



पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

दूरभाष : 0771-2262802 (अकादमिक विभाग), 0771-2262540 (सुसज्जित सचिवालय)

क्रमांक 538/अका./2019

रायपुर, दिनांक 22/06/2019

प्रति,

प्राचार्य/प्राचार्या
संस्कृत समस्त महाविद्यालय
पं. रविशंकर शुक्ल विश्वविद्यालय
रायपुर (छ.ग.)

विषय :- स्नातक स्तर भाग-एक के पाठ्यक्रम बाबत।
संदर्भ :- संयुक्त संचालक, उच्च शिक्षा का पत्र क्रमांक 2456/315/आउशि/सम/2019,
दिनांक 16.05.2019

महोदय/महोदया,

विषयगतम् संदर्भित पत्र के माध्यम से प्राप्त स्नातक स्तर भाग-एक के निम्नलिखित कक्षा/विषयों के परिवर्तित/संशोधित पाठ्यक्रम शिक्षा सत्र 2019-20 से प्रभावशील किया जाता है-

1. बी.ए. - आधार पाठ्यक्रम-हिन्दी भाषा, राजनीति, अर्थशास्त्र, संगीत, दर्शनशास्त्र, मानवविज्ञान, गणित, इतिहास, हिन्दी साहित्य, समाजशास्त्र, भूगोल, मनोविज्ञान, संस्कृत, सांख्यिकी, प्राचीन भारतीय इतिहास।
2. बी.कॉम. - आधार पाठ्यक्रम-हिन्दी भाषा, वाणिज्य।
3. बी.एस.सी. - जैविकी, मानवविज्ञान, बायोटेक्नोलॉजी, कंप्यूटर साइंस, गणित, नीतिकशास्त्र, ग्रामीणशास्त्र, सूक्ष्मजीव विज्ञान, वनस्पतिशास्त्र, भूविज्ञान, इलेक्ट्रॉनिक्स, रसायन, सांख्यिकी, भूगोल, आधार पाठ्यक्रम-हिन्दी भाषा।
4. बी.एस.सी. (गृह विज्ञान) - आधार पाठ्यक्रम-हिन्दी भाषा, एवं गृहविज्ञान।

उपरोक्त विषयों को शिक्षा सत्र 2019-20 से संशोधित रूप में स्नातक स्तर भाग-एक के लिए प्रभावशील किया जाता है, स्नातक स्तर भाग-दो एवं तीन के पाठ्यक्रम यथावत् रहेंगे।

अतः आपसे अनुरोध है कि पाठ्यक्रम परिवर्तन/संशोधन से महाविद्यालय के शिक्षकों एवं छात्र-छात्राओं को अवगत करने का कष्ट करेंगे।

संलग्न :- उपरोक्तानुसार।

21-06-19

विशेष कर्तव्यस्थ अधिकारी (अका.)

अनक. 2



पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)


दूरभाष - 0771-2282882 (अकादमिक विभाग), 0771-2282540 (कुलसचिव कार्यालय)

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पु. क्र. 539/अका./2019
प्रतिनिधि :-

रायपुर, दिनांक 22/06/2019

1. संयुक्त संचालक, उच्च शिक्षा को पत्र क्रमांक 2456/315/आदर्श/सम/2019, दिनांक 16.06.2019 को परिप्रेक्ष्य में सूचनाई।
2. उपकुलसचिव परीक्षा, सहायक कुलसचिव नोकरीय विभाग,
3. कुलपति जी के सचिव/कुलसचिव के निज सहायक, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर को सूचनाई।


वरिष्ठ अधीक्षक (अका.)

Meeting of Central Board of Studies (Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question PaperChemistry/ Science.....

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I PAPER I (Inorganic Chem)		
Unit-I (A: Atomic Structure) (B: Periodic Properties)	Fundamental particles removed. Atomic and ionic radii added. (Remaining part is same as existing)	Already there in Hr. Secondary syllabus To re-appropriate and updating. Unit-I, Part-B re-appropriated
Unit-II (Chemical Bonding)	No major changes compared to existing syllabus	
Unit-III (Chemical Bonding)	No major changes compared to existing syllabus	
Unit-IV (A: s-Block Elements) (B: Chemistry of Noble Gases)	Changed to- (A: s-Block Elements) (B: p-Block Elements)	'Oxidation Reduction' part moved to B.Sc-II. 'Acid and Bases' part moved to B.Sc-II in Part-A of Unit-V Changes have been made to maintain continuity in the topics.
Unit-V (A: p-Block Elements) (B: Inorganic Chemical Analysis)	Changed into two parts as Part A- Chemistry of Noble Metals & Part B- Theoretical principles in Qualitative analysis	Reappropriation needed to strengthen the topic. Included because students do not practice much in Hr. Sec. level. (Graphene like hot topic is introduced)
Laboratory Course (Semimicro Analysis)	Split in 4 sections • Semimicro analysis • Acid-Base Titrations • Redox Titrations • Iodo/ Iodometric Titrations	For developing enhanced experimental skills

(Signature of members of Central Board of Studies)

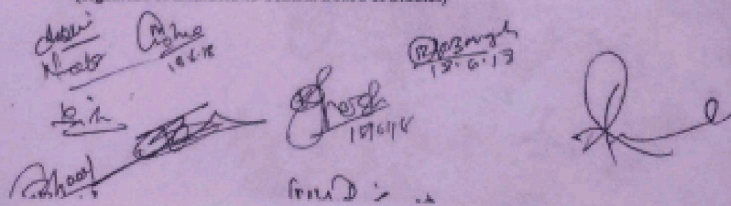
Dr. N. S. Chaturvedi 18.6.18
 Dr. P. K. Mishra 18.6.18
 Dr. S. K. Mishra 18.6.18
 Dr. R. K. Mishra 18.6.18
 Dr. S. K. Mishra 18.6.18

Meeting of Central Board of Studies (Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper Chemistry/ Science

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I PAPER II (Organic Chem)		
Unit-I Basics of Organic Chemistry	Added new topics- 'influence of hybridization on bond properties' & 'isomers'	Important topics, for upgradation
Unit-II Introduction to Stereochemistry	Added new topics- 'Newman and Sawhorse Projection formulae and their inter-conversions'	Important topics, for upgradation
Unit-III Conformational Analysis of Alkanes	Minor addition of topics (e.g. sugars and theory of strain rings)	for upgradation
Unit-IV Aromatic Hydrocarbons	No change, only reappropriation	-
Laboratory Course	No major changes in the existing syllabus	-

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper Chemistry/Science

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I PAPER III (Physical Chem) Unit-I Mathematical Concepts for Chemists and Computers	Computers part has been removed Added- Significant figures and their applications	Students learn now a day since primary classes. Important topic
Unit-II Gaseous State	No change	Appropriate
Unit-III A. Liquid State B. Colloidal State	Part B. changed to 'Colloids and Surface Chemistry' (" brought from Unit IV of existing syllabus)	Reappropriation
Unit-IV A. Solid State B. Surface Chemistry	'Surface Chemistry' moved to Unit-III	Reappropriate
Unit-V Chemical Kinetics	'Complex reactions...side reactions' deleted	Less important
Laboratory Course	No drastic change made	Existing course structure is well organized

(Signature of members of Central Board of Studies)

The block contains several handwritten signatures and dates. From left to right: a signature with the name 'Nanda' written below it; a signature with the name 'Bhargava' written below it and the date '18/6/18' written to its right; a signature with the name 'Ghosh' written below it and the date '18/6/18' written to its right; and a signature with the date '18/6/18' written below it. There are also some other illegible signatures and initials.

NEW CURRICULUM OF B.Sc. PART I

CHEMISTRY

The new curriculum will comprise of Three theory papers of 33, 33 and 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 and the practical work of 180 hrs duration.

PAPER I

INORGANIC CHEMISTRY

M.M.33

UNIT-I

A. ATOMIC STRUCTURE

Bohr's theory, its limitation and atomic spectrum of hydrogen atom. General idea of de-Broglie matter-waves, Heisenberg uncertainty principle, Schrödinger wave equation, significance of Ψ and Ψ^2 , radial & angular wave functions and probability distribution curves, quantum numbers, Atomic orbital and shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's Multiplicity rule, electronic configuration of the elements.

B. PERIODIC PROPERTIES

Detailed discussion of the following periodic properties of the elements, with reference to s and p-block. Trends in periodic table and applications in predicting and explaining the chemical behavior.

- Atomic and ionic radii,
- Ionization enthalpy,
- Electron gain enthalpy,
- Electronegativity, Pauling's, Mulliken's, Alfred Rochow's scales.
- Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

UNIT-II

CHEMICAL BONDING I

Ionic bond: Ionic Solids - Ionic structures, radius ratio & co-ordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy Born-Haber cycle, Solvation

energy and solubility of ionic solids, polarising power & polarisability of ions, Fajans rule, Ionic character in covalent compounds: Bond moment and dipole moment, Percentage ionic character from dipole moment and electronegativity difference, Metallic bond-free electron, Valence bond & band theories.

UNIT-III

CHEMICAL BONDING II

Covalent bond: Lewis structure, Valence bond theory and its limitations, Concept of hybridization, Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O , NH_3 , PCl_3 , PCl_5 , SF_6 , H_3O^+ , SF_4 , ClF_3 , and ICl_2^- . Molecular orbital theory. Bond order and bond strength, Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2 , O_2 , F_2 , CO , NO .

UNIT-IV

A. s-BLOCK ELEMENTS

General concepts on group relationships and gradation properties, Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals

B. p-BLOCK ELEMENTS

General concepts on group relationships and gradation properties. Halides, hydrides, oxides and oxyacids of Boron, Aluminum, Nitrogen and Phosphorus. Boranes, borazines, fullerenes, graphene and silicates, interhalogens and pseudohalogens.

UNIT-V

A. CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure, bonding in xenon compounds

B. THEORETICAL PRINCIPLES IN QUALITATIVE ANALYSIS (H_2S SCHEME)

Basic principles involved in the analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.

REFERENCE BOOKS:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Puri, B. R., Sharma, I. R. and Kalia, K. C., Principles of Inorganic Chemistry, Milestone Publishers/ Vishal Publishing Co.; 33rd Edition 2016
7. Madan, R. D. Modern Inorganic Chemistry, S Chand Publishing, 1987.

PAPER: II

ORGANIC CHEMISTRY

UNIT-I BASICS OF ORGANIC CHEMISTRY

Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment, Electrophiles and Nucleophiles; Nucleophilicity and basicity; Homolytic and Heterolytic cleavage, Generation, shape and relative stability of Carbocations, Carbanions, Free radicals, Carbenes and Nitrenes. Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

UNIT-II INTRODUCTION TO STEREOCHEMISTRY

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Diastereoisomers, meso compounds, Relative and absolute configuration: Fischer, Newmann and Sawhorse Projection formulae and their interconversions; Erythrose and threose, D/L, d/l system of nomenclature, Cahn-Ingold-Prelog system of nomenclature (C.I.P rules), R/S nomenclature. Geometrical isomerism: cis-trans, syn-anti and E/Z notations.

UNIT-III CONFORMATIONAL ANALYSIS OF ALKANES

Conformational analysis of alkanes, ethane, butane, cyclohexane and sugars. Relative stability and Energy diagrams. Types of cycloalkanes and their relative stability, Baeyer strain theory: Theory of strainless rings, Chair, Boat and Twist boat conformation of cyclohexane with energy diagrams; Relative stability of mono-substituted cycloalkanes and disubstituted cyclohexane.

UNIT-IV CHEMISTRY OF ALIPHATIC HYDROCARBONS

A. Carbon-Carbon sigma (σ) bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reaction, Free radical substitutions: Halogenation-relative reactivity and selectivity.

B. Carbon-Carbon Pi (π) bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions, Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions and mechanisms (Markownikoff/ Anti - Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation), 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-V AROMATIC HYDROCARBONS

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.

REFERENCE BOOKS:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.

5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
6. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
7. Organic Chemistry, Paula Y. Bruice, 2nd Edition, Prentice-Hall, International Edition (1998).
8. A Guide Book of Reaction Mechanism by Peter Sykes.

PAPER - III

PHYSICAL CHEMISTRY

M.M.34

UNIT-I

MATHEMATICAL CONCEPTS FOR CHEMIST

Basic Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs, Properties of straight line, slope and intercept, Functions, Differentiation of functions, maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; Permutation and combination and probability theory, Significant figures and their applications.

UNIT-II

GASEOUS STATE CHEMISTRY

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path; Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Joule Thompson effect, Liquefaction of Gases.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor (Z), and its variation with pressure and temperature for different gases. Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

UNIT-III

A. LIQUID STATE CHEMISTRY

Intermolecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension.

B. COLLOIDS and SURFACE CHEMISTRY

Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Synthesis and thixotropy, Application of colloids.

Physical adsorption, chemisorption, adsorption isotherms (Langmuir and Freundlich). Nature of adsorbed state. Qualitative discussion of BET.

UNIT-IV

SOLID STATE CHEMISTRY

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Crystal defects.

UNIT-V

A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions.

Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of catalyst, Enzyme catalysed reactions, Michaelis catalysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS:

1. Atkins, P. W. & Paula, J. de Atkins's Physical Chemistry 10th Ed., Oxford University Press (2014).

2. Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4. Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).
5. Engel, T. & Reid, P. *Physical Chemistry* 3rd Ed. Pearson (2013).
6. Pari, B.R., Sharma, L. R. and Pathania, M.S., *Principles of Physical Chemistry*, Vishal Publishing Co., 47th Ed. (2016).
7. Bahl, A., Bahl, B.S. and Tuli, G.D. *Essentials of Physical Chemistry*, 5 Chand Publishers (2010).
8. Rakshit P.C., *Physical Chemistry*, Sarai Book House Ed. (2014).
9. Singh B., *Mathematics for Chemist*, Pragati Publications.

PAPER - IV
LABORATORY COURSE

INORGANIC CHEMISTRY

A. Semi-micro qualitative analysis (using H₂S or other methods) of mixtures - not more than five ionic species (two anions and two cations, excluding interfering, insoluble salts) out of the following:

Cations : NH₄⁺, Pb²⁺, Bi³⁺, Cu²⁺, Cd²⁺, Fe²⁺, Al³⁺, Co²⁺, Ni²⁺, Mn²⁺, Zn²⁺, Ba²⁺, Sr²⁺, Ca²⁺, Na⁺
Anions : CO₃²⁻, S²⁻, SO₃²⁻, S₂O₃²⁻, NO₃⁻, CH₃COO⁻, Cl⁻, Br⁻, I⁻, NO₂⁻, SO₄²⁻

(Spot tests may be carried out wherever feasible)

B. Acid-Base Titrations

- Standardization of sodium hydroxide by oxalic acid solution.
- Determination of strength of HCl solution using sodium hydroxide as intermediate.
- Estimation of carbonate and hydroxide present together in mixture.
- Estimation of carbonate and bicarbonate present together in a mixture.
- Estimation of free alkali present in different soaps/detergents

C. Redox Titrations

- Standardization of KMnO₄ by oxalic acid solution.
- Estimation of Fe(II) using standardized KMnO₄ solution.
- Estimation of oxalic acid and sodium oxalate in a given mixture.
- Estimation of Fe(II) with K₂Cr₂O₇ using internal (diphenylamine, anthranilic acid) and external indicator.

D. Iodo / Iodimetric Titrations

- Estimation of Cu(II) and K₂Cr₂O₇ using sodium thiosulphate solution iodimetrically.
- Estimation of (a) arsenite and (b) antimony iodimetrically.

- Estimation of available chlorine in bleaching powder iodometrically.
- Estimation of Copper and Iron in mixture by standard solution of $K_2Cr_2O_7$ using sodium thiosulphate solution as titrant.

ORGANIC CHEMISTRY

1. Demonstration of laboratory Glassware and Equipments.
 2. Calibration of the thermometer. $80^\circ-82^\circ$ (Naphthalene), $113.5^\circ-114^\circ$ (Acetanilide), $132.5^\circ-133^\circ$ (Urea), 100° (Distilled Water).
 3. Purification of organic compounds by crystallization using different solvents.
 - Phthalic acid from hot water (using fluted filter paper and stemless funnel).
 - Acetanilide from boiling water.
 - Naphthalene from ethanol.
 - Benzoic acid from water.
 4. Determination of the melting points of organic compounds.
Naphthalene $80^\circ-82^\circ$, Benzoic acid $121.5^\circ-122^\circ$, Urea $132.5^\circ-133^\circ$, Succinic acid $184.5^\circ-185^\circ$, Cinnamic acid $132.5^\circ-133^\circ$, Salicylic acid $157.5^\circ-158^\circ$, Acetanilide $113.5^\circ-114^\circ$, m-Dinitrobenzene 90° , p-Dichlorobenzene 52° , Aspirin 135° .
 5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
 - Urea – Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1).
 6. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100°C by distillation and capillary method).
 - Ethanol 78° , Cyclohexane 81.4° , Toluene 110.6° , Benzene 80° .
 1. Distillation (Demonstration)
 - Simple distillation of ethanol-water mixture using water condenser.
 - Distillation of nitrobenzene and aniline using air condenser.
 - ii. Sublimation
 - Camphor, Naphthalene, Phthalic acid and Succinic acid.
 - iii. Decolorisation and crystallization using charcoal.
 - Decolorisation of brown sugar with animal charcoal using gravity filtration
crystallization and decolorisation of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo red using 1 g of decolorizing carbon) from ethanol.
7. Qualitative Analysis

Detection of elements (N, S and halogens) and functional groups (Phenolic, Carboxylic, Carbonyl, Esters, Carbohydrates, Amines, Amides, Nitro and Amide) in simple organic compounds.

PHYSICAL CHEMISTRY

1. Surface tension measurements.

- Determine the surface tension by (i) drop number (ii) drop weight method.
- Surface tension composition curve for a binary liquid mixture.

2. Viscosity measurement using Ostwald's viscometer.

- Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature.
- Study of the variation of viscosity of sucrose solution with the concentration of solute.
- Viscosity Composition curve for a binary liquid mixture.

3. Chemical Kinetics

- To determine the specific rate of hydrolysis of methyl/ethyl acetate catalysed by hydrogen ions at room temperature.
- To study the effect of acid strength on the hydrolysis of an ester.
- To compare the strengths of HCl & H₂SO₄, by studying the kinetics of hydrolysis of ethyl acetate.

4. Colloids

- To prepare colloidal solution of silver nanoparticles (reduction method) and other metal nanoparticles using capping agents.

Note: Experiments may be added/ deleted subject to availability of time and facilities

B.Sc.- I (BOTANY) PAPER-I

BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

UNIT-I

VIRUSES: General characteristics, types of viruses based on structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle. Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages. Mycostrains-Types and Significance.

UNIT -II

BACTERIA: General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and Gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, *Rhizobium*, *Anaerobacter*, *Anaeroba*.

UNIT-III

FUNGI: General account of habit and habits, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi. Heterothallism and Parasexuality. Outlines of classification of fungi. Economic importance of fungi. Life cycles of *Saprolegnia*, *Albugo*, *Aspergillus*, *Penicillium*, *Agaricus*, *Ustilago*, *Puccinia*, *Alternaria* and *Cercospora*. VAM Fungi

UNIT-IV

ALGAE: Algae: General characters, range of thallus organization, Gaidukov phenomenon, reproduction, life cycle patterns and economic importance. Classification, Systematic position, occurrence, structure and life cycle of following genera : *Nostoc*, *Gloetocapsa*, *Filix*, *Coelastrum*, *Volvox*, *Chara*, *Ectocarpus*, *Polysiphonia*.

UNIT -V

Lichens- General account, types, structure, nutrition, reproduction and economic importance. Mycoplasma: Structure and importance. Blue Green Algae (BGA) in nitrogen economy of soil and reclamation of Ushar land. Mushroom Biotechnology

Books Recommended:

Dubey R.C. and Maheshwari D.K. *A text book of Microbiology*, S. Chand Publishing, New Delhi
Pruscott, L. Harley, J and Klein, D. *Microbiology*, 7th edition, Tata Mc Graw-Hill Co. New Delhi.

Sharma P.D., *Microbiology and Plant pathology*, Rastogi Publication, New Delhi.

Alexopoulos, C.J. Mims, C.W. and Blackwell, M.M. *Introduction to Mycology*, John Wiley & Sons.

Dubeey H.C. *An Introduction to Fungi*, Vikas Publishing, New Delhi

Mehrotra R.S. & Agrawal A., *Plant Pathology*, Tata McGraw, New Delhi

Sharma P.D. *Plant Pathology*, Rastogi Publishers, Meerut.

Srivastava, H.N. *Fungi*, Pradep Publications, Jalandhar

Weber, J. & Weber, R. *Introduction to Fungi*, Cambridge University Press, Cambridge

Kumar H.D. *Introduction to phycology*, All. East-west Press, New Delhi

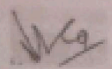
Lee RE, *Phycology*, Cambridge University Press U.K.

Srivastava, H.N., *Algae*, Pradep Publications, Jalandhar

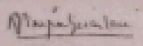
Pandey S.K. *Quick Concepts of Botany*, Lambert Academic publishing, Germany

Pandey S.N., Mishra S.P. & Trivedi P.S. *A Text Book of Botany (Vol-I)*, Vikas Publishing, New Delhi

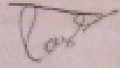
Singh, Pandey and Jain, *A Text book of Botany*, Rastogi Publication, Meerut.



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 Raipur, (C.G.)



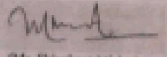
(Dr. Rekha Prasadgautkar)
 Prof. & Head
 Govt. N PG Science College
 Raipur, (C.G.)



(Dr.Ranjana Srivastava)
 Prof. & Head
 Govt. VYTPG Science College
 Raipur, (C.G.)



(Mrs. Sanchal Moghe)
 Govt. Bilasa Girls College, Bilaspur



(Mr. Shivakant Mishra)

(Mr. Sachar Tiwari)

B.Sc-I (BOTANY) PAPER –II
(BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND
PALAEOBOTANY)

UNIT -I

BRYOPHYTES: General characteristics, affinities, range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in *Rivina*, *Marchantia*, *Pellia*, *Anthoceros*, *Funaria*. Vegetative reproduction in Bryophytes, Evolution of sporophytes.

UNIT-II

PTERIDOPHYTES: General characteristics, affinities, economic importance and classification, Heterospory and seed habit, stellar system in Pteridophytes, Apospory and apogamy, Telome theory, *Azolla* as Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of *Psidium*, *Lycopodium*, *Adiantum*, *Equisetum*, *Marsilea*.

UNIT-IV

Gymnosperm: General characteristics, affinities, economic importance and classification, Morphology, anatomy and reproduction in *Cycas*, *Pinus* and *Ephedra*.

UNIT-V

PALAEOBOTANY: Geological time scale, types of fossils and fossilization, Rhyaria, study of some fossil gymnosperms. *Lignoceras*

Books Recommended:

Parhar, N.S. *The Biology and Morphology of Pteridophytes*, Central Book Depot, Allahabad.

Parhar, N.S. *An Introduction to Bryophytes* Vol. I/Bryophytes Central Book Depot, Allahabad.

Sambasivayya, A.V.S.S. *A textbook of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany*, IK International Publishers.

Pandey SN, Mishra SP and Trivedi PS *A text Book of Botany (Vol.III)*, Vikas Publishing, New Delhi

Bhatnagar, SP and Mehta, A. *Gymnosperm*, New Age International (P) Ltd., Publishers, New Delhi

Biswas C. and Johri BM, *The Gymnosperms*, Springer-Verlag, Germany.

Srivastava, HN, *Palaeobotany*, Pradeep Publications Jalandhar

Srivastava, HN, *Bryophyta*, Pradeep Publications Jalandhar

Singh, Pandey and Jain, *A Text Book of Botany*, Rastogi Publication, Meerut

Srivastava, HN, *Fundamentals of Pteridophytes*, Pradeep Publications, Jalandhar

B.Sc. I (BOTANY)

PRACTICAL

Study of external (Morphological) and internal (microscopic/anatomical) features of representative genera given in the theory.

1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachospermum
2. Gram staining
3. Fungi: Albigo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercozoa
4. Bryophyte: Riccia, Marchantia, Feltia, Anthoceros, Splachnum, Funaria
5. Pteridophyte: Lycopodium, Selaginella, Equisetum, Marsilea
6. Gymnosperm: Cycas, Pinus, Ephedra.

PRACTICAL SCHEME

TIME: 4 Hrs.

MLM : 50

1.	Algae/Fungi/Gram Staining	10
2.	Bryophyta/Pteridophyta	10
3.	Gymnosperm	10
4.	Spotting	10
5.	Viva-Voce	05
6.	Seasonal	05

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Prof. & Head

Govt. N PG Science College

Raipur, (C.G.)

(Dr. Rajana Shrivastava)

Prof. & Head

Govt. VYTBG Science College

Raipur, (C.G.)

(Mrs. Sanchal Moghe)

Govt. Bilasa Girls College, Bilaspur

(Mr. Shivanant Mishra)

(Mr. Sadhar Tiwari)

Zoology
B.Sc. Part I 2018-19
Paper I
(Cell Biology and Non-chordata)

Unit-I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear
Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit-II

1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit-III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.
- 2. Protozoa: Type study - Paramecium,
- 2. Porifera: Type study - Sycon.
- 3. Coelenterata: Type study - Obelia

Unit-IV

- General characters and classification of Phylum Platyhelminthes, Nematelminthes, Annelida and Arthropoda up to order.
- 2. Platyhelminthes and Nematelminthes: Type Study - Fasciola, Ascaris
- 3. Annelida: Type Study - Pheretima.
- 4. Arthropoda: Type Study - Palaemon.

Unit-V

- General characters and classification of Phylum Mollusca and Echinodermata up to order.
- 2. Mollusca: Type Study - Pila.
- 3. Echinodermata- Type Study- Asterias (Starfish).

Zoology
B.Sc. Part I 2018-19
Paper II
(Chordata and Embryology)

Unit-I

1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders.
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Mysine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Nertery.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit-III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV

1. Fertilization
2. Gametogenesis, Structure of gamete and Types of eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

Zoology
B.Sc. Part I 2018-19
Practical

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

- Dissection of Earthworm, Cockroach, Prawn and Pila
- Minor dissection—appendages of Prawn & hantre plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermal/drawing/Model etc.)

- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology.

Scheme of Practical Exam

Time: 3hrs

1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Exercise based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spets-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

PRACTICAL EXAMINATION

05 Hrs.
M.M. 50

Three experiments are to be performed

1. Inorganic Mixture Analysis, four radicals two basic & two acid (excluding insoluble, interfering & combination of acid radicals) OR Two Titrations (Acid-Bases, Redox and Iodo/Iodimetry) 12 marks
 2. Detection of functional group in the given organic compound and determine its MP/BP. 8 marks
OR
Crystallization of any one compound as given in the prospectus along with the determination of mixed MP.
OR
Decolorisation of brown sugar along with sublimation of camphor/ Naphthlene.
 3. Any one physical experiment that can be completed in two hours including calculations. 14 marks
 4. Viva 10 marks
 5. Sessionals 06 marks
- In case of Ex-Students two marks will be added to each of the experiments

REFERENCE TEXT:

1. Mendham, J. A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Ahluwalia, V. K., Dhillon, S. and Gulati, A. College practical Chemistry, University Press.
3. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
4. Furniss, B.S.; Haasford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
6. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
7. Halpern, A. M. & McHane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

**New Proposed Syllabus
For
UNDERGRADUATE PROGRAMME
(B.Sc. PROGRAM in PHYSICS)**

B.Sc. Programme in Physics

Course structure

B.Sc. - Part-I

PAPER 1	Mechanics, Oscillations and Properties Of Matter
PAPER 2	Electricity and Magnetism And Electromagnetic Theory

B.Sc. - Part-II

PAPER 1	Thermodynamics, Kinetic Theory And Statistical Physics
PAPER 2	Waves, Acoustics and Optics

B.Sc. - Part-III

PAPER 1	Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics
PAPER 2	Solid State Physics, Solid State Device And Electronics

B.Sc. Part-I

Subject: Physics

Paper-I: MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER

UNIT	Current Course	New Proposed Course	Justification
I	Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems. (Cartesian, Cylindrical and Spherical) uniformly rotating frame, centripetal acceleration, Coriolis force and its applications. Motion under a central force, Kepler's laws. Gravitational law and field. Potential due to a spherical body. System of particles, center of mass, equation of motion, conservation of linear & angular momentum, conservation of energy.	<u>Cartesian, Cylindrical and Spherical coordinate system, inertial and non-inertial frames of reference, uniformly rotating frame</u> , Coriolis force and its applications. Motion under a central force, Kepler's laws. <u>Effect of centrifugal and Coriolis forces due to earth's rotation, Center of mass (C.M), Lab and C.M frame of reference, motion of CM of system of particles subject to external forces, elastic, and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum</u> , Conservation of energy.	The change in Unit is due to repetition of topics already covered in detail in 12th syllabus
II	Rigid body motion, rotational motion, moments of inertia and their products, principal moments & axes, Introductory idea of Euler's equations. potential well and periodic oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations, spring and mass system, simple and compound pendulum, torsional pendulum.	Rigid body motion, rotational motion, moments of inertia and their products, principal moments & axes, Introductory idea of Euler's equations. potential well and periodic oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations, spring and mass system, simple and compound pendulum, torsional pendulum.	No modification required
III	Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, case of different frequencies. Damped harmonic oscillator, power dissipation, quality factor, examples, driven (forced), harmonic oscillator, transient and steady states, power absorption, resonance.	Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, Damped harmonic oscillator, case of different frequencies. power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.	No modification required

<p>as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity, Transverse B field, 180° deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields-velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.</p>	<p>E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity, Transverse B field, 180° deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields-velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.</p>	<p>No modifications.</p>
<p>v Elasticity, small deformations, Hooke's law elastic constants for an isotropic solid and relations between them beams supported at both the ends, cantilever, torsion of cylinder, bending moments and shearing forces. Kinematics of moving fluids, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseuille's law. Capillary tube flow, Reynold's number, Stokes law, surface tension and surface energy, molecular interpretation of surface tension, pressure on a curved liquids surface, wetting.</p>	<p>Elasticity: <u>Strain and stress, elastic limit, Hooke's law, Modulus of rigidity, Poisson's ratio, Bulk modulus, relation connecting different elastic- constants, twisting couple of a cylinder (solid and hollow), Bending moment, Cantilever, Young modulus by bending of beam,</u> <u>Viscosity</u> : Poiseuille's equation of liquid flow through a narrow tube, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseuille's law, <u>Coefficient of viscosity,</u> Stokes law, Surface tension and molecular interpretation of surface tension, Surface energy, Angle of contact, wetting.</p>	<p>This Unit is rearranged according to relevant topics.</p>

TEXT AND REFERENCE BOOKS :

1. E M purcell, Ed Berkely physics course, vol. Mechnics (Mc. Gr. Hill) R P Feynman,
2. R B lighton and M Sands, the feynman lectures in physics, vol 1 (B) publications, Bombay, Delhi, Calcutta, Madras
3. D P Khandelwal, Oscillations and waves (Himalaya Publishing House Bombay)
4. R. K. Ghosh. The Mathematics of waves and vibrations (Macmillan 1975) .
5. J.C. Upadhyaya- Mechanics (Hindi and English Edition.)
6. D.S. Mathur- Mechanics and properties of matter.
7. Brij lal and subramanium- Oscillations and waves. Resnick and Halliday- Volume I
8. Physics Part -1: Resanick and Halliday.
9. Mechanics : D.S.Mathur.

B.Sc. Part-I

Subject: Physics

Paper-II: ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

UNIT	Current Course	New Proposed Course	Justification
I	Functions of two and three variables, partial derivatives, geometrical interpretation of partial derivatives of functions of two variables. Total differential of a function of two and three variables. Repeated integrals of a function of more than one variable, definition of a double and triple integral. Scalars and vectors, dot and cross products, triple vector product, gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stokes theorem.	Repeated integrals of a function of more than one variable, definition of a double and triple integral. Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, and their geometrical interpretation, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stokes theorem and their physical significance. Kirchoff's law, Ideal Constant-voltage and Constant-current Sources, Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, and Maximum Power Transfer theorem.	This Unit is upgraded. Network theorems are introduced.
II	Coulomb's law in vacuum expressed in Vector forms calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox ? Fields at the surface of a conductor screening of E field by a conductor, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a	Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its application: E due to (1) an Infinite Line of Charge, (2) a Charged Cylindrical Conductor, (3) an Infinite Sheet of Charge and Two Parallel Charged Sheets, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field.	Applications of Gauss's law are specified.

	grounded infinite conductor.		
III	Dielectrics parallel plate capacitor with a dielectric, electric susceptibility, permittivity and dielectric constant, polarization and polarization vector, displacement vector, molecular interpretation of Clausius-Mossotti equation. Steady current, current density J , non-steady currents and continuity equation, Kirchoff's law and analysis of multi-loop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor.	<i>Dielectric constant, Polar and Non Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P, Electric displacement vector D. Relation between three electric vectors, Dielectric susceptibility and permittivity, Polarizability and mechanism of Polarization, Lorentz local field, Clausius Mossotti equation, Debye equation, Ferroelectric and Paraelectric dielectrics.</i> Steady current, current density J , non-steady currents and continuity equation, rise and decay of current in LR, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor.	This Unit is modified in accordance with the syllabus of other universities.
IV	Force on a moving charge, Lorentz force equation and definition of B , force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio. $\nabla \cdot B = 0$, $\nabla \times B = \mu_0 j$. Biot and Savart's law, Ampere's law field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (Linear cases), interpretation of a bar magnet as a surface distribution of sinusoidal current.	<i>Magnetization Current and magnetization vector M, three magnetic vectors and their relationship, Magnetic permeability and susceptibility, Diamagnetic, paramagnetic and ferromagnetic substances. B-H. Curve, cycle of magnetization and hysteresis, Hysteresis loss.</i> Biot-Savart's Law and its applications: B due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms).	This Unit is modified in accordance with the syllabus of other universities and syllabus of different competitive exams.
V	Electromagnetic induction, Faraday's law, electromotive force, $\epsilon = \int E \cdot dr$, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation	Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B , plane electromagnetic	No modification required

satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.	waves in vacuum, Poynting's vector.	
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TEXT AND REFERENCE BOOK :

1. Berkeley Physics Course, Electricity and Magnetism, Ed. E.M. Purcell (Mc Graw - Hill)
2. Halliday and Resnik, Physics, Vol. 2
3. D J Griffith, Introduction to Electrodynamics (Prentice-Hall of India)
4. Raitz and Milford, Electricity and Magnetism (Addison-Wesley)
5. A S Mahajan and A A Rangwala, Electricity and Magnetism (Tata Mc Graw-hill)
6. A M Portis, Electromagnetic fields.
7. Pugh & Pugh, Principles of Electricity and Magnetism (Addison-Wesley)
8. Panofsky and Phillips, Classical Electricity and Magnetism, (India Book House)
9. S S Atwood, Electricity and Magnetism (Dover).

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Swarn
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MC
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Amun
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Mh
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PHYSICS

OBJECTIVES OF THE COURSE

The undergraduate training in physics is aimed at providing the necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in physics becomes in tune with the changing scenario and incorporate new and rapid advancements and multi disciplinary skills, societal relevance, global interface, self sustaining and supportive learning.

It is desired that undergraduate i.e. B.Sc. level besides grasping the basic concepts of physics should in addition have broader vision. Therefore, they should be exposed to societal interface of physics and role of physics in the development of technologies.

EXAMINATION SCHEME:

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each groups as listed in the list of experiments.
4. Practical examination will be of 4 hours duration- one experiment to be completed in 2 hours.

The distribution practical marks as follows:

Experiment	: 15+15=30
Viva voce	: 10
Internal assessment	: 10

5. The external examiner should ensure that at least 16 experiments are in working order at the time of examination and submit a certificate to this effect.

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K. Swarnam
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PRACTICALS

Minimum 16 (Eight from each group)

Experiments out of the following or similar experiments of equal standard

GROUP-A

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Moment of inertia of Fly wheel.
3. Moment of inertia of irregular bodies by inertia table.
4. Study of conservation of momentum in two dimensional oscillations.
5. Study of a compound pendulum.
6. Study of damping of a bar pendulum under various mechanics.
7. Study of oscillations under a bifilar suspension.
8. Study of modulus of rigidity by Maxwell's needle.
9. Determination of Y , k , η by Searl's apparatus.
10. To study the oscillation of a rubber band and hence to draw a potential energy curve from it.
11. Study of oscillation of a mass under different combinations of springs.
12. Study of tension of wire (static and dynamic method).
13. Poisson's ratio of rubber tube.
14. Study of bending of a cantilever or a beam.
15. Study of flow of liquids through capillaries.
16. Determination of surface tension of a liquid.
17. Study of viscosity of a fluid by different methods.

GROUP-B

1. Use of a vibration magnetometer to study a field.
2. Study of magnetic field B due to a current.
3. Measurement of low resistance by Carey-Foster bridge.
4. Measurement of inductance using impedance at different frequencies.
5. Study of decay of currents in LR and RC circuits.
6. Response curve for LCR circuit and response frequency and quality factor.
7. Study of waveforms using cathode-ray oscilloscope.
8. Characteristics of a choke and Measurement of inductance.
9. Study of Lorentz force.
10. Study of discrete and continuous LC transmission line.
11. Elementary FORTRAN programs, Flowcharts and their interpretation.
12. To find the product of two matrices.
13. Numerical solution of equation of motion.
14. To find the roots of quadratic equation.

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प्रपत्र

विषय/संकाय/प्रश्नपत्र का नाम: B.Sc. Part-I (Mathematics)

Paper-I (Algebra and Trigonometry)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-I Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	Unit-I Symmetric, Skew-symmetric, Hermitian and skew hermitian, matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	पाठ्यक्रम का वह भाग जो कक्षा-11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak

Prof.B.S.Thakur

Prof.M.A.Siddiqui

Dr.S.K.Bhatt

Dr.R.K.Mishra

Dr.A.K.Mishra

S.K.Gupta

Sangeeta Pandey

प्रपत्र

विषय/संकाय/प्रश्नपत्र का नाम: B.Sc. Part-I (Mathematics)

Paper-II (Calculus)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-III Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	Unit-III Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	पाठ्यक्रम का वह भाग जो कक्षा-11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
Unit-IV Degree an order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	Unit-IV Degree an order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak

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S.K.Gupta

Sangeeta Pandey

प्रपत्र

विषय/संकाय/प्रश्नपत्र का नाम: B.Sc. Part-I (Mathematics)

Paper-III (VECTOR ANALYSIS AND GEOMETRY)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-IV Plane the Straight line and the plane. Sphere. Cone. Cylinder.	Unit-IV Plane the Straight line and the plane. Sphere. Cone. Cylinder.	कक्षा-11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
प्रश्नपत्र का शेष भाग यथावत है।		

Prof.H.K.Pathak

Prof.B.S.Thakur

Prof.M.A.Siddiqui

Dr.S.K.Bhatt

Dr.R.K.Mishra

Dr.A.K.Mishra

S.K.Gupta

Sangeeta Pandey

MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-I

MATHEMATICS

PAPER - I

ALGEBRA AND TRIGONOMETRY

- UNIT-I** Elementary operations on matrices, Inverse of a matrix, Linear independence of row and column matrices, Row rank, column rank and rank of a matrix, Equivalence of column and row ranks, Eigenvalues, eigenvectors and the characteristic equations of a matrix, Cayley Hamilton theorem and its use in finding inverse of a matrix.
- UNIT-II** Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations, Theorems on consistency of a system of linear equations, Relation between the roots and coefficients of general polynomial equations in one variable, Transformation of equations, Descartes's rule of signs, Solution of cubic equations (Cardan's method), Biquadratic equation.
- UNIT-III** Mappings, Equivalence relations and partitions, Congruence modulo n , Definition of a group with examples and simple properties, Subgroups, generation of groups, cyclic groups, coset decomposition, Lagrange's theorem and its consequences, Fermat's and Euler's theorems, Normal subgroups, Quotient group, Permutation groups, Even and odd permutations, The alternating group A_n , Cayley's theorem.
- UNIT-IV** Homomorphism and Isomorphism of groups, The fundamental theorems of homomorphism, Introduction, properties and examples of rings, Subrings, Integral domain and fields Characteristic of a ring and Field.

TRIGONOMETRY :

- UNIT-V** De-Moivre's theorem and its applications, Direct and Inverse circular and hyperbolic functions, Logarithm of a complex quantity, Expansion of trigonometrical functions, Gregory's series, Summation of series.

TEXT BOOK :

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd, New Delhi, 2000.
3. Chandrika Prasad, Text-Book on Algebra and Theory of equations, Pathshala Private Ltd., Allahabad.
4. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.

REFERENCES :

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal, First Course in Linear Algebra, Wiley Eastern, New Delhi, 1982.
2. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
3. S.K. Jain, A. Datta and P.D. Bhattacharya, Basic Linear Algebra with MATLAB, Kay College Publishing (Springer-Verlag), 2001.
4. H.S. Hill and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
5. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pathshala Pvt. Ltd., Allahabad.

B.Sc. Part-I
MATHEMATICS
PAPER - II
CALCULUS

DIFFERENTIAL CALCULUS :

- UNIT-I** $\epsilon - \delta$ definition of the limit of a function, Basic properties of limits, Continuous functions and classification of discontinuities, Differentiability, Successive differentiation, Leibnitz theorem, Maclaurin and Taylor series expansions.
- UNIT-II** Asymptotes, Curvature, Tests for convexity and concavity, Points of inflexion, Multiple points, Tracing of curves in cartesian and polar coordinates.

INTEGRAL CALCULUS:

- UNIT-III** Integration of transcendental functions, Reduction formulae, Definite integrals, Quadrature, Rectification, Volumes and surfaces of solids of revolution.

ORDINARY DIFFERENTIAL EQUATIONS :

- UNIT-IV** Degree and order of a differential equation, Equations reducible to the linear form, Exact differential equations, First order higher degree equations solvable for x, y, p , Clairaut's form and singular solutions, Geometrical meaning of a differential equation, Orthogonal trajectories, Linear differential equations with constant coefficients, Homogeneous linear ordinary differential equations.
- UNIT-V** Linear differential equations of second order, Transformation of the equation by changing the dependent variable/the independent variable, Method of variation of parameters, Ordinary simultaneous differential equations.

TEXT BOOK :

1. Gerañh Prasad, Differential Calculus, Pothiashala Private Ltd, Allahabad.
2. Gerañh Prasad, Integral Calculus, Pothiashala Private Ltd, Allahabad.
3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekker, Inc, New York, 1975.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co, New York.
3. N. Piskunov, Differential and Integral Calculus, Pease Publishers, Moscow.
4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
5. G.F. Simmons, Differential Equations, Tata Mc Graw Hill, 1972.
6. F.A. Collington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
7. H.T.H. Piggie, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishes & Distributors, Delhi, 1985.
8. W.E. Boyce and P.O. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.
9. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, 1999.

B.Sc. Part-I
MATHEMATICS
PAPER - III
VECTOR ANALYSIS AND GEOMETRY

VECTOR ANALYSIS :

- UNIT-I** Scalar and vector product of three vectors. Product of four vectors. Reciprocal Vectors. Vector differentials. Gradient, divergence and curl.
- UNIT-II** Vector integration. Theorems of Gauss, Green, Stokes and problems based on these.
- UNIT-III** General equation of second degree. Tracing of conics. System of conics. Confocal conics. Polar equation of a conic.
- UNIT-IV** Sphere, Cone, Cylinder.
- UNIT-V** Central Conicoids, Paraboloids. Plane sections of conicoids. Generating lines. Confocal Conicoids. Reduction of second degree equations.

TEXT BOOKS :

1. N. Sures and S.N. Nigam, Introduction to vector Analysis, Panchsala Pvt. Ltd. Allahabad.
2. Gopal Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Panchsala Pvt. Ltd., Allahabad.
3. E.J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Macmillan India Ltd. 1954.

REFERENCES :

1. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.
2. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 1979.
4. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co., New Delhi.
5. S.L. Loney, The Elements of Coordinate Geometry, Macmillan and Company, London.
6. P.K. Jais and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd., 1994.
7. P.K. Jais and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wiley Eastern Ltd., 1999.
8. N. Sures and R.S. Gupta, Analytical Geometry of three Dimensions, Panchsala Pvt. Ltd. Allahabad.