सरगुजा विश्वविद्यालय

अम्बिकापुर (सरगुजा–छ.ग.)

(छ.ग. विश्वविद्यालय अधिनियम क्र. 18/2008 द्वारा स्थापित व निगमित)

पाठ्यक्रम

B. Sc. Part - II

बी.एस.सी. भाग – 2

परीक्षा वर्ष : 2018

कुलसचिव
सरगुजा विश्वविद्यालय, अम्बिकापुर
छत्तीसगढ़

मूल्य : 25/–

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SCHEME OF EXAMINATION

	Subject	Paper	max. Marks	Total Marks	Min. Marks
C	Environmental Studies		75	100	33
	Fild Work		25		
Foundation Course					
	Hindi Language	I	75	75	26
	English Language	II	75	75	26

नोट : प्रत्येक खंड में से 2 (दो) प्रश्न हल करने होगे। सभी प्रश्न समान अंक के होगे।

Three Elective Subject :

1. Physics	I	50	100	33
	II	50		
	Practical		50	17
2. Chemistry	I	33	100	33
	II	33		
	III	34		
	Practical		50	17
3. Mathematics	I	50	150	50
	II	50		
	III	50		
4. Botany	I	50	100	33
	II	50		
	Practical		50	17
5. Zoology	I	50	100	33
	II	50		
	Practical		50	17
6. Geology	I	50	100	33
	II	50		
	Practical	50		17
7. Statistics	I	50	100	33
	II	50		
	Practical		50	17
8. Anthropology	I	50	100	50
	II	50		
	Practical		50	17

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आधार पाठ्यक्रम

प्रश्न पत्र - प्रथम

हिन्दी भाषा

पूर्णांक - 75

खण्ड-क निम्नलिखित 5 लेखकों के एक-एक निबंध पाठ्यक्रम में सम्मिलित होंगे - अंक-30

1. महात्मा गांधी - सत्य और अहिंसा
2. विनोबा भावे - ग्राम सेवा
3. आचार्य नरेन्द्र देव - युवकों का समाज में स्थान
4. वासुदेव शरण अग्रवाल - मातृ-भूमि
5. भगवतशरण उपाध्याय - हिमालय की व्युत्पत्ति
6. हरि ठाकुर - डॉ. खूबचंद बघेल

खण्ड-ख हिन्दी भाषा और उसके विविध रूप अंक-20

- कार्यालयीन भाषा
- मीडिया की भाषा
- वित्त एवं वाणिज्य की भाषा
- मशीनी भाषा

खण्ड-ग अनुवाद व्यवहार : अंग्रेजी से हिन्दी में अनुवाद अंक-25

हिन्दी की व्यवहारिक कोटियाँ-

रचनागत प्रयोगगत उदाहरण, संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, समास, संधि एवं संक्षिप्तियां, रचना एवं प्रयोगगत विवेचन।

ENGLISH LANGUAGE

M.M. 75

The question paper for B.A./B.Sc./B.Com./B.H.Sc., English Language and cultural valuers shall comprise the following units :

UNIT-I Short answer questions to be assed by (Five short answer questions of three marks each) 15 Marks

UNIT-II (a) Reading comprehension of an unseen passage 05 Marks
(b) Vocabulary

UNIT-III Report-Writing 10 Marks

UNIT-IV Expansion of an idea 10 Marks

UNIT-V Grammar and Vocabulary based on the prescribed text book. 20+15 Marks

Note : Question on all the units shall asked from the prescribed text which will comprise specimens of popular creative/writing and the following it any

(a) Matter & technology
  (i) State of matter and its structure
  (ii) Technology (Electronics Communication, Space Science)
(b) Our Scientists & Institutions
  (i) Life & work of our eminent scientist Arya Bhatt. Kaurd Charak Shusruta, Nagarjuna, J.C. Bose and C.V. Raman, S. Rmanujam, Homi J. Babha Birbal Sahani.
  (iii) Indian Scientific Institutions (Ancient & Modern)

Books Prescribed :

Foundation English for U.G. Second Yaer - Published by M.P. Hindi Granth Academy, Bhopal.

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NEW CURRICULUM OF B.SC. PART II

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 & 34 marks each and practical work of 50 marks. The curriculum is to be completed in 180 working days as per the UGC norms & conforming to the directives of the Govt. of Chhattisgarh. The Theory papers are of 60 hrs. each duration & the practical work of 180 hrs. duration.

PAPER - I

M.M. 33

INORGANIC CHEMISTRY

UNIT-I **CHEMISTRY OF ELEMENTS OF FIRST TRANSITION SERIES**

Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT-II **CHEMISTRY OF ELEMENTS OF SECOND & THIRD TRANSITION SERIES**

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and streochemistry.

UNIT-III **A. OXIDATION AND REDUCTION**

Use of redox potential data analysis of redox cycle, redox stability in water-Frost, Latimert & Pourbaix diagrams. Principles involved in the extraction of the elements.

B. COORDINATION COMPOUNDS

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

UNIT-IV **A. CHEMISTRY OF LANTHANIDE ELEMENTS**

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

B. CHEMISTRY OF ACTINIDES

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides.

UNIT-V **A. ACID AND BASES**

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

N. NON-AQUEOUS SOLVENTS **06 HRS.**

Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide.

REFERENCE BOOKS :

1. Basic Inorganic Chemistry, F.A. Cotton, G. Wilkinson and P.L. Gaus, Wiley,

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2. Concise Inorganic Chemistry, J.D. Lee, ELBS.
3. Concepts of models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chamistry, D.E. Shriver, P.W. Atkins and C.H. Langford, Oxford.
5. Inorganic Chamistry, W.W. Porterfield. Addison - Wesley.
6. Inorganic Chamistry. A.G. Sharp, ELBS.
7. Inorganic Chamistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Stayas Prakash.
9. Advanced Inorganic Chemistry, Agarwal & Agarwal.
10. Advanced Inorganic Chemistry, Puri & Sharma, S. Naginchand
11. Inorganic Chemistry, Madan, S, Chand
12. Aadhunik Akarbanic Rasayan, A.K, Shrivastav & P.C. Jain, Goel Pub.
13. Ucchattar Akarbanic Rasayan, Satya Prakash & G.D. Tuli, Shyamlal Prakashan
14. Ucchattar Akarbanic Rasayan, Puri & Sharma.
15. Selected topic in Inorgaic Chemistry by Madan Malik, & Tuli, S. Chand.

PAPER - II

ORGANIC CHEMISTRY

60 Hrs. MM. 33

UNIT-I **ALCOHOLS**

A. Dihydric alcohols - nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol - pinacolone rearrangement.

B. Trihydric alcohols - nomenclature and methods of formation, chemical reactions of glycerol.

PHENOLS

A. Structure and bonding, in phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide Ion. Reactions of phenols, acylation and carboxylation.

B. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben - Hoesch reaction, Lederer - Manasse reaction and Reimer-Tiemann reaction.

EPOXIDES

Synthesis of epoxides. Catalysed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. Anti 1,2 dihydroxylation of alkenes via epoxides. Crown eithers.

UNIT-II **ALDEHYDES AND KETONES**

A. Nomenclature and Structure of the carbonyls group. Synthesis of aldehydes and ketones using 1,3 - dithianes, synthesis of ketones from nitriles.

Mechanism of nucleophilic additions to carbonyls group Benzoin, Aldol, Perkin and Knoevenagel condensations. Condensations with ammonia and its derivateves, Wittig reaction, Mannich reaction.

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B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer - Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen Condensation, Wolff-Kishner reaction, $LiAlH_4$ and NaBH4 reduction. Halogenation of enolizable ketones.

An introduction to α,β unsaturated aldehydes and ketones.

UNIT-III **A. CARBOXYLIC ACIDS** **05 HRS.**

Structure and bonding, Physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Hell-Volhard Zeilinsky reaction. Reduction of carboxylic acids. Mechanism of Decarboxylation.

Methods of formation and chemical reactions of unsaturated mono carboxylic acids. Di carboxylic acids : methods of formation and effect of heat and dehydrating agents.

B. SUBSTITUTED CARBOXYLIC ACIDS

Hydroxy and Halo-substituted Acids.

C. CARBOXYLIC ACID DERIVATIVES

Structure of acid chloredes, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Mechanisms of acid and base catalyzed esterification and hydrolysis.

UNIT-IV **ORGANIC COMPOUNDS OF NITROGEN**

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, Structure and nomenclature of amines, physical properties. Stereo-chemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Prepatation of alkyl and aryl amines (reduction of nitro compounds, nitriles), 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.

UNIT-V **HETEROCYCLIC COMPOUNDS**

A. Introduction

Molecular orbitl picture and aromatic character of pyrrole, furan, thiophene and pyridine, methods of synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution. Mechanism and nucleophilic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine. Piperidine and pyrrole.

B. Preparation and reaction of Indole, quinoline and isoquinoline and with special reference to Fisher Indole synthesis and skraup synthesis and Bisher-Napleralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

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Amino acids and Peptides :

A. Classification, Structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reaction of α-amino acids.

B. Structure and nomenclature of peptides. Peptide synthesis, solid - phase peptide synthesis.

REFERENCE BOOKS :

1. Organic Chamistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chamistry, L.G. Wade Jr. Prentice-Hall.
3. Fundamentals of Organic Chamistry, Solomons, John Wiley
4. Organic Chamistry, Vol. I, II, III, S.M. Mukherjee, S.P. Singh and R.P. Kapoor, Wiley-Eastern (New-Age)
5. Organic Chamistry, F.A. Carey, McGraw Hill
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Organic Chamistry, P.L. Soni
8. Organic Chamistry, Bahi & Bahl
9. Organic Chamistry, Joginder Singh
10. Carbanic Rasayan, Bashi & Bahi
11. Carbanic Rasayan, R.N. Singh, S.M.I. Gupta, M.M. Bakodia & S.K. Wadhwa
12. Carbanic Rasayan, Joginder Singh

PAPER - III

PHYSICAL CHEMISTRY

60 Hrs. M.M. 34

UNIT-I **A. Thermodynamics - I** **12 Hrs.**

Fundamental of thermodynamics system, surroundings etc. Types of systems, intensive and extensive properties, state and path functions themodynamic operations Internal energy, enthalpy, Heat capacity of gases at constant volume and at constant pressure and their relationship.

First Law of Thermodynamics limitation of first law. Joule-Thompson expansion, inversion temperature of gases. Calculation of w,q, dU & dH for the liquification expansion of ideal gases under isothermal and adiabatic conditions.

B. Thermo chemistry

Standard state,- Hess's law of heat summation. Enthalpy of reaction at constant pressure and constant volume. Enthalpy of neutralizations. Enthalpy of combustion, Enthalpy of formation, Calculation of Bond enthalpy. Elirchhoff's equation.

UNIT-II **A. Thermodynamics-II**

Second Law of Thermodynamics : Spontaseous process need of second law, statements of Carnot cycle and effciency of heat engine, Carnot theorem. Thermodynamic state of temperature.

Concept of entropy : entropy change in a reversible and irreversible process, Entropy change in insothermal reversible expansion of an ideal gas, Entropy

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change in isothermal mixing of ideal gases, physical signification of entropy.

B. Gibbs and Helmholtz free energy variation of G and A with pressure, volume temperature, Gibbs Helmholtz equation.

UNIT-III PHASE EQUILIBRIUM

A. Gibbs Phase rule, Phase components and degree of freedom, Limitation of phase rule.

Applications of phase rule to one component system - water system, suplhur system.

Application of phase rule to two component systems : pb-Ag system, Zn, Mg system, ferric chloride-water system, desilverization of ____ congruent and incongruent, melting point, eutectic point.

Three component systems : solid solution liquid pairs.

Liquid liquid mixture : (Partially miscible liquids) : phenol-water, trimethylamine-water nicotine systems, constant temperature, azeotrops.

B. Nerst distribution law, Henry's law, application, solvent extraction.

UNIT-IV ELECTROCHEMISTRY-I **10 HRS.**

A. Electrolytic Conductance : Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, kohlrausch's law; application of kohlrausch's law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titration.

B. Theories of strong electrolytes : limitations of ostwald dilution law, weak and strong electrolyte, Debye-Huckel-Onsagar (DHO) equation for strong electrolyte, relaxation and electrophoretic effect.

C. Migration of ions : Transport number, definition and determination by Hittorf method and moving boundary method.

UNIT-V ELECTROCHEMISTRY-II **10 HRS.**

A. Electrochemical cell or Galvenic cell : reversible and irreversible cells conventional representation of electrochemical cells, EMF of the cell, effect of temperature on EMF of the cell, Nernst equation, calculation of ΔG, ΔH and ΔS for cell reaction.

B. Single electrode potential : standard hydrogen electrode, calomel electrode quinhydrone electrode, redox electrodes, electrochemical series.

C. Concentration cells with & without transport, liquid junction potential, application of concentration cell in determining valency of ions, solubility product, activity coefficient.

D. Determination of pH and pka using hydrogen and quinhydrone electrode potentiometric titrations, buffer solutions; Henderson-Hazel Equation, Hydrolysis of salts, Corrosion : type theories and prevention.

REFERENCE BOOKS :

1. Physical Chemistry, G.M. Barrow, International student edition-McGraw Hill
2. University general chemistry, C.N.R. Rao, Macmillan.

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3. Physical Chemistry, R.A. Alberty, Wiley Eastern.
4. The elements of Physical Chemistry, Eastern.
5. Physical Chemistry through problems, S.K. Dogra & S. Dogra, Wiley Eastern.
6. Physical Chemistry, B.D. Khosla.
7. Physical Chemistry, Puri & Sharma
8. Bhoutic Rasayan, Puri, Sharma & Pathania, Vishal Publishing Company.
9. Bhoutic Rasayan, P.L. Soni
10. Bhoutic Rasayan, Bahl & Tuli
11. Physical Chemistry, R.L. Kapoor, Vol. I-IV

PAPER - IV

LABORATORY COURSE

180 Hrs.

Inorganic Chemistry

Calibration of fractional weights, pipettes and burettes. Preparation of standard solutions, Dilution-0.1 M to 0.01 M. solutions.

Quantitative Analysis

Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using NaOH.

(b) Determination of alkali content-antacid tablet using HCl.

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

(d) Estimation of hardness of water by EDTA.

(e) Estimation of ferrous & ferric by dichromate method.

(f) Estimation of copper using thiosulphate.

Instrumentation

Colorimetry

(a) Job's method

(b) Mole-ratio method

Adulteration-Food Stuffs.

Effluent analysis, water analysis

Solvent Extraction

Separation and estimation of Mg (H) and Fe (H).

Ion Exchange Method

Separation and estimation of Mg (H) and Zn (H).

Organic Chemistry

Laboratory Techniques

A. Thin layer Chromatography

Determination of R_f values and identification of organic compounds.

(a) Separation of green leaf pigments (spinach leave may be used)

(b) Preparation and separation of 2, 4-dinitrophenyl hydrazones of acetone, 2-butanone, hexan-2 and 3-one using toluene and light petroleum (40:60)

(c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

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B Paper Chromatography : Ascending & Circular.

Determination of R_f values and identification of organic compounds.

(a) Separation of mixture of phenylalanine and glycine. Alanine and aspartic acid, Leucine and glutamic acid, Spray reagent-ninhydrin.

(b) Separation of mixture of D, L-alanine, glycine, and L-Leucine using n-butanol : acetic acid : water (4:1:5), Spray reagent-ninhydrin.

(c) Separation of monosaccharides- a mixture of D-galactose and d-fructose using n-butanol : acctone : water (4:5:1), Spray reagent-aniline hydrogen phthalate.

Qualitative Analysis

Identification of an organic compound through the functional group analysis, determination of M.Pt. and preparation of derivatives. (Aliphatic and Aromatic)

Physical Chemistry

Transition Temperature

Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2.4H_2O/SrBr_2.2H_2O$).

PHASE EQUILIBRIUM

1. To study the effect of asolute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquide (e.g. Phenol-water system and to determine the concentration of that solute in the fiven phenol-water system.
2. To construct the phose diagram of two component system (e.g. diphenylamine-benzophenone) by cooling curve method.

THERMO CHEMISTRY

1. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
2. To determine the enthalpy of neutralisation of a weak acid / weak base versus strong base / strong acid and determine the enthalpy of ionisation of the weak acid weak base.
3. To determine the enthalpy of solution of solid calclum chloride and calculate the lattice energy of caloium ohiofide from ite enthaply data using Born Haber cycle.

Regerence Book -

1. Vogel's qualitative Analysis, revised Svehla, Orient Longman.
2. Standered method of chemical analysis, W.W.Scott, the Technical press.
3. Experimental Organic Chemistry, Vol. I & II, P.R.Singh, D.S. Gupta and K.S.Bajpai, Tata McGraw Hill.
4. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
5. Vogel's Text Book of Practical Organic Chemistry, B.S. Furnis, A.J. Hannaford, V.Rogers, P.W.G. S----ith and A.R. Tatchel, ELBS.
6. Experiments in General Chemistry C.N.R.Rao & U.C. Agrawal.
7. Experiments in Phyeical Chemistry R.C. Das & B.Behra, Tata McGraw Hill.
8. Advanced Practical Phvsical Chemistry, J.B. Yadav, Goel Publishing House.

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5 Hrs. **PRACTICAL EXAMINATION** M.M. 50

Three Experiments are to be Performed.

1. Inorganic - One experiment from synthesis and analysis by preparing the standard solution be given. 12 marks

OR One Experiment from instrumentation either by colorimetry / solvent extraction/ion exchange method.

2. (a) Identification of the given organic compound & determine its M.Pt./B.Pt. 6 marks
   (b) Determination of R_f value and identification of organic compounds by paper chromatography. 6 marks
3. Any one physical experiment that can be completed in two hours inciuding calculations. 12 marks
4. Viva 10 marks
5. Sessional 04 marks

In case of Ex-Students one marks will be added to each of the experimets.

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BOTANY

PAPER - I

DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS

M.M. : 50

UNIT-I.

1. Characteristics of seed plants ; evolution of the seed habit ; seed plants with (angiosperms) and without (gymnosperms) fruits ; fossil and living seed plants.
2. General features of gymnosperms and their classification ; evolution and diversity of gymnosperms ; geological time scale, fossilization and fossil gymnosperms.

UNIT-II

3. Morphology of vegetative and reproductive parts ; anatomy of roots, stem and leaf, reproduction and life cycle of Pinus, Cycas and Ephedra.

UNIT-III

4. Angiosperms : origin and evolution, some examples of primitive angiosperms.

UNIT-IV

7. Classification of angiosperms ; salient features of the systems proposed by Bentham and Hooker and Engler and Prantl.
8. Major contributions of cytology, phytochemistry and taximetrics to taxonomy.

UNIT-V

9. Diversity of flowering plants : General account of the families Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae and Poaceae.

PAPER - II

STRUCTURE DEVELOPMENT AND REPRODUCTION IN FLOWERING PLANTS

M.M. 50

UNIT-I.

1. The basic body plan of a flowering plant : modular type of growth.
2. Diversity in plant form in annuals, biennials and perennials ; convergence of evolution of tree habit in gymnosperms, monocotyledons and dicotyledons ; trees-largest and longest-lived organisms.

UNIT-II

3. The shoot system : the shoot apical meristem and its histological organization ; vascularization of primary shoot in monocotyledons and dicotyledons ; formation of internodes, branching pattern ; monopodial and sympodial growth ; canopy architecture ; cambium and its functions ; formation of secondary xylem, a general account of wood structure in relation to conduction of water and minerals ; characteristics of growth rings, sapwood and heart wood ; role of woody skeleton ; secondary phloem - structure-function relationships, periderm.

UNIT-III

4. Leaf : origin, development, arrangement and diversity in size and shape ; internal structure in relation to photosynthesis and water loss ; adaptations to water stress ; senescence and abscission.
5. The root system : the root apical meristem ; differentiation of primary and secondary tissues and their roles ; structural modification for storage, respiration, reproduction and for interaction with microbes.

UNIT-IV

6. Flower : a modified shoot ; structure, development and varieties of flower, functions, structure of anther and pistil, the male and female gemetophytes ; types of pollination ; attractions and rewards for pollinators ; pollen-pistil inter-

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action, self incompatibility, double fertilization, formation of seed-endosperm and embryo ; fruit development and maturation.

UNIT-V

7. Significance of seed : suspended animation ; ecological adaptation ; unit of genetic recombination and replenishment, dispersal strategies.
8. Vegetative reproduction : vegetative propagation, grafting, economic aspects.

PRACTICAL SCHEME

Time : 4 Hrs. **M.M. : 50**

1.	Plant Description	08
2.	Gymnosperm	07
3.	Anatomy	07
4.	Embryology	04
5.	Spotting (1-5 Spots)	10
6.	Field Report (Local Flora : Rainy/Winter/Summer Season)	04
7.	Viva-Voce	05
8.	Sessional	05
	Total Marks :	**50**

BOTANY (PRACTICAL)
SUGGESTED LABORATORY EXERCISES

ANGIOSPERMS

The following species are suitable for study. This list is only indicative. Teachers may select plants available in their locality.

1. Ranunculaceae : Ranunculus, Delphinium
2. Brassicaceae : Brassica, Alyssum, Iberis, Coronoupus
3. Malvaceae : Hibiscus, Abutilon
4. Rutaceae : Murraya, Citrus
5. Fabaceae : Faboideae : Lathyrus, Cajanus, Melilotus, Trigonella, Caesalpinioideae ; Cassia, Caesalpinia ; Mimosoideae ; Prosopis, Mimosa, Acacia.
6. Apiaceae : Coriandrum, Foeniculum, Anethum
7. Acanthaceae : Adhatoda, Peristrophe
8. Apocynaceae : Vinca, Thevetia, Nerium
9. Asclepiadaceae : Calotropis
10. Solanaceae : Solanum, Withania, Datura
11. Euphorbiaceae : Euphorbia, Phyllanthus
12. Lamiaceae : Ocimum, Salvia
13. Chenopodiaceae : Chenopodium, Beta
14. Liliaceae : Asphodelus, Asparagus
15. Poaceae : Avena, Triticum, Hordeum, Poa, Sorghum

GYMNOSPERMS

CYCAS

i. Habit, armour of leaf bases on the stem (if specimen is not available show photograph), very young leaf (circinate vernation) and old foliage leaves, scale leaf, bulbils, male cone (specimen), microsporophyll, megasporophyll, mature seed.

ii. Study through permanent slides - normal root (T.S.), stem (T.S.) (if sections are not

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available show photographs), ovule (L.S.).

iii. Study through hand sections or dissections - coralloid root (T.S.), rachis (T.S.), leaflet (V.S.), microsporophyll (V.S.), pollen grains (W.M.).

PINUS

i. Habit, long and dwarf shoot showing cataphylls and scale leaves, T.S. wood showing growth rings, male cone, 1st year, 2nd year female cones, winged seed.

ii. Study through permanent slides - root (T.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polycotyledonous condition.

Study through hand sections or dissections - young stem (T.S.), old stem (wood) (T.L.S. and R.L.S.), needle (T.S.), male cone (L.S.), male cone (T.S.), pollen grains (W.M.).

EPHEDRA

i. Habit and structure of whole male and female cones.

ii. Permanent slides - female cone (L.S.)

iii. Hand sections/dissections-node (L.S.), internode (T.S.), macerated stem to see vessel structure, epidermal peel mount of vegetative parts to study stomata, male cone (T.S. and L.S.), pollen grains.

SUGGESTED LABORATORY EXERCISES :

Embryology, Anatomy and Vegetative Propogation etc.

1. Study of commonly occuring dicotyledonous plant (for example Solanum nigrum or Kalanchoe) to understand the body plan and modular type of growth.
2. Life forms exhibited by flowering plants (by a visit to a forest or a garden), study of tree like habit in cycads, bamboos, banana, traveller's tree (Ravenala madagasariensis) or yucca and comparison with ture trees as exemplified by conifers and dicotyledons.
3. L.S. shoot tip to study the cytohistological zonation and origin of leaf primordia.
4. Monopodial and Sympodial types of branching in stems (especially rhizomes).
5. Anatomy of primary and secondary growth in monocots and dicots using hand sections (or prepared slides), structure of secondary phloem and xylem, Growth rings in wood, Microscopic study of wood in T.S., T.L.S. and R.L.S.
6. Field study of diversity in leaf shape, size, thickness, surface properties, internal structure of leaf, structure and development of stomata (using epidermal peels of leaf).
7. Anatomy of the root, Primary and secondary structure.
8. Examination of a wide range of flowers available in the locality and methods of their pollination.
9. Structure of anther, microsporogenesis (using slides) and pollen grains (using whole mounts), pollen viability using in vitro pollen germination.
10. Structure of ovule and embryo sac development (using serial sections)
11. Test of self-incompatibility (using Petunia axillaris, Brassica campestris, B. olderacea or suitable available material) using field pollinations.
12. Nuclear and cellular endosperm, embryo development in monocots and dicots (using slides/dissections).
13. Simple experiments to show vegetative propagation (leaf cuttings in Bryophyllum, Sansevieria, Begonia, stem cuttings in rose, salix, money plant, sugarcane and Bougainvillea).
14. Germination of non-dormant and dormant seeds.

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ZOOLOGY

PAPER - I

ANATOMY & PHYSIOLOGY

M.M. : 50

UNIT-I Comparative Anatomy of various organ systems of vertebrates.

1. Integument and its derivatives : structure of scales, hair and feathers.
2. Alimentary canaland digestive glands in vertebrates.
3. Respiratory Organs

Gills and lung, Air-Sae in birds

UNIT-II

1. Endoskeleton-Limbs, girdles and vertebrae.
2. Circulatory System - Evolution of heart and aortic arches.
3. Urinogenital System - Kidney and excretory ducts.

UNIT-III

1. Nervous System - General plan of brain and spinal cord.
2. Endocaine glands - classification and histology.
3. Gonads and genital ducts.

UNIT-IV

1. Digestion and absorption of dietary components.
2. Physiology of heart, Cardiac cycle and ECG.
3. Blood Coagulation.
4. Respiration-Mechanism and control of breathing.

UNIT-V

1. Excretion-Physiology of excretion, Osmoregulation.
2. Physiology of Muscle contraction.
3. Physiology of nerve impulse, Synaptic transmission.
4. Ear and Eye - structure and function.

LIST OF RECOMMENDED BOOKS :

1. Conn, Stumpy RK, Bruening and D.C. : Outlines of Biochemistry.
2. Gaviong : Review of Medical Physiology.
3. Eckest, R. : Animal Physiology (W.H. Freeman)
4. Hildbrand : Analysis of Vertebrate structure
5. Kingsley : Outlines of Comparative Anatomy (Central Book Depot)
6. Rouer & Parsons : The Vertebrate Body, (Saunders)
7. Walta & Gyles : Biology of the Vertebrates (Macmillan)

PAPER - II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

UNIT-I

1. General Characters of Hormones.
2. Hormone Receptor
3. Biosynthesis and secretion of thyroid, Adrnal ; Ovarian and testicular hormones.
4. Endocrine disorder due to hormones and other gland.

UNIT-II

1. Reproductive cycle in vertebrate.
2. Menustration, Lactation and pregnancy.
3. Mechanism of parturition.
4. Hormonal regulation of gametogenesis.
5. Extra embryonic membrane.

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UNIT-III

1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, Mutation, Isolation and Natural selection.
4. Evolution of Horse.

UNIT-IV

1. Introduction to Ethology.
2. Patterns of Behaviour Taxes, Rellexes, Drives and Stereotyped Behaviour.
3. Reproductive Behavioural Patterns.
4. Hormones, Drugs and Behaviour.

UNIT-V

1. Aquaculture
2. Sericultural
3. Apiculture
4. Pisciculture
5. Poultry keeping
6. Elements of Pest Control -
   1. Chemical control
   2. Biological Control

PRACTICAL WORK

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

1. Study of the representative examples of the different chordates (Classification and character)
2. Dissection of various systems of scoliodon-Afferent and Efferent branchial vessels, cranial nerves, internal ear.
3. Simple microscopic technique through unstained or stained permanent mounts.
4. Study of prepared slides histological, as per theory papers.
5. Study of limb girdles and vertebrae of frog, varanus, fowl and Rabbit.
6. Identification of species and individuals of honey bee.
7. Life cycle of honey bee and silkworm.

PRACTICAL WORK - DISTRIBUTION OF MARKS

1.	Major dissection (Cranial nerves/Efferent branchial vessel)	12
2.	Minor dissection (Afferent branchial/Internal ear)	08
3.	Permanent mount	09
4.	Spotting-8 (Slides-4, bones-2, specimens-2)	16
5.	Viva	05
6.	Sessional marks	
	Total :	**50**

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