10	20	50	4	0	2	6	
3	BSCLS603	Zoology-VI	60	20	20	100	20	10	20	50	4	0	2	6	
4	BSCLS604	English Language and Aspects of Development	60	20	20	100	-	-	-	-	3	1	-	4	
5	BSCLS605	DBMS	60	20	20	100	-	-	-	-	3	1	-	4	
	Total		300	100	100	500	60	30	60	150	18	2	6	26	650

Semester-I

BSCLS101 Botany I

Unit 1: Microbes

Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance;

Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

Unit 2: Algae

General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Vaucheria*, *Fucus*, *Polysiphonia*. Economic importance of algae

Unit 3: Fungi and Introduction to Archegoniate

Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium*, *Alternaria* (Ascomycota), *Puccinia*, *Agaricus* (Basidiomycota); Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance. Unifying features of archegoniates, Transition to land habit, Alternation of generations.

Unit 4: Bryophytes and Pteridophytes

General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of *Sphagnum*.

General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to 11 family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris*. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.

Unit 5: Gymnosperms

General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus*. (Developmental details not to be included). Ecological and economical importance.

Suggested Readings

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

BSCLS101 Botany-I

PRACTICAL

- EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
- Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
- Gram staining
- Study of vegetative and reproductive structures of *Nostoc*, *Chlamydomonas* (electron micrographs), *Oedogonium*, *Vaucheria*, *Fucus** and *Polysiphonia* through temporary Preparations and permanent slides. (* *Fucus* - Specimen and permanent slides)
- *Rhizopus* and *Penicillium*: Asexual stage from temporary mounts and sexual structures through permanent slides.
- *Alternaria*: Specimens/photographs and tease mounts.
- *Puccinia*: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
- *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
- Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
- Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
- *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup,
- w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
- *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
- *Selaginella*- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m.

microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).

- ***Equisetum***- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m.spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).
- ***Pteris***- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).
- ***Cycas***- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s.microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
- ***Pinus***- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

BSCLS102 Chemistry-I

UNIT I

Atomic Structure:

- Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.
- What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2 , Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wavefunctions (atomic orbitals) and their variations for $1s$, $2s$, $2p$, $3s$, $3p$ and $3d$ orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to $1s$ and $2s$ atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms . Shapes of s , p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms).
- Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

UNIT II

Chemical Bonding and Molecular Structure

- Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability.
- Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bonding:

- VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.
- Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach:

- Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO⁺. Comparison of VB and MO approaches.

Section B: Organic Chemistry-1

UNIT III

Fundamentals of Organic Chemistry

- Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.
- Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.
- Reactive Intermediates: Carbocations, Carbanions and free radicals.
- Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.

Stereochemistry

- Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis – trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

UNIT IV

Aliphatic Hydrocarbons

- Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes:

- (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.

UNIT V

Alkenes:

- (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO_4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymercuration-demercuration, Hydroboration-oxidation.

Alkynes:

- (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.
- Reactions: formation of metal acetylides, addition of bromine and alkaline KMnO_4 , ozonolysis and oxidation with hot alk. KMnO_4 .

Reference Books:

- Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
- Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India, 2006.
- Graham Solomon, T.W., Fryhle, C.B. & Snyder, S.A. Organic Chemistry, John Wiley & Sons (2014).
- McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988).
- Eliel, E.L. Stereochemistry of Carbon Compounds, Tata McGraw Hill education, 2000.
- Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.

BSCLS 102 Chemistry

- PRACTICAL

Section A: Inorganic Chemistry - Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with KMnO_4 .
3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO_4 .
4. Estimation of Fe (II) ions by titrating it with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal indicator.
5. Estimation of Cu (II) ions iodometrically using $\text{Na}_2\text{S}_2\text{O}_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)

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- (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography
- (b) Identify and separate the sugars present in the given mixture by paper chromatography.

BSCLS103 Zoology-I

Unit 1: Kingdom Protista

- General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa

Unit 2: Phylum Porifera, Phylum Platyhelminthes, Phylum Cnidaria, Phylum Nematelminthes

- General characters and classification up to classes; Canal System in *Sycon*
- General characters and classification up to classes; Polymorphism in Hydrozoa
- General characters and classification up to classes; Life history of *Taenia solium*
- General characters and classification up to classes; Life history of *Ascaris lumbricoides* and its parasitic adaptations

Unit 3: Phylum Annelida

- General characters and classification up to classes; Metamerism in Annelida

Unit 4: Phylum Arthropoda

- General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in Insects

Unit 5: Phylum Mollusca, Phylum Echinodermata

- General characters and classification up to classes; Torsion in gastropods
- General characters and classification up to classes; Water-vascular system in Asteroidea

BLS 103 ANIMAL DIVERSITY

PRACTICAL

- Study of the following specimens:

Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Hyalonema, nd Euplectella, Obelia, Physalia, Aurelia, Tubipora, Metridium, Taenia solium, Male and female Ascaris lumbricoides, Aphrodite, Nereis, Pheretima, Hirudinaria, Palaemon, Cancer, Limulus Palamnaeus, Scolopendra, Julus, Periplaneta, Apis, Chiton, Dentalium, Pila, Unio Loligo, Sepia, Octopus, Pentaceros, Ophiura, Echinus, Cucumaria and Antedon, Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla, Ichthyophis/Ureotyphlus, Salamandra, Bufo, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Crocodylus, Gavialis, Any six common birds from different orders, Sorex, Bat, Funambulus, Loris Study of the following permanent slides:

- T.S. and L.S. of *Sycon*, Study of life history stages of *Taenia*, T.S. of Male and female *Ascaris*
- Key for Identification of poisonous and non-poisonous snakes
- An “**animal album**” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

SUGGESTED READINGS

1. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
3. Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
4. Pough H. *Vertebrate life*, VIII Edition, Pearson International.
5. Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.

BSCFC104 ENGLISH LANGUAGE

Unit I: Vocabulary Building

- 1a. Prefixes and Suffixes
- 1b. Conversion
- 1c. Compounding
- 1d. Analogy
2. One-Word Substitutes
3. Words Often Confused
4. Synonyms and Antonyms
5. Phrasal Verbs

Unit II: Grammar - 1

1. Types of Verbs
2. Subject-Verb Agreement

Unit III: Grammar - 2

1. Meanings of Modals
2. Tense (Present and Past) and Aspect
3. The Several Possibilities for Denoting Future Time
4. Articles and Prepositions

Unit IV: Listening Skills

1. The Importance of Listening
2. Types of Listening
3. Barriers/Obstacles to Effective Listening
4. Strategies for Effective Listening

Unit V: Reading Skills

1. Skimming
2. Scanning

BSCFC105 HINDI LANGUAGE & MORAL VALUES

इकाई १ हिंदी भाषा

- १ स्वतंत्रता पुकारती (कविता) - जय शंकर प्रसाद
- २ पुष्प की अभिलाषा (कविता) - माखन लाल चतुर्वेदी
- ३ वाक्य संरचना और अशुद्धियाँ (संकलित)

इकाई २ हिंदी भाषा

- १ नमक का दरोगा (कहानी) - प्रेमचंद
- २ एक थे राजा भोज (निबंध) - डॉ त्रिभुवन नाथ शुक्ल
- ३ पर्यायवाची, विलोम, एकार्थी, अनेकार्थी एवं शब्दयुग्म शब्द (संकलित)

इकाई ३ हिंदी भाषा

- १ भगवान बुद्धा (निबंध) - स्वामी विवेकानंद
- २ लोकतंत्र एक धर्म है (निबंध) - डॉ सर्वपल्ली राधाकृष्णन
- ३ नहीं रूकती है नदी - हीरालाल बाछोतिया
- पल्लवन

इकाई ४ हिंदी भाषा

- १ अफसर (निबंध) - शरद जोशी
- २ हमारी सांस्कृतिक एकता (निबंध) - रामधारी सिंह दिनकर (एक भारत श्रेष्ठ भारत के अंतर्गत)
- ३ संक्षेपण (संकलित)

इकाई ५ हिंदी भाषा

- नैतिक मूल्य परिचय एवं वर्गीकरण (आलेख) - डॉ शशि राय
- आवरण की सभ्यता (निबंध) - सरदार पूरणसिंह
- अंतर्ज्ञान और नैतिक जीवन (लेख) - डॉ सर्वपल्ली राधाकृष्णन
- अप्य दीपो भव (लेख) - स्वामी श्रद्धानन्द

Semester-II

BSCLS 201 Botany-II

Unit 1: Introduction to plant Ecology, Ecological factors

Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Unit 2: Plant communities & Ecosystem

Characters; Ecotone and edge effect; Succession; Processes and types. Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit 3: Phytogeography

Principle biogeographical zones; Endemism

Unit 4: Introduction to plant taxonomy

Identification, Classification, Nomenclature. Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Unit 5: Plant identification

Ranks, Categories and taxonomic groups, principles and rules (ICN) : ranks and names :binomial nomenclature system , typification ,author citation , valid publication , rejection of names , principal of priority and its limitations, Types of classification –artificial , natural and phylogenetic . Bentham and Hooker's (upto series), Engler and Prantl (upto series)

BSCLS 201 Botany-II

PRACTICALS

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each).
(b) Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
6. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
7. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): Brassicaceae - *Brassica*, *Alyssum* / *Iberis*; Asteraceae - *Sonchus/Launaea*, *Vernonia/Ageratum*, *Eclipta/Tridax*; Solanaceae - *Solanum nigrum*, *Withania*; Lamiaceae - *Salvia*, *Ocimum*; Liliaceae - *Asphodelus* / *Lilium* / *Allium*.
8. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Suggested Readings

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). *Plant Systematics*. Elsevier Academic Press, San Diego, CA, U.S.A.

BSCLS202 CHEMISTRY-II

UNIT 1

Physical Chemistry-1

Chemical Energetics

- Review of thermodynamics and the Laws of Thermodynamics.
- Important principles and definitions of thermochemistry. Concept of standard state
- standard enthalpies of formations, integral and differential enthalpies of solution and dilution.
- Calculation of bond energy, bond dissociation energy and resonance energy from
- Thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.

UNIT 2

Chemical Equilibrium:

- Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG_0 , Le Chatelier's principle. Relationships between K_p , K_c and K_x for reactions involving ideal gases.

Ionic Equilibria:

- Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases,
- pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Organic Chemistry-2

- Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

UNIT 3

Aromatic hydrocarbons

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation.

Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene).

Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Upto 5 Carbons)

- Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions.
- Preparation: from alkenes and alcohols.
- Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's
- Ether synthesis: Elimination vs substitution.

Aryl Halides

- Preparation: (Chloro, bromo and iodo-benzene case): from phenol,
- Sandmeyer & Gattermann reactions.
- Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by -OH group)
- Effect of nitro substituent. Benzyne Mechanism: KNH₂/NH₃ (or NaNH₂/NH₃).
- Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

UNIT IV

Alcohols, Phenols and Ethers (Upto 5 Carbons)

Alcohols: Preparation: Preparation of 1o, 2o and 3o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.

- Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO₄, acidic dichromate, conc. HNO₃). Oppeneauer oxidation
- Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts.

Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben-Hoesch Condensation, Schotten – Baumann Reaction.

UNIT V

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic):

- Formaldehyde, acetaldehyde, acetone and benzaldehyde
- Preparation: from acid chlorides and from nitriles.
- Reactions – Reaction with HCN, ROH, NaHSO₃, NH₂-G derivatives. Iodoform test. Aldol
- Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemmensen reduction and Wolff Kishner reduction. Meerwein-Ponndorf Verley reduction.

Reference Books:

- Graham Solomon, T.W., Fryhle, C.B. & Snyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry*, S. Chand, 2010.
- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
- Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).

BSCLS 202 CHEMISTRY-II

PRACTICALS

Section A: Physical Chemistry

Thermochemistry

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO₃, NH₄Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH .

Ionic equilibria pH measurements

- a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
- b) Preparation of buffer solutions:
 - (i) Sodium acetate-acetic acid
 - (ii) Ammonium chloride-ammonium hydroxideMeasurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
2. Criteria of Purity: Determination of melting and boiling points.
3. Preparations: Mechanism of various reactions involved to be discussed.
Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
 - (a) Bromination of Phenol/Aniline
 - (b) Benzoylation of amines/phenols
 - (c) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

Reference Books

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).

BSCLS203 Zoology-II

UNIT :1 Protchordates & Agnetha

- General features and phylogeny of protochordata
- General features og Agnetha and classification of cyclostomes up to classes

UNIT :2 Pisces & amphibia

- General features and classification up to orders ; Osmoregulation in fishes
- General features and classification up to orders ; Parental care

UNIT :3 Reptiles

- General features and classification up to orders ; Poisonous and nonpoisonous snakes , biting mechanism of snake

UNIT 4: Aves

- General features and classification up to orders; Flight adaptation in birds

UNIT 5: Mammals

- Classifiaction upto orders ; origin of mammals

REFERENCE BOOKS

- Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.

BSCLS 203 ZOOLOGY -II

PRACTICALS

LIST OF EXPERIMENTS

1. Balanoglossus, Herdmania , Branchiostoma
2. Petromyzon, Sphyrna , Pridtis , Trpido , LABio
3. Exocoetus , Anguilla, Ichthyophis\ Ureotphlus, Salamandra , Bufo,Hyla, CHelone,
4. Hemidactylus, Chamaeleon , Draco, Vipera,Naja , Crocodylus , Gavialis
5. Any six common birds from different orders , Sorex, Bat, Funambulus ,Loris
6. Study of the following permanent slides : T.S. and L.S, of Sycon
7. Study of life history stages of Taenia
8. T.S. of male and female Ascaris
9. Key for identification of poisonous and nonpoisonous snake
10. An “animal album “ containing photographs , cut outs with appropriate write up about the above mentioned taxa. Different taxa/ toic may be given to different sets of students for this purpose .

NOTE : Minimum 8/10 experiments to be performed

SUGGESTED READINGS

- Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
- Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.
- Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.
- Gilbert, S. F. (2006). *Developmental Biology*, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
- Balinsky, B.I. (2008). *An introduction to Embryology*, International Thomson Computer Press.
- Carlson, Bruce M (1996). *Patten's Foundations of Embryology*, McGraw Hill, Inc.

BSCFC204 ENVIRONMENTAL STUDIES

Unit-I : Natural Resources: Definition, scope and importance. Need for public awareness. Brief description of;

1. Forest resources: Use and over-exploitation. Deforestation; timber extraction, mining, dams. Effect of deforestation environment and tribal people
2. Water resources: Use and over-utilization. Effects of over utilisation of surface and ground water. Floods, drought.
3. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
4. Food resources: World food problems, Effects of modern agriculture; fertilizer-pesticide, salinity problems. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
5. Land resources: Land as resources, land degradation, man induced landslides, soil erosion and desertification

Unit-II: Ecosystems, Biodiversity and its conservation

1. Concept of an ecosystem
2. Structure and function of an ecosystem
3. Producers, consumers and decomposers
4. Food chains, food webs and ecological pyramids
5. Characteristic features of the following ecosystems:-
6. Forest ecosystem, Desert ecosystem, Aquatic ecosystem.
7. Value of biodiversity: Consumptive use, productive use. Biodiversity in India.
8. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.
9. Endangered and endemic species of India
10. Conservation of biodiversity

Unit-III: Environmental Pollution

1. Definition
2. Causes, effects and control measures of :-
3. Air pollution
4. Water pollution
5. Soil pollution
6. Noise pollution
7. Solid waste management; Measures for safe urban and industrial waste disposal
8. Role of individual in prevention of pollution
9. Disaster management: Drought, floods and cyclones

Unit-IV: Social Issues and the Environment

1. From Unsustainable to Sustainable development
2. Water conservation, rain water harvesting, watershed management.
3. Climate change, global warming, ozone layer depletion,
4. Environment protection Act
5. Wildlife Protection Act, Forest Conservation Act

Unit-V : Human Population and the Environment

1. Population explosion, impact on environment.
2. Family welfare Programme.
3. Environment and human health.
4. Women and Child Welfare.
5. Value Education.
6. Role of Information Technology in Environment and humanhealth.

Reference Books:

- 1.Environmental Studies by Dr.M.Satyanarayana, Dr. M.V. R.K.Narasimhacharyulu, Dr.G. Rambabu and Dr.V.VivekaVardhani, Published by Telugu Academy, Hyderabad.
- 2.Environmental Studies by R.C.Sharma, Gurbir Sangha, published by Kalyani Publishers.
- 3.Environmental Studies by Purnima Smarath, published by Kalyani Publishers

BSCFC205 ENTREPRENEURSHIP DEVELOPMENT

Unit-I:

Entrepreneurship: Entrepreneur characteristics – Classification of Entrepreneurships – Incorporation of Business – Forms of Business organizations –Role of Entrepreneurship in economic development –Start-ups.

Unit-II:

Idea Generation and Opportunity Assessment: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for generating ideas – Opportunity Recognition – Steps in tapping opportunities.

Unit-III:

Project Formulation and Appraisal : Preparation of Project Report –Content; Guidelines for Report preparation – Project Appraisal techniques –economic – Steps Analysis; Financial Analysis; Market Analysis; Technical Feasibility.

Unit-IV:

Institutions Supporting Small Business Enterprises: Central level Institutions: NABARD; SIDBI, NIC, KVIC; SIDIO; NSIC Ltd; etc. – state level Institutions –DICs- SFC- SSIDC- Other financial assistance.

Unit-V:

Government Policy and Taxation Benefits: Government Policy for SSIs- tax Incentives and Concessions –Non-tax Concessions –Rehabilitation and Investment Allowances.

Reference Books:

1. Arya Kumar, Entrepreneurship, Pearson, Delhi, 2012.
2. Poornima M.CH., Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi,2009
3. Michael H. Morris, ET. al., Entrepreneurship and Innovation, Cen gage Learning, New Delhi, 2011
4. Kanishka Bedi, Management and Entrepreneurship, Oxford University Press, Delhi, 2009
5. Anil Kumar, S., ET.al., Entrepreneurship Development, New Age International Publishers, New Delhi, 2011
6. Khanka, SS, Entrepreneurship Development, S. Chand, New Delhi.

SEMESTER-III

BSCLS301 BOTANY-III

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical			Theory	Practical
			End Sem	Mid Sem	Assi gn.	La b Wo rk	Assign ment /Quiz/ Term paper	End Sem		
BSCLS301	BotanyIII	6(4+2)	60	20	20	20	10	20	3hr	3hr

OBJECTIVES:

Students will be able to understand following aspects:

- Histological organization of root, stem and leaves of Monocotyledons and Dicotyledons.
- Economic importance of different plants groups.
- Ethnobotanical importance of plants.

UNIT – I

The Root system: Root apical meristem, Differentiation of primary and secondary tissues and their roles, Anatomy of Monocotyledons and Dicotyledons roots, Morphological modification of root for storage, respiration, reproduction and interaction with microbes.

UNIT – II

The Shoot system: Shoot apical meristem and histological organization, Anatomy of primary stem in Monocotyledons and Dicotyledons, Secondary growth in stem and root – Vascular cambium and its functions, Characteristics of growth rings, Sapwood and Heart wood, Secondary Phloem, Cork Cambium and Periderm. Primary and secondary anomalous structure with special reference to *Salvadora*, *Bignonia*, *Achyranthes*, *Boerhavia*, *Dracaena*.

UNIT – III

The Leaf system: Origin, Development, Diversity in size, shape and arrangement, internal structure of Monocotyledons and Dicotyledons leaf in relation to photosynthesis and water loss, Adaptations to water stress, senescence and abscission.

UNIT – IV

Study the economic botany of the following: Cereals: *Triticum*, *Zea*; Pulses: *Glycine max*, *Cajanus cajan*; Fibres: Classification; *Gossypium*, *Crotalaria*, *Corchorus*; artificial fibres; Wood: Classification and properties: *Shorea*, *Tectona*, *Pinus*, *Cedrus*; Paper: Raw materials and manufacture; Sugar: Sugarcane, Beet.

UNIT – V

Study of economic uses of the following: Medicinal Plants: *Rauwolfia*, *Datura*, *Cinchona*, *Papaver*; Beverages: Alcoholic, Non-alcoholic and tea and coffee; Spices and condiments: *Coriandrum*, *Cuminum*, *Ferula*, *Curcuma*, *Trigonella*, *Elettaria*, *Capsicum*, *Piper*, *Zingiber*; Oil: *Arachis*, *Cocos*, *Helianthus*.

Ethnobotany: Introduction; Aims and Objectives; knowledge of important plants of various groups from Ethnobotanical point of view as food, fodder and Medicine with special reference to Madhya Pradesh.

COURSE LEARNING OUTCOME

Students will be able to understand histological organization of root, stem and leaves of Monocotyledons and Dicotyledons; Economic importance of different plants groups. Ethnobotanical importance of plants.

REFERENCES BOOKS-

- Structure, development & Reproduction in flowering plants Dr. Niranjana Shrotriya and Dr. Archana Shrotriya.
- Dr. S.B. Agarwal and Dr. V.K. Agarwal, Unified Botany.
- Hill, A.H.: Economic Botany, McGraw Hill Book Co., 1952.
- Text book of botany, Angiosperms, Singh, Pandey and Jain

BSCLS301 BOTANY -III**PRACTICAL**

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical			Theory	Practical
			End Sem	Mid Sem	Assign.	Lab Work	Assignment /Quiz/Term paper	End Sem		
BSCLS301	Botany-III	2	-	-	-	20	10	20		3 hr

List of Practical

1. Study of transverse section of monocot stems: *Zea mays*, *Triticum etc*
2. Study of transverse section of dicot stems: *Cicer*, *Helianthus*, *Cucurbita*, *Tinospora*, *Bignonia*, *Boerhavia*
3. Study of transverse section of monocot and dicot roots: *Zea mays*, *Triticum*, *Cicer*, *Helianthus*
4. Study of cross section of monocot and dicot leaves: *Zea mays*, *Triticum*, *Mangifera*, *Nerim*
5. Project related to economic botany, ethnobotany
6. Field visit to study ethnobotanical aspect of a rural area.
7. Project related to plant anatomy
8. Spotting

BSCLS302 CHEMISTRY-III

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								Credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem.	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCLS302	Chemistry-III	60	20	20	100	20	10	20	50	4	0	2	6

OBJECTIVES:

Objective of these papers is to explain students about fundamentals and laws of thermodynamics and concept of heat and work.

To explain Entropy, Chemical equilibrium and buffers; properties of elements of transition series, Coordination Compounds, Oxidation and Reduction.

To give knowledge about Electromagnetic spectrum, Nomenclature, structure and bonding of Alcohol and Phenols

UNIT I

Physical Chemistry

Thermodynamics-1 Definition of thermodynamic terms: System, surrounding, 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: Joule Thomson coefficient.

Calculation of w , q , dU and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process. Thermochemistry: Standard state, standard enthalpy of formation: Hess's Law of heat summation and its application. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization.

Second Law of Thermodynamics- Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

UNIT II

Thermodynamics-II

(a) Concept of entropy: Entropy as a state function, entropy as a function of P&T, entropy change in physical change, Clausius inequality, entropy as criteria of spontaneity and equilibrium.

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 a thermodynamic quantities, A and G as a criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change.

(b) Chemical equilibrium Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chateliers's principle ,Clapeyron equation and Clausius- Clapeyron equation, applications.

(c) Buffers: Mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts.

UNIT III

Inorganic Chemistry

Chemistry of elements of I transition series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds such as carbides, oxides and sulphides. Complexes illustrating relative stability of their oxidation states General characteristics, oxidation states, magnetic behaviour, spectral properties and stereochemistry

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, spectral properties and stereochemistry.

UNIT-IV

(a) **Coordination Compounds:** Werner's coordination theory and its experimental verification, EAN Concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, VBT of transition metal complexes.

(b) **Oxidation and Reduction:** Use of redox potential data, analysis of redox cycle, redox stability in H₂O: Frost, Latimer and Pourbaix diagram. Principle involved in the extraction of elements.

UNIT-V

Organic Chemistry

(a) **Alcohols:** 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, pinacole-pinacolone rearrangement. Trihydric alcohols-nomenclature and methods of formation, chemical reactions of glycerol

(c) **Phenols:** 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: electrophillic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Riemer- Tiemann reaction

COURSE LEARNING OUTCOMES:

It will help students to understand practical aspects of Laws of Thermodynamics, chemical equilibrium and preparation and application of different Buffer solutions. Students will be able to understand oxidation states, magnetic behaviour, spectral properties and stereochemistry of elements of Transition Series. It will enhance understanding of properties and application of absorption spectrum and UV absorption spectroscopy. Structure and bonding, physical properties and preparation of Alcohol and Phenols

Reference Books

1. Unified Chemistry M. N. Tondan B.Sc. III SEM
2. Unified Practical Chemistry M. N. Tondan B.Sc. II Year
3. Unified Chemistry B.Sc. III SEM Yugbodh Publication
4. Unified Practical Chemistry B.Sc. II Year
5. Organic Chemistry Mukherjee

BSCLS302 Chemistry -III

PRACTICAL

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Credit			Total Credits		
			Theory				Practical			L	T	P			
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem					Total Marks	
1	BSCLS302	Chemistry-III						20	10	20	50			2	2

List of Practical

- Calibration of the fractional weights, pipettes and burettes. Preparation of standard solutions. Dilution of 0.1 M to 0.001 M solutions.
- Quantitative analysis -Volumetric analysis.
- Determination of acetic acid in commercial vinegar using NaOH.
- Determination of alkali content- antacid tablet using HCl.
- Estimation of calcium content in chalk as calcium oxalate by permagnometry.
- Estimation of hardness of water by EDTA
- Gravimetric analysis:
 - Barium as barium sulphate
 - Organic Chemistry Laboratory Techniques
 - Thin layer chromatography
 - Determination of Rf values and identification of organic compounds.
 - Separation of green leaf pigments (spinach leaves may be used).
 - Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:6).
 - Separation of a mixture of dyes using cyclohexane and ethylacetate (8:5:1.5). B. Paper chromatography: Ascending and Circular Determination of Rf values and identification of organic compounds
 - Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid. Spray reagent ninhydrin.
 - Separation of a mixture of DL-alanine, glycine and L-leucine using nbutanol: acetic acid: water (4:1:5). Spray reagent ninhydrin.
 - Separation of monosaccharides- a mixture of D-galactose and Dfructose using n-butanol: acetone: water (4:1:5). Spray reagent-aniline hydrogen phthalate.

BSCLS303 ZOOLOGY -III

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								Credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem.	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCLS303	Zoology - III	60	20	20	100	20	10	20	50	4	0	2	6

OBJECTIVE

To explain students about structure of cell and Nuclear Organization; developmental biology, Chromosome, Role of nucleus and nucleolus in nucleocytoplasmic, Chemistry of Gene; Split genes, overlapping genes and Pseudo genes and Mendalism

UNIT I:

The cell – History of Cell Biology, Cell theory, Prokaryotic and Eukaryotic cell. Nuclear Organization of cell, Extra nuclear organization of cell, Cell reproduction – Amitosis, mitosis, meiosis

UNIT-II

Parthenogenesis, Gametogenesis, Fertilization, Patterns of cleavage, Frog and chick Embryology upto the formation of three germinal layers, Concept of competence, determination and differentiation, Concept of regeneration

UNIT-III

Chromosome: The Physical basis of heredity and transmitters of heredity; Types of chromosomes: Lampbrush, salivary gland and Beta Chromosomes; Nucleocytoplasmic interactions: Ultra structure of nucleus, nucleolus, Role of nucleus and nucleolus in nucleocytoplasmic interactions including Synthesis & Export of RNA, transport of Proteins.

UNIT IV:

Chemistry of Gene; Split genes, overlapping genes and Pseudo genes, ; Nucleic Acids and their structure; Genetic Code; Gene Expression and Regulation; Cytoplasmic inheritance: Maternal effect on limnea (Shell Coiling), Kappa particles in Paramecium. Transcription in Prokaryotes and Eukaryotes; Translation in Eukaryotes

UNIT V:

Mendel's laws of heredity, Kinds of variations-Genetic basis of variation. Linkage and Chromosomal Aberrations: Gene Linkage: Kinds and Theories of linkage, significance of linkage, Sex Chromosomes System: Sex differentiation, chromosome theory of sex determination., Sex linked inheritance (Haemophilia, Colour blindness), Structural changes in chromosomes; Numerical changes in chromosomes. Mutation: Types of Mutation, Causes of mutation, Mutagens- classification, Types & effects.

COURSE LEARNING OUTCOMES

Students will be able to understand about structure of cell and Nuclear Organization; developmental biology, Chromosome, Role of nucleus and nucleolus in nucleocytoplasmic, Chemistry of Gene; Split genes, overlapping genes and Pseudo genes and Mendalism and Mutation.

Reference Books:

1. Genetics –Mohan .p. Arora , Gurdarshan S . Sandhu
2. Genetics – P.K. Gupta,
3. Unified Zoology – U.K. Tiwari and V.K. Singh
4. R.P.Unified Zoology – Dr. S.M. Saxena

BSCLS303 ZOOLOGY -III**PRACTICAL**

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								Credit			Total Credits	
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS303	Zoology-III						20	10	20	50			2	2

LIST OF PRACTICAL

1. Identification of spots related to theory.
2. Squash preparation of onion root tip / Chironomous larva salivary gland/grass hopper testis.
3. Study of instruments techniques related to applied genetics – PCR, Gel electrophoresis, DNA fingerprinting etc.
4. Problems based on genetics.

BSCFC304 APTITUDE-I

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem.	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCFC304	Aptitude - I	60	20	20	100					3	1		4

Objective: The aim of this course is to ensure that students are synthesizing the material, understanding key concepts, and making abstract connections through testing of a comprehensive nature.

Unit-1: General Intelligence & Reasoning: Analogy, Blood Relation, Classification, Coding-Decoding, Direction and Distance, Matrix, Non-verbal reasoning, puzzles, series.

Unit-2: General Awareness: Current affairs, Govt. Project & Scheme, Basic science and symbols, sports awareness, economics, new innovations, people in news.

Unit-3 : English Comprehension: Error spotting, one word substitution, phrases and idioms, reading comprehension, sentence correction, spelling correction.

Unit-4 : Quantitative Aptitude-I: Algebra, averages, data interpretation, interest, mensuration, number systems, percentage.

Unit-5: Quantitative Aptitude-II: Ratio and proportion, problem on age, simplification, speed, distance and time, trigonometry.

Learning Outcome: Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.

Reference Books :

1. Quantitative Aptitude for Competitive Examination by Pearson edition.
2. Quantitative Aptitude and Reasoning by R.V. Parveen.
3. Quantitative Aptitude by R. S. Agrawal
4. A Comprehensive grammar of english by G. N. Verma
5. For New and Knowledge – The Hindu, Times of India and Economics Times.

BSCFC 305 COMPUTER APPLICATIONS

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem.	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCFC305	Computer Applications	60	20	20	100					3	1		4

OBJECTIVE

To explain students about basics of computer, memory devices in computer, MS DOS, windows, MS word, Excel and power point.

UNIT-I:

Basics of Computers :Definition of a Computer - Characteristics and Applications of Computers Block Diagram of a Digital Computer – Classification of Computers based on size and working Central Processing UNIT – I/O Devices.

UNIT II

Primary, Auxiliary and Cache Memory – Memory Devices. Software, Hardware, Firmware and People ware – Definition and Types of Operating System – Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Pane.

UNIT III

Features of MS-Word – MS-Word Window Components – Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Equations – Spelling and Grammar – Thesaurus – Mail Merge

UNIT IV:

Features of PowerPoint – Creating a Blank Presentation - Creating a Presentation using a Template - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures - Inserting Other Objects, Audio, Video - Resizing and Scaling of an Object – Slide Transition – Custom Animation

UNIY-V

MS-Excel: Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Formulae, Referencing cells – Inserting Rows/Columns – Changing column widths and row heights, auto format, changing font sizes, colors, shading.

COURSE LEARNING OUTCOMES

Students will be able to understand practical aspects of basics of computer, functions of operating systems, memory devices in computer, MS DOS, windows, MS word, table preparation, page set up, Excel and power point.

Reference Books:

1. Fundamentals of Computers by ReemaThareja, Publishers : Oxford University Press, India
2. Fundamentals of Computers by V.Raja Raman, Publishers : PHI
3. Microsoft Office 2010 Bible by John Walkenbach, Herb Tyson, Michael R.Groh and FaitheWempen, Publishers : Wiley

BSCLS401 BOTANY-IV

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCLS401	Botany-IV	60	20	20	100					3	1		4

OBECTIVE

To explain students about cell wall and plasma membrane; Chromosomal organization; Structure of gene, tRNA, and ribosomes. genetic code; Genetic inheritance; Mendelism; laws of segregation and independent assortment and DNA damage and repair.

UNIT I

The cell envelops; plasma membrane, bilayer lipid structure, function of the cell wall. Structure and function of cell organelles: Golgibodies, ER, Peroxisome, Vacuole, Chloroplast and Mitochondrion.

UNIT II

Ultrastructure and function of nucleus: Nuclear membrane, Nucleolus, Extranuclear genome, Plasmids. DNA the genetic material, DNA structure and replication, the nucleosome model, satellite and repetitive DNA; Mitosis and Meiosis.

UNIT III

Chromosomal organization; morphology, centromere and telomere, special types of chromosomes, Variations in chromosomes structure: Deletions, duplications translocation, inversions; variation in chromosome number: aneuploidy, polyploidy.

UNIT IV

Structure of gene, tRNA, and ribosomes. genetic code, transfer of genetic information; trascription, translation, protein syntesis, Regulation of gene expression in prokaryotes and eukaryotes.

UNIT V

Genetic inheritance; Mendelism; laws of segregation and independent assortment; linkage analysis; interactions of genes. Genetic variations; mutations, spontaneous and induced; transposable elements; DNA damage and repair.

COURSE LEARNING OUTCOME

This course will help students to understand about cell wall and plasma membrane; Chromosomal organization; Structure of gene, tRNA, and ribosomes. genetic code; Genetic inheritance; Mendelism; laws of segregation and independent assortment and DNA damage and repair.

Reference Books

- 1.Cell biology and genetics PK. Gupta
- 2.Veerbala Rastogi Cell biology book.

3. S.P. Singh & B.S. Tomar Cell biology
4. R.P. Meyyar 2000 Genetics

BSCLS401 BOTANY-IV

PRACTICAL

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								credits			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem.	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCLS401	Botany-IV					20	10	20	50			2	2

LIST OF PRACTICAL

- Smear preparation of root tip of onion bud to study different stages of mitosis
- Smear preparation of flower bud of onion to study different stages of meiosis.
- Project related to cell biology/ transcription/ translation/ Mitosis and Meiosis/genetics etc.
- Problem related to cytogenetics
- Cell and Cell organelles
- Structure of RNA and DNA
- Spotting

BSCLS402 Chemistry-IV

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								credits			Total Credits
			Theory				Practical				L	T	P	
			End Sem.	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem	Total Marks				
1	BSCLS402	Chemistry-IV	60	20	20	100	20	10	20	50	4	0	2	2

OBJECTIVE

To explain students about Phase equilibrium Statement, Solid solutions, Liquid-liquid mixtures.

To explain about basics of electro chemistry, Migration of ions, Electrolytic and Galvanic cells; Chemistry of Lanthanides Elements; Chemistry of Actinides

Objective of this course is to explain about Nomenclature, structure, synthesis of Aldehydes and ketones, Carboxylic Acids and Synthesis of acid chlorides, esters and amides

Physical Chemistry

UNIT I

Phase equilibrium Statement and the meaning of the terms: phase component and the degree of freedom, derivation of the Gibbs phase rule. Phase equilibria of one component system: water, CO₂ and S system. Phase equilibria of two component system: solid liquid equilibria, simple eutectic: Bi-Cd, Pb-Ag system, desilverisation of lead.

Solid solutions: compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H₂O) (FeCl₃-H₂O) and (CuSO₄-H₂O) system. Freezing mixtures, acetone-dry ice.

Liquid-liquid mixtures: Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system azeotropes: HCl-H₂O and ethanol water systems.

UNIT-II

Electrochemistry Electrical transport- conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific conductance and equivalent 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. 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.

UNIT III

Inorganic chemistry

Chemistry of Lanthanides Elements: electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of 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 later lanthanides.

Organic Chemistry

UNIT IV

Aldehydes and ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes and ketones 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.. Wittig reaction, Mannich reaction.

UNIT V

Carboxylic Acids: 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.

Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of formation and chemical reactions of halo acids, hydroxyl acids, malic, tartaric and citric acids.

COURSE LEARNING OUTCOMES

1. It will help students to understand about Phase equilibrium Statement, Solid solutions, Liquid-liquid mixtures.
2. Students will be able to understand basics of electro chemistry, Migration of ions, Electrolytic and Galvanic cells; Chemistry of Lanthanides Elements; Chemistry of Actinides
3. Students will be able to understand about Nomenclature , structure, synthesis of Aldehydes and ketones, Carboxylic Acids and Synthesis of acid chlorides, esters and amides

References books

1. Unified Chemistry M. N. Tondan B.Sc. IV SEM
2. Unified Practical Chemistry M. N. Tondan B.Sc. II Year
3. Yugbodh Publication Unified Chemistry B.Sc. IV SEM
4. Yugbodh Publication Unified Practical Chemistry B.Sc. II Year

BSCLS402 Chemistry-IV

PRACTICAL

S.No.	Subject Code	Subject Name	Maximum Marks Allotted							credits			Total Credits	
			Theory				Practical			L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem					Total Marks
1	BSCLS402	Chemistry-IV					20	10	20	50			2	2

List of Practical

Qualitative analysis

1. Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
2. Determination of transition temperature of given substance by thermometric, dilatometric method (e.g.) ($\text{MnCl}_2 \times 4\text{H}_2\text{O}$ / $\text{SrBr}_2 \times 2\text{H}_2\text{O}$).

Phase equilibrium

1. To study the effect of solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquid (e.g., phenol water system) and to determine the concentration of that soluble in phenol water system.
2. To construct the phase diagram of two component (e.g., diphenyl amine benzophenone) by cooling curve method.

Thermochemistry

To determine the enthalpy of neutralization of weak acid/weak base versus strong acid/ strong base and determine the enthalpy of ionization of the weak acid/ base.

Inorganic chemistry-Quantitative Volumetric Analysis

1. Estimation of ferrous and ferric by dichromate method.
2. Estimation of copper using thiosulphate.

BSCLS403 Zoology -IV

S.No.	Subject Code	Subject Name	Maximum Marks Allotted								Credits			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment/Quiz/Term paper	End Sem	Total Marks				
1	BSCLS403	Zoology-IV	60	20	20	100	20	10	20	50	4	0	2	2

OBJECTIVE

To explain about Nutrition, Metabolism; mechanism and physiology of respiration; regulatory mechanisms and Enzymes; endocrinology.

UNIT I:

- Nutrition, Metabolism
- Physiology of digestion in mammals
- Protein Metabolism-Deamination, decarboxylation. Transamination of amino acids, and Ornithine cycle.
- Carbohydrate metabolism- Glycogenesis, Glycogenolysis, glycolysis, The Citric acid cycle, Gluconeogenesis.
- Lipid Metabolism-Beta oxidation of fatty acids.

UNIT II:

- Respiration
- Organs of respiration in mammals
- Mechanism of respiration in mammals.
- Physiology of respiration (transport of gases, chloride shift).
- Properties and function of respiratory pigments.

UNIT III:

- Regulatory Mechanisms and Enzymes
- Osmoregulation.
- Physiology of Excretion- urea and urine formation in mammals.
- Thermoregulation.
- Definition and nomenclature of enzymes, classification of enzymes.
- Mechanism of enzyme action.

UNIT IV:

- Neuromuscular Co- ordination

- Structure and properties of nervous tissue.
- Physiology of nerve impulse conduction.
- Types of muscles and their properties.
- Theory of muscle contraction and its biochemistry.

UNIT V:

- Endocrine system
- Structure and functions of Pituitary Gland.
- Structure and functions of Thyroid Gland.
- Structure and functions of Adrenal Gland.
- Structure and functions of Parathyroid, Thymus and Islets of langerhan's.

COURSE LEARNING OUTCOME

Students will be able to understand Nutrition, Metabolism; mechanism and physiology of respiration; regulatory mechanisms and Enzymes; endocrinology, Structure and properties of nervous tissue.

Reference Books-

- Animal Physiology – Verma P.S. and Sherma.
- Prani Vigyan 2 Books of Hindi Grantha Academy.
- Practical 2 Books of Hindi Grantha Academy
- Verma P S, Animal Physiology- S Chand.
- Nigam H C, Animal Physiology- Vishal Publication.
- Agrawal, Srivastava & Kumar, Animal Physiology- CBS.
- Satyanarayana .U, Biochemistry- Books & Allied Pvt. Ltd
- H S Srivastava- Elements of Biochemistry, Rastogi
- Laboratory Techniques by Swaroop, Arora & Pathak..
- Unified Zoology IV Sem. – U.K. Tiwari and V.K. Singh
- Unified Practical Zoology – Dr. A.K. Kushrestha

BSCLS403 Zoology -IV

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								credits			Total Credits	
			Theory				Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks					
1	BSCLS403	Zoology -IV						20	10	20	50			2	2

LIST OF PRACTICAL

1. Detection of protein, carbohydrate and lipid.
2. Study of Human salivary enzyme activity in relation to pH.
3. Detection of nitrogenous waste products – Ammonia & Urea
4. Use of Kymograph
5. Exercise on Haematology – Counting of RBC /WBC and Blood grouping in blood samples.
6. Estimation of Haemoglobin in blood samples.
7. Histological study of various endocrine glands –T. S. of Thyroid, T. S. of Pituitary gland, T. S. of Adrenal gland , T. S. of Testis, T. S. of Ovary.
8. Histological study of Alimentary canal & various digestive organs – T.S of Stomach , T.S of Intestine , T.S of Pancreas, and T. S. of liver.
9. Histological study of Visceral organs - T.S of Lungs, L.S. of Kidney
10. Histological study of Muscles – Striated, Unstriated & Cardiac muscle.

BSCFC 404 Internet Fundamentals and Web Tools

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								credits			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCFC404	Internet Fundamentals And Web Tools	60	20	20	100					3	1		4

OBJECTIVE

To explain about fundamental of internet, Web Site Address, Searching the Internet, basics of Emails, Web Applications, Web Terminologies and Basic HTML.

UNIT-I: Fundamentals of Internet : Networking Concepts, Data Communication – Types of Networking, Internet and its Services, Internet Addressing – Internet Applications – Computer Viruses and its types – Browser –Types of Browsers.

UNIT-II: Internet applications: Using Internet Explorer, Standard Internet Explorer Buttons, Entering a Web Site Address, Searching the Internet – Introduction to Social Networking: twitter, tumblr, Linkedin, facebook, flickr, skype, yelp, vimeo, yahoo!, google+, youtube, WhatsApp, etc.

UNIT-III : E-mail :Definition of E-mail - Advantages and Disadvantages – UserIds, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management,Email Inner Workings.

UNIT IV: WWW- Web Applications, Web Terminologies, Web Browsers,URL– Components of URL, Searching WWW – Search Engines and Examples

UNIT-V: Basic HTML: Basic HTML – Web Terminology – Structure of a HTML Document – HTML, Head and Body tags – Semantic and Syntactic Tags – HR, Heading, Font, Image and Anchor Tags –Different types of Lists using tags – Table Tags, Image formats – Creation of simple HTML Documents.

COURSE LEARNING OUTCOME

Students will be able to understand practical aspects of internet, Web Site Address, Searching the Internet, basics of Emails, Web Applications, Web Terminologies and Basic HTML.

Reference Books:

1. In-line/On-line : Fundamentals of the Internet and the World Wide Web, 2/e – by Raymond Greenlaw and Ellen Hepp, Publishers : TMH

BFC 405 Aptitude - II

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted								credit			Total Credits
			Theory				Practical				L	T	P	
			End Sem	Mid Sem. MST	Quiz, Assignment	Total Marks	Lab Work	Assignment /Quiz/Term paper	End Sem	Total Marks				
1	BSCSFC405	Aptitude II	60	20	20	100					3	1	-	4

Objective: The aim of this course is to introduce to student the basic concepts related of Aptitude which can form foundation to understanding advanced concepts in managing an organization.

Unit-1 General Intelligence & Reasoning: Word formation, Arranging words in Logical order or Dictionary order, Venn diagram, Missing Number, Forecasting, Blood Relation, verbal reasoning.

Unit-2 General Awareness: Static general knowledge, Biology, Chemistry, Physics + Space Science, Computer & Mobile Technology, Diseases, Pollution & Nutrition, people in news, Govt. Project & Scheme News reading.

Unit-3 English comprehension: Spelling, Fill in the blank, Word replacement, Error spotting, one word substitution, phrases and idioms, reading comprehension, sentence correction.

Unit-4 Quantitative Aptitude-I: Classification, data interpretation, compound interest, mensuration, number systems, percentage, probability Problem in age.

Unit-5 Quantitative Aptitude-II: Simplification, speed, distance and time, trigonometry, mixture problem, geometry- Squares, cuboid, Problem in triangle.

Learning Outcome: Students will be able to apply quantitative aptitude, logical reasoning, English comprehension and trigonometry understand and solve the problems.

Reference Books:

1. Quantitative Aptitude for Competitive Examination by Pearson edition.
2. Quantitative Aptitude and Reasoning by R.V. Parveen.
3. Quantitative Aptitude by R. S. Agrawal
4. A Comprehensive grammar of english by G. N. Verma
5. For New and Knowledge – The Hindu, Times of India and Economics Times.

Course – BSc(life science)

Subject Code – BSCLS 501

Semester – V

Subject- BOTANY-V

DEPARTMENT: LIFE SCIENCE

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS501	BOTANY-V	6(4-0-2)	60	20	20	-	-	100	3 hr	-

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts ‘A’(6 marks) and ‘ B’(6 marks) both are compulsory .One question will have 12 marks.

Syllabus

UNIT – I

Plant Water Relations: Properties of water, Importance of water in plant life, Diffusion, Osmosis & Osmotic relation to plant cell, Water Absorption, Ascent of Sap, Essential macro & micronutrients and their role. Transpiration: Structure & Physiology of Stomata, Mechanism of Transpiration, Factors affecting the rate of transpiration.

UNIT – II

Photosynthesis: Chloroplast, Photosynthetic pigments, Red drop, Emerson's effect, Concept of two Photosystems, Light reaction, Dark reaction - Calvin cycle, Hatch-Slack cycle, CAM cycle, Factors affecting rate of photosynthesis & Photorespiration.

UNIT – III

Respiration: Mitochondria, aerobic and anaerobic respiration, Respiratory coefficient, mechanism of respiration - Glycolysis, Kreb's cycle, Pentose phosphate pathway, Electron transport system, Factors affecting rate of respiration, Redox potential and theories of ATP synthesis.

UNIT – IV

Definition, classification and chemical structure: monosaccharide, disaccharide, oligosaccharide and polysaccharides; Amino acids, essential and non essential amino acids; Lipids, saturated and non saturated fatty acids.

Classification, nomenclature and characteristics of Enzymes, Concept of holoenzyme, apoenzyme, co-enzyme and co-factors, mode & mechanism of enzyme action, Factors affecting enzyme activity. Plant Hormones, mode of action of Auxins, Gibberellins, Cytokinin and Abscissic acid.

UNIT – V

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.

SUBJECT PRACTICAL- BOTANY- V Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS501	Botany-V	3	-	-	-	50		50		3 hr

PRACTICALS

1- Preparation of solution of specific Normality, Molal and Molar solutions.

2- Exercises related to osmosis and osmotic relation.

3- Exercises related to Transpiration.

4- To separate Plastidial pigments by Paper Chromatography.

5- To perform the exercise of Photosynthesis & Respiration.

6- To perform biochemical test for Carbohydrate, Lipid and Protien.

7- To extract Enzyme for any plant part and demonstrate its activity.

(In Exam Any two experiments from above mentioned list are asked)

Question 2 Comment on any technique related to Biotechnology

Spotting-

Viva- voce-

Practical Record-

- **REFERENCES BOOKS**

- R.P. Singh Plant Physiology
- S.R. singh and S. Shrivastava plant physiology and biochemistry
- B Verma plant physiology
- Pandey Biochemistry and physiology
- Rastogi Biochemistry m c grow hill pub.
- Hopkins, W.G.1995. Introduction toPlant Physiology.John Wiley & Sons, Inc, New York. USA.
- Moor,T.C.1989 Biochemistry And Physiology of Plant Hormones Springer- Verlag,New York, USA.
- Dr.S.B.Agarwal &Dr.Amit Agarwal Unified practical Botany

Department of Science B.Sc. V Sem.

Subject Code	Subject Name	Credits	Maximum marks Allotted								Duration of Exam.	
			Theory				Practical				Theory	Practical
			End Sem	Mid Sem	Assign .	Total	Lab Work	Term work	End sem	Total		
BSCLS 502	Chemical Kinetics , Spectroscopy and state of matter	6	60	20	20	100			50	50	3 hr	3hr

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts ‘A’(6 marks) and ‘ B’(6 marks) both are compulsory .One question will have 12 marks.

Course – BSc(life science)

Subject Code – BSCLS 502

**Semester – V
matter**

Subject – Chemical Kinetics , Spectroscopy and state of

Physical Chemistry

UNIT I

Spectroscopy - I

(a) Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

(b) 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.

(c) Raman spectrum, concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, application of Raman spectrum.

Spectroscopy - II

(a) UV Spectroscopy : Electronic excitation, elementary idea of instrument used, Applications to structure determination of organic molecules. Woodward-Fieser rule for determining max of λ , ν_{max} of α,β -unsaturated carbonyl compounds.

(b) Infrared Spectrum : Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

UNIT -II

(a) Solutions, dilute solutions and colligative properties-I Ideal and non ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solutions- colligative properties. Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurements, determination of molecular weight from osmotic pressure.

(b) Solutions, dilute solutions and colligative properties-II Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods of determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solute.

UNIT III (inorganic Chemistry)

Oxidation and Reduction

Electrode potential, electrochemical series and its applications, Principles involved in the extraction of the elements. .

Acids and Bases Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concept of acids and bases. 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, supersaturation, 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.

Non-aqueous Solvents Physical properties of a solvent, types of solvents and their general characteristics, Reactions in non aqueous solution with reference liquid NH_3 and Liquid SO_2

UNIT IV

Electromagnetic Spectrum Absorption

Spectra 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 chromophore and auxochrome, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. U.V. spectra of conjugated enes and enones.

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

UNIT V

Organic Compounds of Nitrogen:

Preparation of nitroalkanes and nitroarenes, Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid. Halonitroarenes: reactivity, 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 catalysts, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitrites), reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction, Hofmann 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.

B.Sc. – V sem (PRACTICAL)

Inorganic Chemistry :

Synthesis and Analysis:

- (a) Preparation of sodium trioxalato ferrate (III), $\text{Na}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$ 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-bisoxalato diaqua chromate (III) ion.

Organic Chemistry :

Crystallization:

Concept of induction of crystallization,

Phthalic acid from hot water (using fluted filter paper and steamless funnel)

Acetanilide from boiling water

Naphthalene from ethanol

Benzoic acid from water

Sublimation (Simple and Vacuum):

Camphor, Naphthalene, Phthalic acid and succinic acid.

Qualitative Analysis:

Detection of extra elements (N, S and halogens) and functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

Physical Chemistry :

Molecular Weight Determination:

1. Determination of molecular weight of a non-volatile solute by Rast method/ Beckmann freezing point method.
2. Determination of the apparent degree of dissociation of an electrolyte (e.g., NaCl) in aqueous solution at different concentrations by ebullioscopy.

DEPARTMENT OF SCIENCE

Subject Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS503	Zoology-V	6(4-0-2)	70	20	10			100	3 hr	

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts ‘A’(6 marks) and ‘ B’(6 marks) both are compulsory .One question will have 12 marks.

Syllabus

Unit –1 Aquaculture

- Definition and scope of aquaculture.
- Prawn culture –(Culture of fresh water prawn, Methods of prawn fishing, preservation and processing of prawns)
- Pearl culture and Pearl Industry.
- By-products of fishing industry.
- Frog culture, Breeding and selection.

Unit –II Pisciculture

- General account of Edible fresh water fishes.
- Carp culture: Management of ponds, Preservation and processing of fishes.
- Maintenance of Aquarium
- Plankton and their role in Fisheries.
- Elementary knowledge of polyculture.

Unit –III Economic Entomology

- Sericulture: Species of silkworm, life history of Bombyx mori, Sericulture Industry in India.

- Apiculture –life cycle and species Methods of bee keeping, Products of bees, enemies of bees.
- Lac culture: Lifecycle, Host Plant cultivation.
- Common Pest: Stored Grains Sitophilus oryzae and Tribolium Castanaeum, Vegetable pest Piers brassicae and Dacus cucurbitae..
- Biological control of insect pests.

Unit –IV Toxicology

- Toxicology: Basic concepts,
- Heavy metal toxicity- Pb, Cd, Hg.
- Toxicity testing, LC 50, LD 50, acute and chronic toxicity.
- Pesticide and their toxicological effect.
- Occupational health hazards and their control

Unit-V Lab Techniques

- pH- Definition, Study of pH- meter, determination of pH.
- Chromatography: Principles & Types of chromatography (Paper Chromatography).
- Types of microtome and their uses.
- General ideas of some common fixatives, stains and reagents.
- Museum keeping, preservation and skeleton preparation, taxidermy(Bird)

PRACTICAL- ZOOLOGY-V

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS503	Zoology-V	3	-	-	-	50		50		3 hr

1. Study of museum specimen of fresh water edible fishes.
2. Study of pH of Water and soil.
3. Study of Chromatography (Paper Chromatography).
4. Study of working instrument : Microtome.
5. Study of different techniques for Museum Keeping..
6. Maintenance of aquarium.
7. Study of pests-
Stored grain pests- Sitophilus Oryzae & Tribolium castanaeum.
Vegetable pests- Pieris brassicae & Dacus cucurbitae

1. Study of Plankton – Euglena, Paramoecium, Cyclops, Mysis, Daphnia

PRACTICAL MARKS DISTRIBUTION

1. Exercise based on pH determination_____ 08
2. Exercise based on simple chromatography_____ 08
3. Comments on instruments based on
theory paper(any one)_____ 06
4. Exercise based on museum keeping techniques_____ 06
5. Spotting _____ 12
6. Viva _____ 05
7. Practical record/collection_____ 05

Reference Books

1. Unified Zoology – J.K. Awasthi
2. Unified Practical Zoology – Dr. A.K. Kushrestha
3. Techniques and methods in Biology - K.L.Ghatak
4. Fish And Fisheries -Pandey ,Shukla
5. A manual of practical Zoology Chordates ---Dr. P.S. Verma
6. Nayar, B.V. : Pest Management and Pesticides Indian Scenario.Namratha Publications, Madras.
7. Venkitaraman : Economic Zoology, Sudrashana Publishers

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS504	HINDI (BHASHA KAUSHAL EVAM SANCHAR SADHAN)	2	35	10	5	-	-	50	3 hr	3 hr

इकाई - 1

1. भारतीय संस्कृति
2. भारतीय समाज व्यवस्था
3. सभ्यता एव संस्कार
4. वैश्विक चेतना
5. समन्वयीकरण (भारतीय एव अंतर्राष्ट्रीय सदर्भ में)

इकाई - 2

1. धर्म
2. न्याय
3. दर्शन
4. नीति
5. साहित्य

इकाई - 3

1. संचार संसाधन : सम्पर्कके नए क्षितिज
2. समाचार पत्र
3. भारतीय प्रेस परिषद्
4. रेडियो
5. दूरदर्शन

इकाई - 4

1. सिनेमा
2. रंगमंच
3. सर्गीत
4. चित्र, मूर्ति, स्थापत्य कला
5. शिल्प कला

इकाई - 5

1. कम्प्यूटर
2. दूरभाष: विज्ञान की सौगात
3. मंत्रं (कहानी): प्रमे चदं

4. मातृभूमि (कविता): मैथिलीशरण गुप्त
6. साहित्यकार का दायित्व: डॉ. प्रेम भारती

संदर्भ पुस्तक – मध्यप्रदेश हिन्दी ग्रंथ अकादमी भोपाल द्वारा प्रकाशित पुस्तक

Subject Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS505	Visual Basic	2	35	10	5	-	-	50	3 hr	3 hr

UNIT 1: Introduction to VB.NET: Event Driven Programming, NET as better Programming Platform, NET Framework, NET Architecture, The Just-In-Time Compiler, NET Framework class library

UNIT 2: VB.NET Development Environment: Creating Applications, Building Projects, Using simple components, Running VB.NET applications

UNIT 3: Mastering VB Language: Data, Operators, Conditionals and Loops, Procedures, Error Handling, Classes and Objects.

UNIT 4: Windows Applications in VB .NET: Windows Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Scrollbars, Splitters, Timer Menus, Built-in Dialogs, Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

UNIT 5: Object Oriented Programming in VB .NET: Class and Object, Properties, methods, Constructors and Destructors, Method overloading, Inheritance, Access modifiers Overloading and Overriding, Interfaces, Polymorphism.

Suggested Reading:

Starting Out with Visual Basic 2012, 6th Edition. Gaddis. Addison-Wesley. ISBN: **978-0133128086**.

Subject Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS601	BOTANY-VI	6(4-0-2)	60	20	20			100	3 hr	

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts ‘A’(6 marks) and ‘ B’(6 marks) both are compulsory .One question will have 12 marks.

Syllabus

UNIT-I

The Flower system: Concept of flower as a modified shoot, Structure of Anther, Microsporogenesis and Male Gametophyte, Structure of Pistil, Ovules, Megasporogenesis and Development of Female Gametophyte (Embryo Sac) and its types, Pollination –Mechanism and Agencies of Pollination, Pollen Pistil interactions and Self incompatibility.

UNIT – II

Double Fertilization, Development and types of Endosperm and its morphological nature, Development of Embryo in Monocots and Dicots, Fruit development and maturation. Seed structure and dispersal, Vegetative Propagation.

Unit-III

History of plant tissue culture, contribution made by Haberlandt, White, Nobecourt, Gautheret, Steward, Teinert, Morel and Vasil. Highlights of work done by Indian Scientists. Basic tools and techniques of plant tissue culture, maintenance of aseptic conditions, Laminar Air Flow Chamber, Autoclave, Growth Chamber, methods of sterilization, culture media and their preparation.

Unit-IV

Explant types, initiation of cultures, maintenance of cultures, callus and liquid culture, single cell culture, protoplast isolation, purification, culture and regeneration. Regeneration *in vitro* through organogenesis, somatic embryogenesis, androgenesis and related basic concepts.

Unit-V

Plasmids and their use in gene transfer. Direct gene transfer, microinjection, electroporation, particle - gun technology, liposome mediated gene transfer. Use of laser beams for gene transfer. Plant tissue culture in Industry. Secondary plant products with special reference to alkaloids. Prospects of drug production in cell cultures and Bioreactor.

PRACTICAL- BOTANY-IV

Subject Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCIS602	Botany-VI	2	-	-	-	50		50		3 hr

PRACTICALS

1- Cutting, staining and mounting of cross section of two materials of monocotyledons/dicotyledons root and stem and leaf like Sunflower and Maize or other available material. 15

2- Organisation of shoot Apex and Root Apex. 5

3- Study of Ovules and Anthers and their types 5

- Structure of stigma and style (Hibiscus, Maize, Ocimum, Citrus and Clitoria (Aprajita) or plant studied by you.

4-Spotting-

5-Viva- voce-

6-Practical Record-

- **REFERENCES BOOKS-**

- 1. Structure, development & Reproduction in flowering plants Dr. Niranjana Shrotriya and Dr. Archana Shrotriya.
- 2. Dr. S.B. Agarwal and Dr. V.K. Agarwal unified Botany.
- Kumar .H.D 1988 introduction to phycology, Affiliated east-west press ltd new Delhi
- Smith g.M cryptogamic Botany Vol-1 Tata Mc Graw Hill publishing co. Ltd Bombay, New delhi
- Parihar, N.S. 1995 Pteridophyta, Central book Depot, Allahabad.
- Parihar, N.S. 1996 Biology and morphology of pteridophytes, Central book depot Allahabad
- Rashid, A. 1999 An introduction to pteridophytes, Vikas publishing house
- Bhatnager, S.P. and Moitra, A. 1996; Gymnosperm. New age International, Pvt. Ltd New Delhi
- Singh, H. 1978 Embryology of Gymnosperms, Gebruder Bortager, Berlin
- Dr. S.B. Agarwal & Dr. V.K. Agarwal Unified practical Botany.

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(Registrar)

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Department of Science B.Sc. VI Sem.

Subject Code	Subject Name	Credits	Maximum marks Allotted								Duration of Exam.	
			Theory				Practical				Theory	Practical
			End Sem	Mid Sem	Assign.	Total	Lab Work	Term work	End sem	Total		
BSCLS 602	Quantum Chemistry, Bioinorganic and Organometalic compound	6	60	20	20	100	20	10	20	50	3 hr	3hr

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts ‘A’(6 marks) and ‘ B’(6 marks) both are compulsory .One question will have 12 marks.

Course – BSc(life science)

Subject Code – BSCLS 602

**Semester – VI
compound**

Subject – Quantum Chemistry, Bioinorganic and Organometalic

UNIT – I

Physical Chemistry :

Introductory Quantum Mechanics: Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (without derivation) their solution of overall solution and its defects, Compton effect, de-Broglie's hypothesis, the Heisenberg's uncertainty principle, Hamiltonian Operator.

UNIT – II

Elementary Quantum Mechanics:

Schrödinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box. Schrödinger wave equation for H-atom, separation

into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions. Molecular orbital theory, basic ideas – criteria for forming M.O. from A.O., construction of M.O's by LCAO – H₂ + ion, calculation of energy levels from wave functions, physical picture of bonding and anti-bonding wave functions, concept of σ , σ^* , π , π^* orbitals and their characteristics, Hybrid orbitals – sp, sp³, sp², calculation of coefficients of A.O's used in sp and sp² hybrid orbitals and interpretation of geometry. Introduction to valence bond model of H₂, comparison of M.O. and V.B. models.

Inorganic Chemistry :

UNIT –III

Organometallic Chemistry Definition, nomenclature and classification of organometallic compounds, Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn. Metal carbonyls: 18 electron rule, preparation, structure and nature of bonding in the mononuclear carbonyls.

Silicones and Phosphazenes

Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

Bioinorganic Chemistry

Essential and trace elements in biological processes, metalloporphyrins with special reference to hemoglobin and myoglobin, Biological role of alkali and alkaline earth metal ions with special reference to Ca²⁺.

UNIT – IV Organic Chemistry :

Organometallic Compounds

Organomagnesium compounds : the Grignard reagents, formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.

Organosulphur Compounds Nomenclature, structural formation, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and Sulphaguanidine.

Heterocyclic Compounds Introduction : Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution, Mechanism of nucleophilic substitution reaction in pyridine derivatives, Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to condensed five and six membered heterocycles, Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Nepieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

UNIT –V

Synthetic Polymers

Addition or chain-growth polymerization, Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers, Condensation or step growth-polymerization, Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes, Natural and synthetic rubbers, Elementary idea of organic conducting polymers.

Synthetic Dyes

Colour and constitution (electronic Concept), Classification of dyes, Chemistry and synthesis of Methyl orange, Congo red, Malachite green, crystal violet, phenolphthalein, fluorescein, Alizarin and Indigo.

B.Sc. – V sem (PRACTICAL)

Inorganic Chemistry :

Instrumentation:

Colorimetry

(a) Job's method

(b) Mole-ratio method Adulteration – Food stuffs.

Effluent analysis, water analysis Solvent

Extraction Separation and estimation of Mg(II) and Fe(II) Ion Exchange Method Separation and estimation of Mg(II) and Zn(II)

Organic Chemistry :

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 Nitration Preparation of m-dinitrobenzene Preparation of p-nitroacetanilide Halogenation Preparation of p-bromoacetanilide Preparation of 2, 4, 6-tribromophenol (d) Diazotization/coupling Preparation of methyl orange and methyl red

(e) Oxidation Preparation of benzoic acid from toluence

(f) Reduction Preparation of aniline from nitrobenzene Preparation of m-nitroaniline from m-dinitrobenzene

Physical Chemistry

Colorimetry:

1. To verify Beer – Lambert Law for $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$ and determining the concentration of the given solution of the substance from absorption measurement.

Reference books

1. Unified Chemistry M. N. Tondan B.Sc. VI SEM
 2. Unified Practical Chemistry M. N. Tondan B.Sc. III Year
 3. Yugbodh Publication Unified Chemistry B.Sc. VI SEM
 4. Yugbodh Publication Unified Practical Chemistry B.Sc. III Year
 5. Advanced Inorganic Chemistry: F. A. Cotton
 6. Peter Atkins Inorganic Chemistry
Practical Chemistry : Vogel
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Subject Code	Subject Name	Credits	Maximum marks Allotted					Duration of Exam.		
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS603	Zoology-VI	6(4-0-2)	70	20	10			100	3 hr	

The question paper will consist of 8 questions. Out of Which Candidate have to attempt any 5 questions . Each question will Carry two parts 'A'(6 marks) and ' B'(6 marks) both are compulsory .One question will have 12 marks.

Syllabus

Unit –I

Concept of Ecology

- Abiotic and Biotic Factors
- Energy flow in ecosystem
- Food chain and Food web
- Biogeochemical cycle: CO₂, N and P
- Population Concept- Characteristics of population. Factors affecting population growth.
- Community Concept-Succession, Periodicity ,Indicators

Unit –II

Habitat Ecology

- Fresh water habitat – Factors and classification.
- Marine habitat- Factors and classification
- Terrestrial habitat – Factors and classification.
- Ecological divisions of India.
- Natural resources and their Conservation with special reference to forests

Unit –III

Man and Environment

- Wild life conservation (Laws, National Parks and Sanctuaries of MP)

- Environmental degradation and pollution.
- Thermal and Noise pollution
- Radiation Ecology ,Global Warming and Green House Effect
- Urbanisation and effect of human population on environment.

Unit –IV

Origin of life and evolution

- Origin of life- modern concept only
- Lamarckism, Darwinism.
- Modern Synthetic theory :Variations Mutations, Isolation & Speciation
- Adaptations and Mimicry
- Micro, macro Evolution and Mega evolution.

Unit –V

Palaeontology and distribution

- Fossils, Methods of fossilisation, Determination of age of Fossils.
- Study of Extinct forms: Dinosaurs and Archaeopteryx
- Zoogeographical distribution of animals
- Evolution of man.

PRACTICAL- ZOOLOGY-VI

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS603	Zoology-VI	3	-	-	-	50		50		3 hr

1. Study of Fresh water, Marine and Terrestrial Fauna .
 2. Water analysis – Oxygen, Chloride.
 3. Pond ecosystem.
 4. Wild life : Endangered and threatened species.
 5. Study of specimen related with Micro , Mega evolution ,Commensalisms
Symbiosis , Mimicry , Parasitism and colouration .
- Study of various fossils: Living fossil, Limulus, Latimera, dinosaurs, Archaeopteryx,.

Reference Books -

1. Unified Zoology – U.K. Tiwari and V.K. Singh
2. R.P.Unified Zoology – Dr. S.M. Saxena
3. Unified Practical Zoology – Dr. A.K. Kushrestha
4. Gupta, P.K. : Cycology, Genetics & Evolution Rastogi Publications
5. Anmol publications PVT.LTD-Kavita Juneja

(Board of studies)

(Academic Council)

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(Registrar)

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS605	ENGLISH LANGUAGE AND ASPECTS OF DEVELOPEMENT	2	35	10	5	-	-	50	3 hr	

Unit 1

1. William Wordsworth : “The World is Too Much With Us”
2. K. Aludiapillai : “Communication Education and Information Technology”
3. “Democratic Decentralisation”
4. S. C. Dubey : “Basic Quality of Life”
5. Sister Nivedita : “The Judgment Seat of Vikramaditya”
6. JuliunHuxley : “War as a Biological Phenomenon”
7. Robert Frost : “Stopping by Woods on a Snowy Evening”
8. Ruskin Bond : “The Cherry Tree”

Unit II Short Essay of about 250-300 words

Unit III Translation of a short passage from Hindi to English

Unit IV Drafting CV, writing e-mail message for official purpose

Unit V Language Skills :

One-word substitution, homonyms, homophones, words that confuse, Punctuation, Idioms

Note : Scheme of Marks

Unit I

- This will include 5 objective type questions based on text and language skills. (1x5=5 marks)
- This will also include short-answer questions from text. One question will be asked from each lesson (total 8 questions) and 5 have to be attempted (3x5 = 15 marks)

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			End Sem	Mid Sem	Assign.	End Sem	Term work			
BSCLS605	DBMS	2	35	10	5	-	-	50	3 hr	

UNIT- I

INTRODUCTION TO DATABASE SYSTEM

Introduction To Database Systems Purpose of Database System, View Of Data, Characteristics of Database Approach, Architecture for a Database System, Advantages and Disadvantages Of DBMS, Database Users and Administrator, Database Design and ER Model , Data Model Classification.

UNIT-II

RELATIONAL DATABASE

Structure of Relational Database Database Schema, Key, Relational Operations Formal Relational Query Languages .

UNIT-III

RELATIONAL DATABASE DESIGN

Features of Good Database Design, Universal Relation, Anomalies in A Database

Atomic Domain and 1NF ,Functional Dependency Theory, Decomposition Using Functional Dependency Algorithm for Decomposition, Decomposition Using Multivalued Dependency More Normal Forms, Database Design Process.

UNIT-IV

DATABASE STORAGE AND QUERYING

Basic Concepts Of Indexing and Hashing Query Processing , Measures Of Query Cost , Query Processing for Select, Sort Join Operations. Basics of Query Optimization, Transformation of Relational Expression Estimating Statistics of Expression, Choice of Evaluation Plan .

UNIT-V

TRANSACTION MANAGEMENT

Transaction Concepts, Features of Database Transaction. Concurrency Control in Database - Lock Base, Time Stamp Base, Validation Base Protocols Database Recovery System .

TEXT & REFERENCE BOOKS:

- *SILVERSCHATZ KORTH AND SUDARSHAN-DATABASE SYSTEM CONCEPTS, 6THED. TATA MC-GRAW HILL.*
 - *RAGHU RAMA KRISHNAN-DATABASE MANAGEMENT SYSTEMS, 2NDED. TATA MC-GRAW HILL*
 - *RAJESH NARANG – DATABASE MANAGEMENT SYSTEM, 2ND ED. PHI*
 - *R. ELMASRI ET. AL “FUNDAMENTALS OF DATABASE SYSTEMS”. 3RD EDITION – ADDISON WESLEY, (INDIAN REPRINT), NEW DELHI.*
 - *C.J.DATE, DATA BASE SYSTEMS, Vol I & II*
-