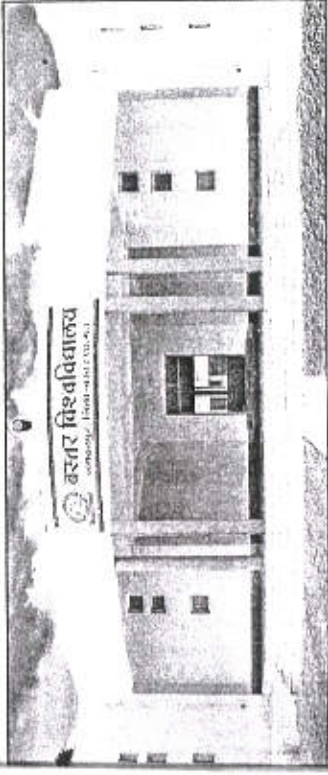


बस्तर विश्वविद्यालय
जगदलपुर (धरमपुरा), जिला-बस्तर (छत्तीसगढ़)
www.bvvjdp.ac.in



पाठ्यक्रम

बी. एस. सी. - 2, (कोड - 082)
B. Sc. Part - II, (Code - 082)

परीक्षा : 2011

कुलसचिव
बस्तर विश्वविद्यालय, जगदलपुर
छत्तीसगढ़ की ओर से

अधिकृत मुद्रक एवं प्रकाशक :



गीता पब्लिकेशन
महामाईघरा, रायपुर (छत्तीसगढ़)

बस्तर विश्वविद्यालय
जगदलपुर (धरमपुरा), जिला-बस्तर (छत्तीसगढ़)



पाठ्यक्रम

बी. एस. सी. - 2, (कोड - 082)
B. Sc. Part - II, (Code - 082)

परीक्षा : 2011

कुलसचिव
बस्तर विश्वविद्यालय, जगदलपुर
छत्तीसगढ़ की ओर से



अधिकृत मुद्रक एवं प्रकाशक :
गीता पब्लिकेशन
महामार्गपारा, रायपुर (छत्तीसगढ़)

REVISED ORDINANCE NO.21
(As per State U.G.C. Scheme)

BACHELOR OF SCIENCE

1. The Three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-II examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the third year.
2. A candidate who, after passing (10+2) Higher Secondary or Intermediate examination of C.G. Board of Secondary Education C.G. or any other Examination recognised by the University or C.G. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-I examination.
3. A candidate who, after passing the B.Sc. Part-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-II examination.
4. A candidate who, after passing the B.Sc. Part-II examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-III examination.
5. Besides regular students, subject to their compliance with this Ordinance ex-student and non-collegiate students shall be eligible for admission to the examinations as per provisions of Ordinance No. 6 relating to Examinations (General). Provided that non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department or College. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in -
 - (i) Foundation Course :
 - (ii) Any one of the following combinations of three subjects:
 1. Physics, Chemistry & Mathematics.
 2. Chemistry, Botany & Zoology.
 3. Chemistry, Physics & Zoology.
 4. Chemistry, Botany & Geology.
 5. Chemistry, Zoology & Geology.
 6. Geology, Physics & Mathematics.
 7. Chemistry, Mathematics & Geology.
 8. Chemistry, Botany & Defence Studies.
 9. Chemistry, Zoology & Defence Studies.
 10. Physics, Mathematics & Defence Studies.
 11. Chemistry, Geology & Defence Studies.
 12. Physics, Mathematics & Statistics.
 13. Physics, Chemistry & Statistics.
 14. Chemistry, Mathematics & Statistics.
 15. Chemistry, Zoology & Anthropology.
 16. Chemistry, Botany & Anthropology.

SCHEME OF EXAMINATION

Subject	Paper	max. Marks	Total Marks	Min. Marks
C Environmental Studies		75	100	33
Field 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 होंगे। सभी प्रश्न समान अंक के होंगे।				
Three Elective Subject :				
1. Physics	I } II } Practical	50 } 50 } 50 }	100	33
2. Chemistry	I } II } III } Practical	30 } 33 } 34 } 50 }	50	17
3. Mathematics	I } II } III }	50 } 50 } 50 }	100	33
4. Botany	I } II } Practical	50 } 50 } 50 }	50	17
5. Zoology	I } II } Practical	50 } 50 } 50 }	100	33
6. Geology	I } II } Practical	50 } 50 } 50 }	50	17
7. Statistics	I } II } Practical	50 } 50 } 50 }	100	33
8. Anthropology	I } II } Practical	50 } 50 } 50 }	50	17

17. Chemistry, Geology & Anthropology.
 18. Chemistry, Mathematics & Anthropology.
 19. Chemistry, Anthropology & Defence Studies.
 20. Geology, Mathematics & Statistics.
 21. Mathematics, Defence Studies & Statistics.
 22. Anthropology, Mathematics & Statistics.
 23. Chemistry, Anthropology & Applied Statistics.
 24. Zoology, Botany & Anthropology.
 25. Physics, Mathematics & Electronics.
 26. Physics, Mathematics & Computer Application/Information Technologies.
 27. Chemistry, Mathematics & Computer Application/Information Technologies.
 28. Chemistry, Bio-Chemistry & Pharmacy.
 29. Chemistry, Zoology & Fisheries.
 30. Chemistry, Zoology & Agriculture.
 31. Chemistry, Zoology & Sericulture.
 32. Chemistry, Botany & Environmental Biology.
 33. Chemistry, Botany & Microbiology.
 34. Chemistry, Zoology & Microbiology.
 35. Chemistry, Industrial Chemistry, Mathematics.
 36. Chemistry, Industrial Chemistry, Zoology.
 37. Chemistry, Biochemistry, Botany.
 38. Chemistry, Biochemistry, Zoology.
 39. Chemistry, Biochemistry, Microbiology.
 40. Chemistry, Biotechnology, Botany.
 41. Chemistry, Biotechnology, Zoology.
- (iii) Practicals in case prescribed for core subjects
7. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part I examination in the subjects which he proposes to offer and then the B.Sc. Part II and Part III examination in the same subject. Successful candidates will be given a certificate to that effect.
 8. In order to pass at any part of the three year degree course examination an examinee must obtain not less than 33% of the total marks in each subject/group of subjects. In subject/group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examination separately. Candidate will have to pass separately at the Part I, Part II and Part III examinations. No division shall be assigned on the result of the Part I and Part II examinations. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part II and Part III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/group in which he appeared at the supplementary examination.
 10. Successful examinee at the Part-III examination obtaining 60% or more marks shall be placed in the First Division, those obtaining less than 60% but not less than 45% marks in the Second Division and other successful examinees in the Third Division.

आधार पाठ्यक्रम (पेपर कोड 0841)

प्रश्न पत्र - प्रथम

हिन्दी भाषा

पूर्णांक - 75

अंक-30

खण्ड-क निम्नलिखित 5 लेखकों के एक-एक विषय पाठ्यक्रम में सम्मिलित होंगे -

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. खुलचंद बघेल

खण्ड-ख हिन्दी भाषा और उसके विविध रूप

- कार्यालयीन भाषा
- मीडिया की भाषा
- विज्ञ एवं वाणिज्य की भाषा
- संशोनी भाषा

खण्ड-ग अनुवाद व्यवहार : अंग्रेजी से हिन्दी में अनुवाद

हिन्दी की व्यावहारिक कोटियाँ-

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

ENGLISH LANGUAGE

(Paper Code - 0842)

M.M. 75

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

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

UNIT-II (a) Reading comprehension of an unseen passage

(b) Vocabulary

UNIT-III Report-Writing

UNIT-IV Expansion of an idea

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. Rimanujam, Homi J. Babha Birbal Sahani.

(ii) Indian Scientific Institutions (Ancient & Modern)

Books Prescribed :

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

B.Sc.-II

(7)

Subject	Paper	max. Marks	Total Marks	Min. Marks
Compulsory Subject - Foundation Course :				
9. Defence Studies	I	50	100	33
	II	50		
	Practical			
10. Micro Biology	I	50	100	33
	II	50		
	Practical			
11. Computer Sciences	I	50	100	33
	II	50		
	Practical			
12. Information Technology	I	50	100	33
	II	50		
	Practical			
13. Industrial Chemistry	I	34	100	33
	II	33		
	III	33		
14. Bio Chemistry	I	50	100	33
	II	50		
	Practical			
15. Bio Technology	I	50	100	33
	II	50		
	Practical			

USE OF CALCULATORS

The Students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-1-1986.

1. Student will bring their own Calculators.
2. Calculators will not be provided either by the University or examination centres.
3. Calculators with, memory and following variables be permitted +, -, x, square, reciprocal, exponentials log, square root, trigonometric functions, wize, sine, cosine, tangent etc. factorial summation, xy, yx and in the light of objective approval of merits and demerits of the viva only will be allowed.

**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

INORGANIC CHEMISTRY

(Paper Code - 0845)

M.M. 33

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

Characteristic properties of d-block elements. Properties 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 stereochemistry.

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

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

B. COORDINATION COMPOUNDS

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valency 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

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

B.Sc.-II

(8)

Concise Inorganic Chemistry, J.D. Lee, ELBS.
Concepts of models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.

Inorganic Chemistry, D.E. Shriver, P.W. Atkins and C.H. Langford, Oxford.

Inorganic Chemistry, W.W. Porterfield, Addison - Wesley.

Inorganic Chemistry, A.G. Sharp, ELBS.

Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.

Advanced Inorganic Chemistry, Slayas Prakash.

Advanced Inorganic Chemistry, Agarwal & Agarwal.

Advanced Inorganic Chemistry, Puri & Sharma, S. Naginchand

Inorganic Chemistry, Madan, S. Chand

Aadunik Akarbanic Rasayan, A.K. Shrivastav & P.C. Jain, Goel Pub.

Ucchattar Akarbanic Rasayan, Satya Prakash & G.D. Tuli, Shyamal Prakashan

Ucchattar Akarbanic Rasayan, Puri & Sharma.

5. Selected topic in Inorganic Chemistry by Madan Malik, & Tuli, S. Chand.

PAPER - II

ORGANIC CHEMISTRY

(Paper Code - 0846)

60 Hrs. MM. 33

**UNIT-I
ALCOHOLS**

A. Dihydric alcohols - nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$\text{Pb}(\text{OAc})_2$ 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 ethers.

**UNIT-II
ALDEHYDES AND KETONES**

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

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

B.Sc.-II

(9)

- 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 NaBH_4 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 Zeliginsky 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 chlorides, 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, Stereochemistry of amines, Separation of mixture of primary, secondary and tertiary amines, Structural features affecting basicity of amines, Preparation 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 orbital 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 Bischer-Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

B.Sc.-II

(10)

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 :

- Organic Chemistry, Morrison and Boyd, Prentice-Hall.
- Organic Chemistry, L.G. Wade Jr, Prentice-Hall.
- Fundamentals of Organic Chemistry, Solomons, John Wiley
- Organic Chemistry, Vol. I, II, III, S.M. Mukherjee, S.P. Singh and R.P. Kapoor, Wiley-Eastern (New-Age).
- Organic Chemistry, F.A. Carey, McGraw Hill
- Introduction to Organic Chemistry, Struweisser, Heathcock and Kosover, Macmillan.
- Organic Chemistry, P.L. Soni
- Organic Chemistry, Bahi & Bahi
- Organic Chemistry, Joginder Singh
- Carbanic Rasayan, Bashi & Bahi
- Carbanic Rasayan, R.N. Singh, S.M.I. Gupta, M.M. Bakodia & S.K. Wadhwa
- Carbanic Rasayan, Joginder Singh

PAPER - III

PHYSICAL CHEMISTRY

60 Hrs. M.M. 34

(Paper Code - 0847)

UNIT-I A. Thermodynamics - I

12 Hrs.

Fundamental of thermodynamics system, surroundings etc. Types of systems, intensive and extensive properties, state and path functions, thermodynamic 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 : Spontaneous process need of second law, statements of Carnot cycle and efficiency of heat engine, Carnot theorem, Thermodynamic state of temperature.

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

B.Sc.-II

(11)

change in isothermal mixing of ideal gases, physical significance 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, sulphur 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, azeotropes.

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

UNIT-IV ELECTROCHEMISTRY-I

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-Onsager (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

A. Electrochemical cell or Galvanic 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; Hendersson-Hassel Equation, Hydrolysis of salts, Corrosion : type theories and prevention.

REFERENCE BOOKS :

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

B.Sc.-II

(12)

- Physical Chemistry, R.A. Alberty, Wiley Eastern.
- The elements of Physical Chemistry, Eastern.
- Physical Chemistry through problems, S.K. Dogra & S. Dogra, Wiley Eastern.
- Physical Chemistry, B.D. Khosla.
- Physical Chemistry, Puri & Sharma
- Bhoutic Rasayan, Puri, Sharma & Pathania, Vishal Publishing Company.
- Bhoutic Rasayan, P.L. Soni
- Bhoutic Rasayan, Baht & Tuli
- 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

- 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 permanganometry.
- Estimation of hardness of water by EDTA.
- Estimation of ferrous & ferric by dichromate method.
- Estimation of copper using thio sulphate.

Instrumentation

Colorimetry

- Job's method
- Mole-ratio method

Aquiferation-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.
- Separation of green leaf pigments (spinach leave may be used)
 - Preparation and separation of 2, 4-dinitrophenyl hydrazones of acetone, 2-butanone, hexan-2 and 3-one using toluene and light petroleum (40:60)
 - Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

B.Sc.-II

(13)

B Paper Chromatography : Ascending & Circular.

Determination of R_f values and identification of organic compounds.

- Separation of mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid, Spray reagent-ninhydrin.
- Separation of mixture of D, L-alanine, glycine, and L-Leucine using n-butanol : acetic acid : water (4:1:5). Spray reagent-ninhydrin.
- Separation of monosaccharides- a mixture of D-galactose and d-fructose using n-butanol : acetone : 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 dilatometric method (e.g. $MnCl_2 \cdot 4H_2O$, $SrBr_2 \cdot 2H_2O$).

PHASE EQUILIBRIUM

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

THERMO CHEMISTRY

- To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
- 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.
- To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Reference Book -

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

PRACTICAL EXAMINATION

M.M. 50

5 Hrs.

Three Experiments are to be Performed.

- 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.

- (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
- Any one physical experiment that can be completed in two hours including calculations. 12 marks

10 marks

04 marks

4. Viva

5. Sessional

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

BOTANY
PAPER - I

DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS
(Paper Code - 0861)

- 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 fossil 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.
UNIT-V 8. Major contributions of cytology, phytochemistry and taximetrics to taxonomy.
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.

- UNIT-V** 7. action, self incompatibility, double fertilization, formation of seed-endosperm and embryo ; fruit development and maturation.
8. Significance of seed : suspended animation ; ecological adaptation ; unit of genetic recombination and replenishment, dispersal strategies.
Vegetative reproduction : vegetative propagation, grafting, economic aspects.
- PRACTICAL SCHEME**
- | | |
|--|----|
| 1. Plant Description | 08 |
| 2. Gymnosperm | 07 |
| 3. Anatomy | 07 |
| 4. Embryology | 04 |
| 5. Spotting (1-5 Spots) | 10 |
| 6. Field Report | 04 |
| (Local Flora : Rainy/Winter/Summer-Season) | |
| 7. Viva-Voce | 05 |
| 8. Sessional | 05 |
- Total Marks : 50**

M.M. : 50

Time : 4 Hrs.

PAPER - II
STRUCTURE DEVELOPMENT AND REPRODUCTION
IN FLOWERING PLANTS
(Paper Code - 0862)

- 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 gametophytes ; types of pollination ; attractions and rewards for pollinators ; pollen-pistil inter-

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, Coronopus
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 : Adiantum, Poristrophe
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 venation) 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 available show photograph).

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

- iii. Study through hand sections or dissections - coralloid root (T.S.), rachis (T.S.), leaf (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.), 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 vascular 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 Propagation etc.

1. Study of commonly occurring 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 madagascariensis*) or yucca and comparison with tree forms as exemplified by conifers and dicotyledons.
3. L.S. shoot tip to study the cytological 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. oleracea* 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.

ZOOLOGY

PAPER - I

ANATOMY & PHYSIOLOGY

(Paper Code - 0863)

M.M. : 50

Comparative Anatomy of various organ systems of vertebrates.

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

Gills and lung, Air-Sac in birds

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

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

Digestion and absorption of dietary components.

1. Physiology of heart, Cardiac cycle and ECG.
2. Blood Coagulation.
3. Respiration-Mechanism and control of breathing.
4. Excretion-Physiology of excretion, Osmoregulation.

Excretion-Physiology of excretion, Osmoregulation.

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

Ear and Eye - structure and function.

LIST OF RECOMMENDED BOOKS :

1. Conn, Stumpy RK, Bruening and D.C. : Outlines of Biochemistry.
2. Gavign : 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)

General Characters of Hormones.

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

Reproductive cycle in vertebrate.

1. Menustration, Lactation and pregnancy.
2. Mechanism of parturition.
3. Hormonal regulation of gametogenesis.
4. Extra embryonic membrane.

Extra embryonic membrane.

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR,
EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

PAPER - II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

UNIT-I

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

Reproductive cycle in vertebrate.

1. Menustration, Lactation and pregnancy.
2. Mechanism of parturition.
3. Hormonal regulation of gametogenesis.
4. Extra embryonic membrane.

Extra embryonic membrane.

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR,
EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

PAPER - II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

UNIT-I

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

Reproductive cycle in vertebrate.

1. Menustration, Lactation and pregnancy.
2. Mechanism of parturition.
3. Hormonal regulation of gametogenesis.
4. Extra embryonic membrane.

Extra embryonic membrane.

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR,
EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

PAPER - II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

UNIT-I

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

Reproductive cycle in vertebrate.

1. Menustration, Lactation and pregnancy.
2. Mechanism of parturition.
3. Hormonal regulation of gametogenesis.
4. Extra embryonic membrane.

Extra embryonic membrane.

- UNIT-III**
- Evidences of organic evolution.
 - Theories of organic evolution.
 - Variation, Mutation, Isolation and Natural selection.
 - Evolution of Horse.
- UNIT-IV**
- Introduction to Ethology.
 - Patterns of Behaviour Taxes, Reflexes, Drives and Stereotyped Behaviour.
 - Reproductive Behavioural Patterns.
 - Hormones, Drugs and Behaviour.
- UNIT-V**
- Aquaculture
 - Sericultural
 - Apiculture
 - Pisciculture
 - Poultry keeping
 - Elements of Pest Control
 - Chemical control
 - 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.

Study of the representative examples of the different chordates (Classification and character)

- Dissection of various systems of scoliodon-Afferent and Efferent branchial vessels, cranial nerves, internal ear.
- Simple microscopic technique through unstained or stained permanent mounts.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of frog, varanus, fowl and Rabbit.
- Identification of species and individuals of honey bee.
- 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	00
4. Spotting-8 (Slides-4, bones-2, specimens-2)	16
5. Viva	05
6. Sessional marks	
Total : 50	

MICROBIOLOGY
B.SC. PART II
SCHEME OF EXAMINATION

Paper	Title	M.M.
First	Microbial Physiology and Genetics	50
Second	Principles of Bioinstrumentation and Techniques	50
Practical		50
	Total : 150	

PAPER - I
MICROBIAL PHYSIOLOGY AND GENETICS
(Paper Code - 0869)
M.M. : 50

- UNIT-I** Plasma membrane and transport across membrane, Energy transformation, Physiology of bacterial growth, phases of growth, growth conditions, differentiation in bacterial cells-sporulation, germination; bacterial cell division replication of chromosome, partition of chromosome into daughter cell.
- UNIT-II** Primary and Secondary metabolism.
- UNIT-III** Bacterial plasmids; structure and properties, replication, incompatibility, plasmid amplification.
- Bacteriophages; lytic development cycle - T4; lytic and lysogenic development of phage, single stranded DNA phage.
- Transposition; Structure of bacterial transposons, types of bacterial transposons.
- Mechanism of antibiotic resistance and spread of antibiotic resistance.
- UNIT-IV** Genetic recombination; requirements, molecular basis, genetic analysis of recombination in bacteria.
- UNIT-V** DNA Repair and restriction; Types of repair systems, restriction endonuclease, various types of restriction enzymes, dam and dcm methylases.

Text Book :

- Gene Cloning by T.A. Brown.
- General Microbiology by Power and Daganawala.
- Zinssers Microbiology by KJ Wolfgang, McGraw-Hill Company.
- Microbial Genetics by RM Stanley, F David and EC John.
- Bacteriological Techniques by FJ Baker.

PAPER II
PRINCIPLES OF BIONSTRUMENTATION AND TECHNIQUES
(Paper Code - 0870)
M.M. : 50

- UNIT-I** Colorimetry and spectrophotometry.
Spectrofluorimetry, turbidometry, nephelometry, luminometry.
pHometry.
- UNIT-II** Chromatography; adsorption partition, column, gas, ion-exchange, gel filtration, and affinity, Chromatography, HPLC, FPLC.
Centrifugation and ultracentrifugation.
- UNIT-III** Microscopy- light, phase-contrast, fluorescence, dark field, electron microscopy.
Laser, confocal, microscopy and digital image analysis