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. Mycorrhiza-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, Azatobactor, Anabena.*

UNIT-III

FUNGI: General account of habit and habitat, 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, Peziza, 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, Gloeocaspsa, Volvox,, Oedogonium, Vaucheria, 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

Presscott, 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.

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

Dubey 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, Meruth.

Sristava, H.N. ***Fungi***, Pradeep Publications, Jalandhar

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

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

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

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

Pandey S.K. Quick ***Concept 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

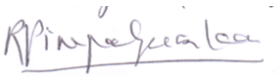
Singh, Pandey and Jain, ***A Text book of Botany,*** Rastogi Publication, Meerut.

(Dr. J.N. Verma)

Proff. & Head

Govt. D.B. Girls PG College

Raipur, (C.G.)

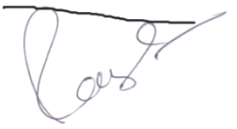


(Dr. Rekha Pimpalgaonkar)

Proff. & Head

Govt. N PG Science College

Raipur, (C.G.)

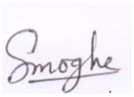


(Dr.Ranjana Shristava)

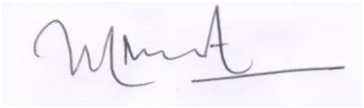
Proff. & Head

Govt. VYTPG Science College

Raipur, (C.G.)



(Mrs. Sanchal Moghe)



(Mr. Shivakant Mishra)

(Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

B.Sc.-I (BOTANY) PAPER –II

(BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY)

UNIT –I

BRYOPHYTA: General characteristics, affinities, range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in *Riccia, 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, Aposory and apogamy, Telome theory, *Azolla* as Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of *Psilotum, Lycopodium, selaginella, 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, Rhynia, study of some fossil gymnosperms. *Lygenopteris*

Books Recommended:

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

Parihar,N.S. ***An introduction to Bryophyta Vol.I:Bryophytes*** Central Book Depot, Allahabad.

Sambamurty,AVSS, ***A textbook of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany,*** IK International Publishers.

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

Bhatanagar, SP and Moitra, 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

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

B.Sc. I (BOTANY)

PRACTICAL

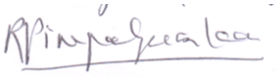
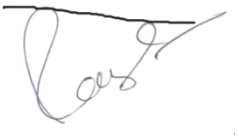
Study of external (Morphorgical) and internal (microscopic/anatomical) features of representative gerera given in the theory.

1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachosperrmum
2. Gram staining
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria
5. Pteridophyta: Lycopodium, Selaginella, Equsetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Epherda.

PRACTICAL SCHEME

TIME: 4 Hrs. **M.M. : 50**

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

(Dr. J.N. Verma) (Dr. Rekha Pimpalgaonkar) (Dr.Ranjana Shristava)

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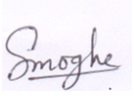
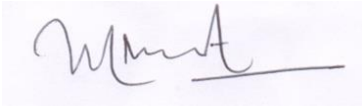
Govt. D.B. Girls PG College Govt. N PG Science College Govt. VYTPG Science College

Raipur, (C.G.) Raipur, (C.G.) Raipur, (C.G.)

(Mrs. Sanchal Moghe) (Mr. Shivakant Mishra) (Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

NEW CURRICULUM OF B.Sc. PART I

CHEMISTRY

The new currlculam will comprise of Three theory papers of 33, 33 and 34 marks each and practical work of 50 marks. The curricuram 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.

a) Atomic and ionic radii,
b) Ionization enthalpy,
c) Electron gain enthalpy,
d) Electronegativity, Pauling's, Mulliken's, Allred Rochow's scales.
e) 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 & polarisabilitry of ions, Fajans rule, Ionic character in covalent compounds: Bond moment and dipole moment, Percentage ionic character from dipole moment and electronegatiity difference, Metallic bond-free electron, Valence bond & band theories.

UNIT-III

CHEMICALBONDING 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, L. 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 (л) 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, Liquification 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, Syneresis and thixotrophy, 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 catatysed reactions, Micellar catatysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS:

1. Atkins, P. W. & Paula, J. de Atkin'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. Puri, 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, S Chand Publishers (2010).
8. Rakshit P.C., Physical Chemistry, Sarat Book House Ed. (2014).
9. Singh B., Mathematics for Chemist, Pragati Publications.

PAPER - IV
LABOBATORY COURSE

INORGANIC CHEMISTRY

A. Semi-micro qualitative analysis (using H_2S or other methods) of mixtures - not more than four ionic species (two anions and two cations, excluding interfering, insoluble salts) out of the following:
Cations : NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Na^+
Anions : CO_3^{2-} , S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, NO_2^-, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}

(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 $KMnO_4$ by oxalic acid solution.
- Estimation of Fe(II) using standardized $KMnO_4$ solution.
- Estimation of oxalic acid and sodium oxalate in a given mixture.
- Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

D. Iodo / Iodimetric Titrations

- Estimation of Cu(II) and $K_2Cr_2O_7$ 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 titrants.

ORGANIC CHEMISTRY

1. Demonstration of laboratory Glasswares and Equipments.
2. Calibration of the thermometer. 80^o–82^o (Naphthalene), 113.5^o–114^o (Acetanilide), 132.5^o-133^o (Urea), 100^o (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^o–82^o, Benzoic acid 121.5^o–122^o, Urea 132.5^o–133^o Succinic acid 184.5^o–185^o, Cinnamic acid 132.5^o–133^o, Salicylic acid 157.5^o–158^o, Acetanilide 113.5^o–114^o, m-Dinitrobenzene 90^o, p-Dichlorobenzene 52^o, Aspirin 135^o.
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^o, Cyclohexane 81.4^o, Toluene 110.6^o, Benzene 80^o.

i. 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 filtrations 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, CarbonyI, Esters, Carbohydrates, Amines, Amides, Nitro and Anilide) 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 & H_2SO_4 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

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 MPt/BPt.

8 marks

O R
Crystallization of any one compound as given in the prospectus along with the determination of mixed MPt.
O R
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., Dhingra, 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.; Hannaford, 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. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

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, Nemathelminthes, Annelida and Arthropoda up to order.

2. Platyhelminthes and Nemathelminthes: Type Study – Fasciola, Ascaris
3. Annelida: Type Study - Pheretima.
4. Arthropoda: Type Study - Palaemone.

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).

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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 Myxine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
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 Typesof 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, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/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 Excersice based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

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. Descarte's rule of signs. Solutions of cubic equations (Cardons 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 groups An. 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, Topies 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, Pothishala 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. Nagpaul, First Course in linear Algebra, Wiley Eastern, New Delhi, 1983.
2. P.B. Bhattacharya, S.K.Jain and S.R. Nagpaul, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
3. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
4. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
5. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala Pvt. Ltd., Allahabad.

B.Sc. Part-I

MATHEMATICS

PAPER - II

CALCULUS

DIFFERENTIAL CALCULUS :

UNIT-I $\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuties. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

UNIT-II Asymptotes. Curvature. Tests for concavity and convexity. 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. Gorakh Prasad, Differential Calculaus, Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd. Allahabad.
3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, 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, Peace 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. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentics Hall of India, 1961.
7. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishe & Distributors, Dehli, 1985.
8. W.E. Boyce and P.O. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.

12. Erwin Kreysizig, 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 differentiation. 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. Saran and S.N. Nigam, Introduction to vector Analysis, Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.
3. R.J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Machmillan India Ltd. 1994.

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 Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.
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. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd., 1994.
7. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wiley Eastern Ltd., 1999.
8. N. Saran and R.S. Gupta, Analytical Geometry of three Dimensions, Pothishala Pvt. Ltd. Allahabad.

B.Sc. Part-I

Paper-I

MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER

(Paper code 0793)

Unit- 1 Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's laws. 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 C.M. 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, Conservation of energy.

Unit-2 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.

Unit-3 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.

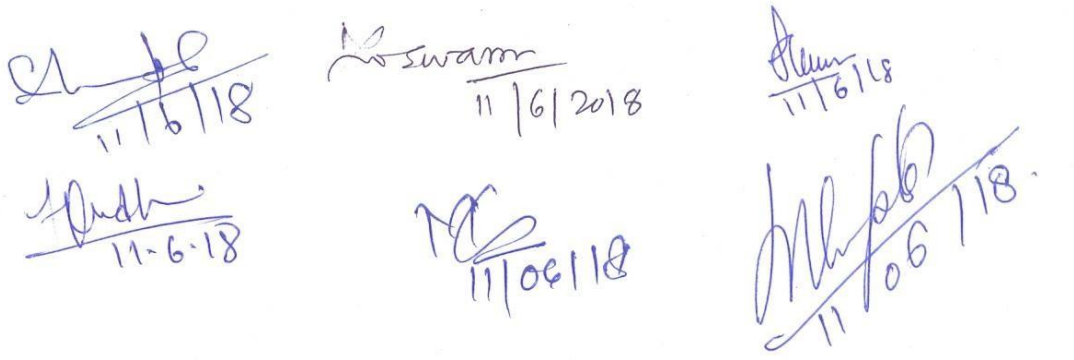
Unit-4 E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity, Transverse B field, 180^{o} deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields: velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.

Unit-5 Elasticity: 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 hallow), Bending moment, Cantilever, Young modulus by bending of beam.

Viscosity: Poiseulle's equation of liquid flow through a narrow tube, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseulle's law, Coefficient of viscosity, Stoke's law, Surface tension and molecular interpretation of surface tension, Surface energy, Angle of contact, wetting.

TEXT AND REFERENCE BOOKS:

1. E M Purcell, Ed Berkely physics course, vol. Mechanics (Mc. Gr. Hill) R P Feynman.
2. R B Lighton and M Sands, the Feynman lectures in physics, vol I (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. Brijlal and Subramanium- Oscillations and waves. Resnick and Halliday- Volume I
8. Physics Part –1: Resnick and Halliday.



Paper-II

ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Unit-1 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 Stoke's 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.

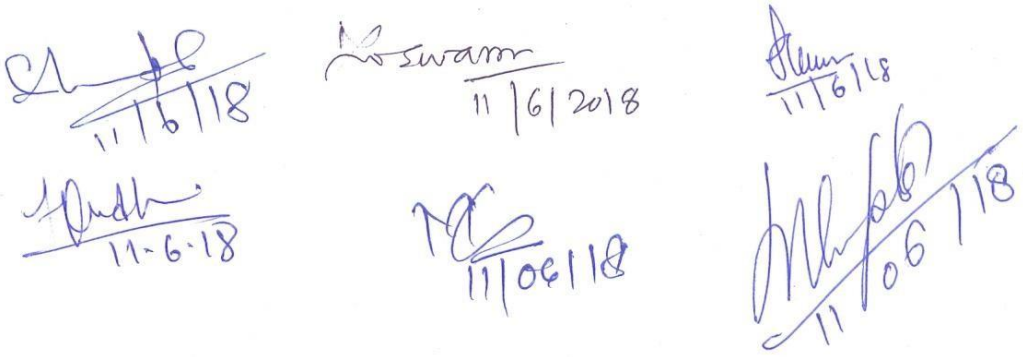
Unit-2 Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric 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.

Unit-3 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, 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 a AC circuit, power factor.

Unit-4 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.

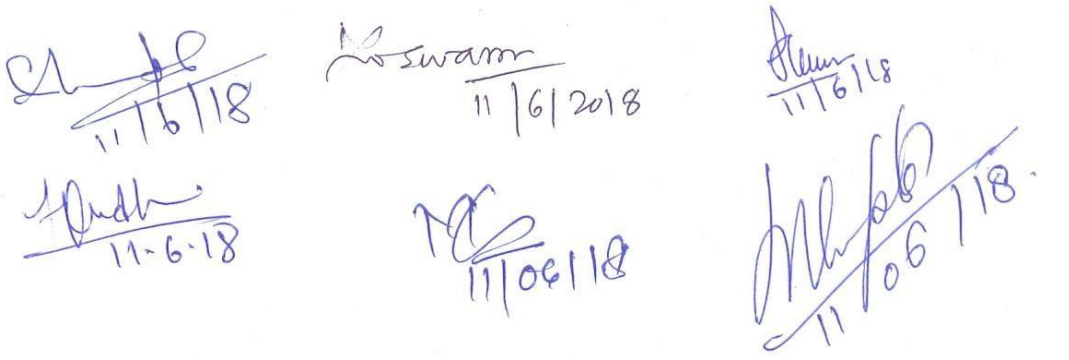


Biot-Savart's Law and its applications: B due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms).

Unit-5 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 waves in vacuum, Poynting's vector.

TEXT AND REFERENCE BOOKS:

1. Berkeley Physics Course, Electricity and Magnetism, Ed. E.M. Purcell (Mc Graw - Hill).
2. Halliday and Resnik, Physics, Vol. 2.
3. D J Grifith, 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).



PRACTICALS

Minimum 16 (Eight from each group)

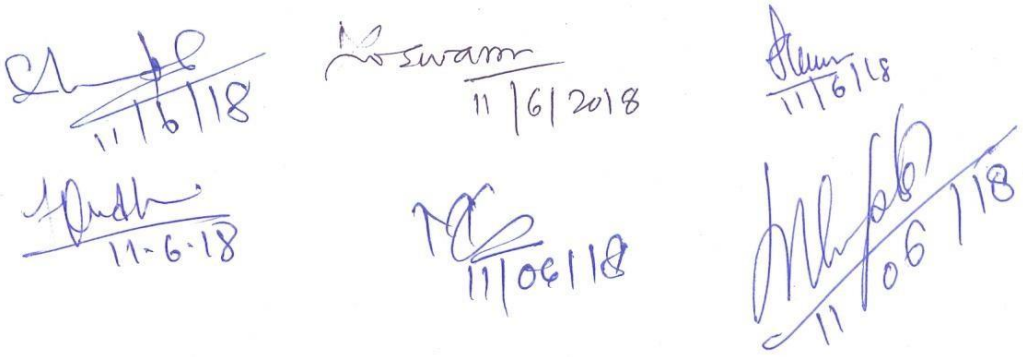
Experiments out of the following or similar experiments of equal standard

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 torsion 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.

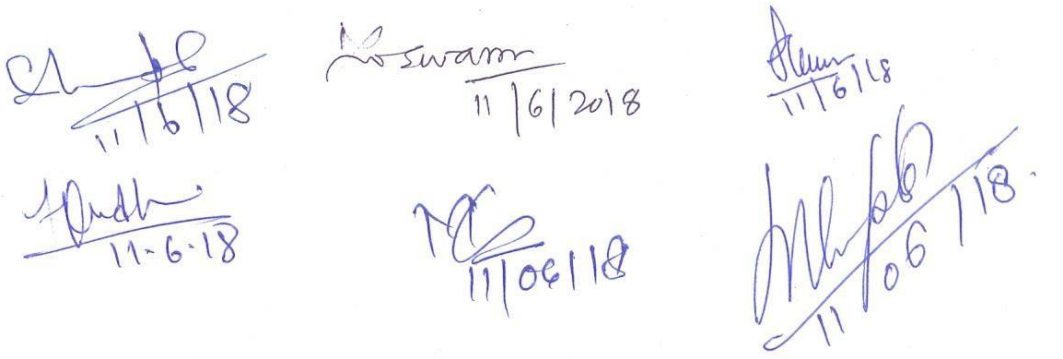
GROUP-B

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.
18. To find the product of two matrices.
19. Numerical solution of equation of motion.
20. To find the roots of quadratic equation.



TEXT AND REFERENCE BOOKs:

1. B saraf et al Mechanical Systems(Vikas publishing House,New Delhi).
2. D.P. khandelwal, A Laboratory Manual of Physics for Undergraduate classes (Vani Publication House,New Delhi).
3. C G Lambe Elements of statistics (Longmans Green and Co London New York, Tprpnto).
4. C Dixon, Numerical analysis.
5. S Lipsdutz and A Poe, schaum's outline of theory and problems of programming with Fortran (MC Graw-Hill Book Company, Singapore 1986).



B.Sc.-I

BIOTECHNOLOGY

PAPER – I

BIOCHEMISTRY, BIOSTASTICS AND COMPUTERS

UNIT-I

1. Introduction to Biochemistry: History, Scope and Development.
2. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides.
3. Lipids: Structure, Classification and Function.

UNIT –II

1. Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.
2. Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application.

UNIT –III

1. Hormones: Plant Hormone-Auxin and Gibberellins and Animal Hormone-Pancreas and Thyroid.
2. Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain and β-oxidation of Fatty acids.

UNIT-IV

1. Scope of Biostatistics, Samples and Population concept, Collection of data-sampling techniques, Processing and Presentation of data.
2. Measures of Central Tendency: Mean, Median and Mode and Standard Deviation.
3. Probability Calculation: Definition of probability, Theorem on total and compound probability.

UNIT-V

1. Computers - General introduction, Organization of computer, Digital and Analogue Computers and Computer Algorithm.
2. Concept of Hardware and Software, Input and Output Devices.
3. Application of computer in co-ordination of solute concentration, pH and Temperature etc., of a Fermenter in operation and Internet application.

List of Books

1. Nelson and Cox (2005) Principles of Biochemistry, Fourth Edition
2. Todd and Howards Mason (2004) Text book of Biochemistry, Fourth Edition
3. Lubert Stryer and Berg ((2004) Biochemistry, Fifth Edition
4. Diana Rain, Marni Ayers Barby - (2006) Textbook on Q level Programming. 4th Edition.
5. Karl Schwartz: (2006) Guide of Micro Soft. Marina Raod, 4th Edition.
6. E Balaguruswamy by Programming in BASIC (1991).
7. RC Campbell by Statistics for Biologists. .
8. P Cassel et al by Inside Microsoft Office,
9. Statistical Methods, GW Snedecor and WG Cochran.
10. AC Wardlaw by Practical Statistics for Experimental Biologists,
11. JHZar by Bio-statistical analysis
12. RR Sokal FJ Rohlf by Introduction to Biostatistics
13. L Y Kun (2003) Microbial Biotechnology: Principles and applications
14. Khan and Khanum (1994) Fundamental of Biostastics

B.Sc.-I

BIOTECHNOLOGY

PAPER–II

CELL BIOLOGY, GENETICS AND MICROBIOLOGY

UNIT-I

1. Concept of life, Cell as a basic unit of living system and Cell theory.
2. Diversity of Cell shape and size.
3. Prokaryotic cell structure: Function and ultra structure of cell (Gram positive and Gram negative Bacteria), Plasma membrane, Flagella, Pilli, Endospore and Capsule.
4. Eukaryotic cell: Plant cell wall and Plasma membrane.

UNIT-II

1. Cytoplasm: Structure and Functions of Endoplasmic reticulum, Ribosome, Golgi complex, Lysosomes, Nucleus, Mitochondria and Chloroplast.
2. Cytoskeleton: Microtubules, Microfilaments and Intermediate filaments.
3. Cell division: Mitosis and Meiosis.
4. Programmed Cell Death.

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UNIT-III

1. Mendel's Laws of Inheritance.
2. Linkage and Crossing over.
3. Chromosome variation in number and structure: Deletion, Duplication, Translocation, Inversion and Aneuploidy, Euploidy (Monoploidy and Polyploidy and its importance).

UNIT-IV

1. History, Scope and Development of Microbiology.
2. Basic techniques of Microbial Culture
3. Microbial Growth & Nutrition of Bacteria: Isolation, media sterilization- physical and chemical agents, pure culture-pour plate method, streak plate method and spread plate method.
4. General features and Economic importance of Fungi, Algae and Protozoa etc.

UNIT-V

1. Bacterial Reproduction: Conjugation, Transduction and Transformation.
2. Mycoplasma – History, Classification, Structure reproduction & Diseases.
3. Viruses – Basic features, Structure, Classification, Multiplication, Bacteriophages (Morphology, life cycle, infection and medicinal importance)

List of Books

1. C.B. Power- Cell biology, First Edition (2005), Himalaya Publishing House.
2. Gereld Karp - Dell and molecular biology, 4th Edition (2005)
3. P.K. Gupta - Cell and molecular biology, Second Edition (2003), Restogi publications.
4. C.B., Oowar - Cell biology, Third Edition (2005) Himalaya Publishing Hosue.
5. S.S. Purohit - Microbiology : Fundamentals and Applications, 6th Edition (2004)
6. R.C. Dubey and D.K. Maheshwari: Practical Microbiology. S.Chand Publication.
7. R.C. Dubey and D.K. Maheshwari,Microbiology (2006). S.Chand Publication.
8. Tortora, Funke and Case - Microbiology, An introduction, sixth Edition (1995), Benjamin/Cummings Publishing Company.
9. Prescott, Harlyey and Klein - Microbiology, Third Edition, Wm. C. Brown Publishers (1996).
10. P. Chakraoborthy - Textbook of microbiology, Second Edition (2007).
11. Prescott, Harley and Klein - Microbiology. Third Edition. Wm. C. Brown.
12. Microbial Genetics, David Freifelder, John F Cronan, Stanley R Maloy, Jones and Bartlett Publishers.
13. Elements of Human Genetics. I.I. cavalla-Sfoeza, WA Benjamin Advanced Book Program.
14. S.K Jadhav and P.K. Mahish (2018) Prayogtmak Jaivprodyogiki awam Sukshmjivigyan- Chhattisgarh Hindi Granth Academy, Raipur.

List of Practical's

MICROBIOLOGY AND BIOCHEMICAL TECHNIQUES

(1) Laboratory rules, Tools, Equipment and Other requirements in Microbiological laboratory.

(2) Micrometry – Use of ocular & stage Micrometrer.

(3) Counting of bacteria by counting chamber, by plate count.

(4)Preparation of media and cultivation techniques:

(a) Basic liquid media (broth)
(b) Basic Solid media, (agar slants and deep tubes)
(c) Demonstration of selective and differential media
(d) Isolation and enumeration of micro organisms
(e) Isolation from air and Soil

(5)Smears and staining methods:

(a) Preparation of bacterial smear
(b) Gram Negative & Positive staining

(6)Methods of obtaining pure cultures

(a) Streak plate method
(b) Pure plate method
(c) Spread plate method
(d) Broth cultures

(7)Growth & Biochemical techniques

(a) Determination of bacterial growth curve
(b) Amylase production test
(c) Cellulose production test
(d) Estimation of Sugar in given solution
(e) Extraction and separation of lipids
(f) Estimation of proteins
(h) Mitosis and Meiosis

(8)Biostatistics:

(a) By Manual and by computer.
(b) Problems on mean, mode and median.

SCHEME OF PRACTICAL EXAMINATION

Time – 4 hrs. **M. M.: 50**

1. Experiment based on culture of micro-organisms	15 Marks
2. Bacterial growth/Staining techniques	10 Marks
3. Biochemical techniques	05 Marks
4. Bio statistics	05 Marks
5. Spotting	05 Marks
6. *Viva – Voce*	05 Marks
7. Record/Sessional	05 Marks

प्रपत्र

विषय / संकाय / प्रश्न–पत्र का नाम– **B.Sc. Computer Science**

क्रमांक	कक्षा का नाम	वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
1.	1st Year	COMPUTER HARDWARE	COMPUTER FUNDAMENTAL	Updation Required
2.	1st Year	COMPUTER SOFTWARE	PROGRAMMING IN 'C' LANGUAGE	Updation Required
3.	1st Year	PRACTICAL	PRACTICAL	Updation Required
4.	2nd Year	COMPUTER HARDWARE	COMPUTER HARDWARE	No Change
5.	2nd Year	COMPUTER SOFTWARE	COMPUTER SOFTWARE	No Change
6.	2nd Year	PRACTICAL	PRACTICAL	No Change
7.	3rd Year	COMPUTER HARDWARE	COMPUTER HARDWARE	No Change
8.	3rd Year	COMPUTER SOFTWARE	COMPUTER SOFTWARE	No Change
9.	3rd Year	PRACTICAL	PRACTICAL	No Change

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

S.N.	Name	Designation/University/College	Signature with Date
1.	Dr. Sanjay Kumar	Head, S.o.S. in Computer Science & I.T., Pt. R.S. University, Raipur	11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	11.06.18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	11/6/18

B.Sc. (CS)
I Year

B.Sc. PART - I
COMPUTER SCIENCE
PAPER - I
COMPUTER FUNDAMENTAL
(PAPER CODE - 0805)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I Classification and Organization of Computers

History of computer, Generation of computer, Calculator vs. Computer, Digital and Analog computers and its evolution, Major components of digital computers; Memory addressing capability of CPU, Word length and processing speed of computes, Microprocessors, Single chipMicrocomputer, Large and small computers, Users interface, Hardware, software and firmware, multi programming multi user system, Dumb smart and intelligent terminals, computer network and multi-processing, LAN parallel processing,Flynn's classification of computers, Control flow and data flow computers

UNIT - II Central Processing Unit

Parts of CPU- ALU,Control Unit, Registers;Architecture of Intel 8085 microprocessor, Instructions for Intel 8085 microprocessor, Instruction Word size, Various addressing mode,Interrupts,Some special Control signals, Instruction cycle, fetch and execute operation, Timing Diagram, Instruction flow and data flow.

UNIT - III Memory

Memory hierarchy, Primary andSecondary Memory, Cache memory, Virtual Memory,Direct Access Storage Devices (DASD), Destructive and Nondestructive Readout, Program and data Memory, Memory Management Unit (MMU), PCMCIA Cards and Slots.

UNIT - IV I/O Devices

I/O devices- Keyboard, Mouse, Monitor, Impact and Non-ImpactPrinters, Plotter, Scanner, other Input/output devices: Scan method of Display- Raster Scan, Vector Scan, Bit Mapped Scan, CRT Controller, I/O Port- Programmable and Non Programmable I/O ports, Inbuilt I/O ports- Parallel and Serial ports, USB, IEEE 1394, AGP, Serial data transfer scheme, Micro controller, Signal Processor, I/O processor, Arithmetic Processor.

UNIT-V SOFTWARE AND PROGRAMMING TECHNIQUES

Application and System Software: Introduction, Example, Difference etc., Introduction to Open Source Software such as Unix/Linux (Ubuntu), Libre office etc., Introduction to Machine Language, Assembly Language and High Level Language; Programming Techniques, Stack, Subroutine, Debugging of programs, Macro, Program Design, Software development, Flow Chart, Multi programming, Multiuser, Multitasking Protection, Operating system and Utility programs, Application packages.

TEXT BOOKS:

1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
2. Computer Fundamentals Architecture and Organization, B. Ram, New Age International Publishers, Fifth Edition.
3. Fundaments of Computers, V. Rajaraman, PHI, Sixth Edition.
4. Computers Today, Donald H. Sanders, McGraw-Hill, Third Edition.
5. IBM PC and Clones, B Govindarajalu, McGraw-Hill, Second Edition
6. UNIX Concepts and Applications, Sumitabha Das, Tata McGraw-Hill, Fourth Edition.

11-06-2018 (Dr. Sanjay Kumar)

11/6/18 (C.L. Gaur)

11.06.18 Hari Shankar Prasad Tarde

11/6/18 (Dr. A.K. Dwivedi)

11/6/18 (Dr. J. Durga Prasad Rao)

B.Sc. PART - I
COMPUTER SCIENCE
PAPER II
PROGRAMMING IN 'C' LANGUAGE
(Paper Code - 0806)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I

Fundamentals of C Programming: Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().

UNIT- II

Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function.
Functions: Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III

Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays.
String: String declaration, initialization, string manipulation with/without using library function.
Structure, Union and Enum - Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, function returning structure. **Union**: basics, declaring union and union variable, **Enum**: declaring enum and enum variable.

UNIT- IV

Pointer: Definition of pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions – malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V

File Handling and Miscellaneous Features: File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite,beof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives: #if, #else, #elif, #endif, #ifndef etc.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, YashwantKanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopal,Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, Second Edition.
5. Applications Programming in ANSI C, R. Johnsonbaugh , Martin Kalin, Macmillan, Second Edition.
6. The Spirit of C, Mullish Cooper, Jaico publishing House.
7. How to solve it by Computer, R.G.Dromey, Pearson Education.

11/6/18
(Dr. A.K. Dwivedi)

11-06-2018
(Dr Sanjay Kumar)

11/06/18
(Dr. K. Gavel)

11-06-18
Hemi Shankar Prasad Tade

11/6/18
(Dr. J. Durga Rao)

Practical

- At least 20 Practical based on Syllabus of Paper-I and Paper-II.

11-06-2018
(Dr. Sanjay Kumar)

11/6/2018
(Dr. A. K. Dwivedi)

11/6/18
(L. K. Gavel)

11/6/18
(Dr. T. Divya Sreenivasa Rao)

11-06-18
Hari Shankar Prasad Tandle

Syllabus

B.Sc. Part I

ELECTRONICS

Paper-I

ELB-101: NETWORK ANALYSIS AND ANALOGELECTRONICS

Theory: **Maximum Marks 50**

Unit-1

Basic Circuit Concepts: Voltage and Current Sources, Review of Resistors, Inductors, Capacitors. Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL),

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak,Peak to Peak, Root Mean Square and Average Values. AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits.AC applied to Series and parallel RLC circuit, Series and Parallel Resonance, condition for Resonance, Resonant Frequency, Bandwidth, and significance of Quality Factor (Q).

Passive Filters: Low Pass, High Pass.

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem,Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorems.

Unit-2

Junction Diode and its applications: PN junction diode (Ideal and practical)-constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanationfor load and line regulation.

Unit-3

Bipolar Junction Transistor: CE, CB Characteristics and regions of operation, Transistor biasing, DC load line, operating point, thermal runaway, idea about stability and stability factor. Voltage divider bias, circuit diagrams and their working.

Field Effect Transistors: JFET, Construction, Working and Characteristics. MOSFET, Construction, Working and Characteristics.

Power Devices: UJT, Construction, Working and Characteristics. SCR, Diac, Triac, Construction, Working and Characteristics and Applications.

Unit-4

Amplifiers: Transistor biasing and Stabilization circuits- Fixed Bias and VoltageDivider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and CAmplifiers.

Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

Unit-5

Feedback in Amplifiers: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift,Weins bridge, Crystal andColpitt's oscillator. Determination of Frequency and Condition of oscillation.

Reference Books:

[1] Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)

[2] Electrical Circuits, M. Nahvi& J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)

[3] Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press

[4] Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.

[5] Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.

[6] Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill

[7] Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning

[8] Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6thEdn., Oxford University Press.

[9] J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

[10] J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

Paper- II

ELB-102: LINEAR AND DIGITAL INTEGRATEDCIRCUITS

Theory: **Maximum Marks 50**

Unit-1

Operational Amplifiers (Black box approach): Characteristics of an Ideal andPractical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground.

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Summingand Difference Amplifier, (3) Differentiator, (4) Integrator, (5) Wein bridge oscillator, (6) Comparator and Zero-crossing detector, and (7) Active low pass and high pass, Butterworth filter (1^{st} order only).

Unit-2

Number System and Codes: Decimal, Binary, Octal and Hexadecimal number systems,base conversions. Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication.

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.

Unit-3

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).Arithmetic Circuits: Binary Addition. Half and Full Adder.Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Data processing circuits: Multiplexers, De-multiplexers, Decoders, Encoders. Clock and Timer (IC 555): Introduction, Block diagram of IC 555, Astable and Monostablemultivibrator circuits.

Unit-4

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered)Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop.Master-slave JK Flip-Flop.

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters (4 bits): Ring Counter. Asynchronous counters, Decade Counter Synchronous Counter.

Unit-5

D-A and A-D Conversion: 4 bit binary weighted and R-2R D-A converters, circuit and working, Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all).

Reference Books:

[1] OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall

[2] Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.

[3] Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw

[4] Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.

[5] Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.

[6] Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.

[7] Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

[8] R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

ELECTRONICS LABORATORY

ELB 103P: NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB

(Hardware and Circuit Simulation Software) **Max.Marks:25**

The scheme of practical examination will be as follows-

Experiment	**--**	**30**
Viva	**--**	**10**
Sessional	**--**	**10**
Total	**--**	**50**

AT LEAST 06 EXPERIMENTS FROM THE FOLLOWING BESIDES #1

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
8. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
9. Study of the I-V Characteristics of UJT and design relaxation oscillator..
10. Study of the output and transfer I-V characteristics of common source JFET.
11. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
12. Design of a Single Stage CE amplifier of given gain.
13. Study of the RC Phase Shift Oscillator.
14. Study the Colpitt`s oscillator.

Reference Books:

1. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
2. Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
4. Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.

ELECTRONICS LAB

ELB 104P: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB

Max.Marks:25

At least 04 experiments each from section A, B and C

Section-A: Op-Amp. Circuits (Hardware)

1. To design an inverting amplifier using Op-amp (741,351)for dc voltage of given gain
2. (a) To design inverting amplifier using Op-amp (741,351) & study its frequency response
   (b) To design non-inverting amplifier using Op-amp (741,351) & study frequency response
3. (a) To add two dc voltages using Op-amp in inverting and non-inverting mode
   (b) To study the zero-crossing detector and comparator.
4. To design a precision Differential amplifier of given I/O specification using Op-amp.
5. To investigate the use of an op-amp as an Integrator.
6. To investigate the use of an op-amp as a Differentiator.
7. To design a Wien bridge oscillator for given frequency using an op-amp.
8. To design a circuit to simulate the solution of simultaneous equation and $1^{st}/2^{nd}$order differential equation.
9. Design a Butterworth Low Pass active Filter (1^{st} order) & study Frequency Response
10. Design a Butterworth High Pass active Filter (1^{st} order) & study Frequency Response
11. Design a digital to analog converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware)

1. (a) To design a combinational logic system for a specified Truth Table.
   (b) To convert Boolean expression into logic circuit & design it using logic gate ICs.
   (c) To minimize a given logic circuit.
2. Half Adder and Full Adder.
3. Half Subtractor and Full Subtractor.
4. 4 bit binary adder and adder-subtractor using Full adder IC.
5. To design a seven segment decoder.
6. To design an AstableMultivibrator of given specification using IC 555 Timer.
7. To design a MonostableMultivibrator of given specification using IC 555 Timer.
8. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
9. To build JK Master-slave flip-flop using Flip-Flop ICs
10. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.
11. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.

Section-C: SPICE/MULTISIM simulations for electronic circuits and devices

1. To verify the Thevenin and Norton Theorems.
2. Design and analyze the series and parallel LCR circuits
3. Design the inverting and non-inverting amplifier using an Op-Amp of given gain
4. Design and Verification of op-amp as integrator and differentiator
5. Design the 1storder active low pass and high pass filters of given cutoff frequency
6. Design a Wein`s Bridge oscillator of given frequency.
7. Design clocked SR and JK Flip-Flop`s using NAND Gates
8. Design 4-bit asynchronous counter using Flip-Flop ICs
9. Design the CE amplifier of a given gain and its frequency response.

Reference Books

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
2. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4thedn., 2000, Prentice Hall
3. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)
4. Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill

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कक्षा / Class- B.Sc-I

Paper –I

भूगतिकी एवं भूआकृति विज्ञान

(Geodynamics & Geomorphology)

इकाई– 01 (i) भूविज्ञान एवं परिप्रेक्ष्य; सौरमण्डल में सूर्य की स्थिति ; परिमाण, आकार, संहति, घनत्व।

(ii) पृथ्वी की उत्पत्ति

(iii) पृथ्वी की आंतरिक संरचना, भूपर्पटी, प्रवार एवं क्रोड

(iv) पृथ्वी की आयुः निर्धारण की विघटनाभिक विधियॉ

(v) वायुमण्डल, जलमण्डल एवं जैवमण्डल का निर्माण एवं संगठन

इकाई– 02 (i) प्लेटविवर्तनिकी का प्रारंभिक– अध्ययन

(ii) महाद्वीपीय विस्थापन की अवधारणायें एवं सिद्धान्त

(iii) समस्थैतिकी की अवधारणायें एवं सिद्धान्त

(iv) समुद्रतल विस्तारण की साक्ष्य

(v) समुद्र, महाद्वीप एवं पर्वतों की उत्पत्ति

इकाई– 03 (i) भूकम्पः भूकम्प की पट्टियॉ, भूकम्प की तीव्रता

(ii) ज्वालामुखीः प्रकार एवं विवरण

(iii) अंतःसमुद्रीपर्वतों, चापाकार द्वीपमालाओं एवं खाइयों का उद्भव, विवरण एवं महत्व

(iv) महाद्वीपीय तटीय क्षेत्रों की विवर्तनिकी : सक्रिय तट एवं सीमांतीय द्रोणियॉ

(v) नवविवर्तनिकी : सक्रियभ्रंश, अपवाह परिवर्तन

इकाई– 04 (i) भूआकृति विज्ञान की मूलभूत धारणायें

(ii) भूआकृतिक कारक एवं शैल अपक्षय की प्रक्रियायें,

(iii) नदी के भूवैज्ञानिक कार्य एवं नदीय भूआकृतियॉ

(iv) वायु के भूवैज्ञानिक कार्य एवं वायुजनित भूआकृतियॉ

(v) हिमनदों के भूवैज्ञानिक कार्य एवं हिमनदजनित भूआकृतियॉ

इकाई– 05 (i) समुद्र के भूवैज्ञानिक कार्य एवं तटीय भूआकृतियॉ

(ii) भूमिगत जल के भूवैज्ञानिक कार्य एवं कार्स्टस्थलाकृति

(iii) ज्वालामुखीय भूआकृतियॉ

(iv) पृथ्वी का उष्माबजट एवं वैश्विक जलवायु परिवर्तन

(V) भारत का भूआकृति विभाजन

प्रायोगिक कार्य–

(1) भूआकृतिक संरचनाओं को प्रदर्शित करने वाले प्रादर्शो का अध्ययन

(2) स्थलाकृतिक मानचित्रों का अध्ययन एवं विभिन्न पैमानों पर सूचक–निर्धारण की जानकारियॉ

(3) भूआकृतिक–मानचित्रों में विभिन्न भूआकृतियों एवं प्रवाह प्रणालियों का अध्ययन

(4) भारत के रेखित–मानचित्र में मुख्य पर्वतों, झीलों एवं नदियों को अंकित करना

(5) भारत के रेखित मानचित्र में भूकम्प प्रेक्षणालयों को अंकित करना

(6) भारतीय महाद्वीपों में आये भूकम्पों का अधिकेन्द्र एवं तीव्रता को मानचित्र में अंकित करना।

(7) आकारमितिक विश्लेषण

Class- B.Sc-I

Paper –I

(Geodynamics & Geomorphology)

Unit:1

(i) Geology & it perspectives. Earth in the solar system; size, shape, mass, & density.

(ii) Origin of Earth.

(iii) Internal structure of Earth, Crust, Mantle and Core.

(iv) Age of Earth: with special emphasis on Radioactive dating.

(v) Formation & composition of Hydrosphere, & Biosphere & Atmosphere.

Unit:2

(i) Elementary idea about Plate-Tectonics.

(ii) Concept & theories of continental-drift

(iii) Concept & theories of lsostasy.

(iv) Evidences of Sea-floor spreading.

(v) Origin of oceans, continents & mountains.

Unit:3

(i) Earthquakes, Earthquake Belts, measurement of Earthquakes.

(ii) Volcanoes: Types & distribution.

(iii) Mid –oceanic- ridges, trenches & island arc; origin, distribution & importance.

(iv) Tectonic of continental margins; Active margins & marginal basins.

(v) Neo-tectonics; active faults, drainage changes.

Unit:4

(i) Fundamental concepts of Geomorphology.

(ii) Geomorphic agents & processes of rock-weathering.

(iii) Geological work of rivers; fluvial land forms.

(iv) Geological work of wind; Aeolian land forms.

(v) Geological work of Glaciers; glacial land forms.

Unit:5

(i) Geological work of oceans; coastal land forms.

(ii) Geological work of Ground water. Karst topography.

(iii) Volcanic land forms.

(iv) Earth's heat budget & global climatic changes.

(v) Physiographic divisions of India.

PRACTICALS:

(1) Study of models showing various Geomorphic features.

(2) Numbering, Indexing of topographic maps on various scales.

(3) Interpretation of various Geomorphic landforms & drainage pattern on topographic maps.

(4) Plotting of major mountain Ranges, Lakes & rivers on outline map of India.

(5) Plotting of seismic observatories on outline map of India.

(6) Plotting of epicenters & magnitude of major earthquakes of Indian subcontinents.

(7) Morphometric analysis.

Suggested Readings:-

भौतिक–भूविज्ञान	–	डॉ.मुकुल घोष–
भौतिक–भूविज्ञान	–	जे.पी. तिवारी एव ंबी.के. सिंह–
भूआकृति–विज्ञान	–	डॉ.सविन्द्र सिंह
भूविज्ञान एक परिचय	–	डॉ.विद्यासागर दुबे
Physical Geology	-	Miller
Principles of physical geology	-	A. Holmes
An introduction to physical geology-		A.K. Dutta
Principles of Geomorphology	-	W.D. Thornbury
Principles of Geomorphology	-	A.F. Ahmed

कक्षा / Class- B.Sc-I

Paper –II

खनिज एवं क्रिस्टल विज्ञान

(Mineralogy & Crystallography)

इकाई– 01

(i) खनिज एवं क्रिस्टल की परिभाषा।

(ii) क्रिस्टल संरचना एवं एकांक कोष।

(iii) क्रिस्टल के तत्व, क्रिस्टल रूप।

(iv) क्रिस्टलीय अक्ष एवं अक्षीय कोण।

(v) क्रिस्टल नोटेशन, अन्तःखण्डीय अनुपात एवं सूचकांक

इकाई– 02

(i) क्रिस्टल विज्ञान के नियम।

(ii) क्रिस्टलीय सममिति।

(iii) क्रिस्टलों का वर्गीकरण। क्रिस्टल समुदायों के सामान्यवर्ग की सममिति।

(iv) सामान्य वर्ग के रूप।

(v) क्रिस्टलों में यमलन।

इकाई– 03

(i) प्रकाश की प्रकृति, प्रकाश का परावर्तन एवं अपवर्तन।

(ii) अपवर्तनांक, क्रांतिक कोण, पूर्ण आंतरिक परावर्तन एवं बेके प्रभाव।

(iii) द्वि–अपवर्तन, निकॉल प्रिज्म की रचना एवं कार्य प्रणाली।

(iv) ध्रुवण सूक्ष्मदर्शी : अवयव एवं कार्यप्रणाली।

(v) खनिजों के प्रकाशीय गुण।

इकाई– 04

(i) सिलिकेट संरचनाएं

(ii) खनिजों में बंध।

(iii) समाकृतिकता, बहुरूपता एवं कूटरूपता।

(iv) ठोस–विलयन

(v) खनिजों के भौतिक गुण।

इकाई– 05 निम्नलिखित खनिज समूहों के संगठन, भौतिक एवं प्रकाशकीय गुणों का अध्ययन–

(i) ऑलिवीन्, गार्नेट एवं अभ्रक समूह।

(ii) पायरॉक्सीन।

(iii) एम्फीबोल।

(iv) फेल्सपार।

(v) सिलिका।

प्रायोगिक कार्य–

(1) क्रिस्टल मॉडल में सममिति तत्वों का अध्ययन।

(2) क्रिस्टल समुदायों की मूल आकृतियों का अध्ययन।

(3) यूलर प्रमेय का सत्यापन।

(4) प्रमुख शैलकर खनिजों का स्थूलदर्शी अध्ययन।

(5) ध्रुवण–सूक्ष्मदर्शी की सहायता से प्रमुख शैलकर खजिनों के प्रकाशीय गुणों का अध्ययन।

(6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Class- B.Sc-I

Paper –II

(Mineralogy & Crystallography)

Unit:1

(i) Definition of Mineral and Crystal.

(ii) Crystal structures, Unit cells

(iii) Elements of crystal. Crystal forms.

(iv) Crystallographic axes and axial angles.

(v) Parameters and indices of crystal notation

Unit:2

(i) Laws of Crystallography

(ii) Crystal symmetry

(iii) Classification and symmetry of normal classes of seven crystal systems

(iv) Forms of normal classes.

(v) Twinning in crystals

Unit:3

(i) Nature of light : reflection and refraction of light.

(ii) Refractive index. Critical angles. Total internal reflection and Becke effect.

(iii) Double refraction. Nicol prism it's construction and working.

(iv) Polarizing Microscope- its parts & functions.

(v) Optical properties of minerals.

Unit:4

(i) Silicate structures.

(ii) Bonding in Minerals.

(iii) Isomorphism. Polymorphism and Pseudomorphism.

(iv) Solid solution

(v) Physical properties of minerals

Unit:5 Study of Composition, physical and optical properties of the following Mineral groups:

(i) Olivine, Garnet and Mica groups.

(ii) Pyroxenes

(iii) Amphiboles

(iv) Feldspars

(v) Silica

PRACTICALS-

(1) Study of symmetry elements in crystal models.

(2) Study of Fundamental forms of normal classes of all seven crystal system.

(3) Verification of Euler's theorem.

(4) Study of Physical properties of rock forming minerals.

(5) Study of the optical properties of important rock forming minerals using polarizing Microscopes.

(6) Geological excursion for seven days.

Suggested Readings:

Rutley's elements of Mineralogy	:	Read, H.D.
Dana's text book of Mineralogy	:	Ford W.E.
खनिज तथा क्रिस्टल विज्ञान	–	डॉ.बी.सी. जैश
खनिज विज्ञान के सिद्धांत	–	डॉ. ए.सी. अग्रवाल
प्रायोगिक भू–विज्ञान (भाग–1)	–	डॉ. र. प्र. मांजरेकर
प्रकाशीय खनिज विज्ञान के मूल तत्व	–	विंचेल

प्रपत्र

विषय / संकाय / प्रश्न–पत्र का नाम– **B.Sc. Information Technology**

क्रमांक	कक्षा का नाम	वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
1.	1st Year	FUNDAMENTAL OF I.T. COMPUTERS & PC SOFTWARE	FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE	Updation Required
2.	1st Year	PROGRAMMING CONCEPT USING C LANGUAGE	PROGRAMMING IN 'C' LANGUAGE	Updation Required
3.	1st Year	PRACTICAL	PRACTICAL	Updation Required
4.	2nd Year	DIGITAL CIRCUITS & COMPUTER H/W	DIGITAL CIRCUITS & COMPUTER H/W	No Change
5.	2nd Year	PAPER-II (PAPER CODE - 0875)	PAPER-II (PAPER CODE - 0875)	No Change
6.	2nd Year	PRACTICAL	PRACTICAL	No Change
7.	3rd Year	AMPLIFIERS AND OSCILLATORS	AMPLIFIERS AND OSCILLATORS	No Change
8.	3rd Year	FUNDAMENTAL DATA STRUCTURE	FUNDAMENTAL DATA STRUCTURE	No Change
9.	3rd Year	PRACTICAL	PRACTICAL	No Change

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

S.N.	Name	Designation/University/College	Signature with Date
1.	Dr. Sanjay Kumar	Head, S.o.S. in Computer Science & I.T., Pt. R.S. University, Raipur	11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	11-06-18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	11/6/18

B.Sc. IT
I year

B.Sc. Part – I
INFORMATION TECHNOLOGY
PAPER - I
FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE
(PAPER CODE - 0824)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I INFORMATION TECHNOLOGY

Concepts of IT and Information System, Application of IT (in Business, Education, Medicine, Science, Governance and Agriculture), Impact of IT on society and industry, Legal and Ethical aspect of IT, Security and Threats in IT, M-Commerce, Virtual reality, Latest trend in IT, Future of IT.

UNIT - II COMPUTER NETWORK

BASIC CONCEPTS OF COMPUTER NETWORK: Internet concepts, LAN, MAN, WAN, Topology, Protocol, Transmission mode, communication process, Required elements of Data Communication.

WIRELESSCOMMUNICATION: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, infrared, radio frequency, microwave.

SOCIAL NETWORKING: Evolution of social network sites (YouTube, Facebook, LinkedIn, Twitter), Advantages and Disadvantages of social networking sites.

UNIT - III MS-WORD

Introduction, Word Processing (MS-WORD), Advantage of word processing, Introduction and Installation, Editing a file, using paragraph styles. Newspaper style columns, Using macros, Advance word processing, Headers and footers, Finding text, Setting up printer. Mail merge and other applications, Mathematical calculator, Table handling.

UNIT - IV MS-EXCEL

Introduction to spreadsheet (MS-EXCEL), Definition and advantage of electronic worksheet, Working on spread sheets, Range and related operations, Setting saving and retrieving worksheets, Inserting, Deleting, Coping and Moving of data cells, Inserting and deleting rows and column, Protecting cells, Printing a worksheet, Erasing a worksheet in Graphs creation, Types of graphs, Creating a chart sheet 3D, Columns charts, Moving and changing the size of chart, Printing the chart.

UNIT - V MS-POWER POINT AND MS-ACCESS

MS-POWER POINT: Presenting with Power point: Creating presentation, Working with slides, Different types of slides, Setting page layout, Selecting background and applying design, Adding graphics to slide, Adding sound and movie, Creating chart and graph, Playing a slide show, Slide transition, Advancing slides, Setting time, Rehearsing timing, Animating slide, Animating objects, Running the show from window.

MS-ACCESS: Creating tables in access, Defining data types, Manipulating records.

TEXT BOOKS:

1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
2. Introduction to Information Technology, V. Rajaraman, PHI, Second Edition.
3. Computer Networks, Forouzan, Tata McGraw-Hill, Second, Edition.
4. Microsoft Office 2007 fundamentals, L Story, D Walls.
5. MS Office, S. S. Shrivastava, Firewall Media

11-06-2018
(Dr. Sanjeev Kumar)

11/6/18
(Dr. A.K. Dwivedi)

11/06/18
(L.K. Gaur)

11/6/18
(Dr. J. Durga Pd. Rao)

11.06.18
Hari Shankar Prasad Tiwari

B. Sc. PART - I
INFORMATION TECHNOLOGY
PAPER II
PROGRAMMING IN 'C' LANGUAGE

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I

Fundamentals of C Programming: Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().

UNIT- II

Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function.

Functions: Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III

Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays.

String: String declaration, initialization, string manipulation with/without using library function.

Structure, Union and Enum - Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure, passing structure to function, function returning structure. **Union**: basics, declaring union and union variable, **Enum**: declaring enum and enum variable.

UNIT- IV

Pointer: Definition of pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions – malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V

File Handling and Miscellaneous Features: File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, feof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives: #if, #else, #elif, #endif, #ifndef etc.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, YashwantKanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopal,Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, Second Edition.
5. Applications Programming in ANSI C, R. Johnsonbaugh , Martin Kalin, Macmillan, Second Edition.
6. The Spirit of C, Mullish Cooper, Jaico publishing House.
7. How to solve it by Computer, R.G.Dromey, Pearson Education.

11-06-2018 (Dr. Sanjay Kumar)

11/6/18 (Dr. A.K. Dwivedi)

11/06/18 (L.K. Gavel)

11/6/18 (Dr. J. Durga Prasad Rao)

Practical

- At least 20 Practical based on Syllabus of Paper-I and Paper-II.

11-06-2018
(Dr. Sanjay Kumar)

11/6/2018
(Dr. A.K. Dwivedi)

11/6/18
(L.K. Gavel)

11/6/18
(Dr. J. Dongre Crossed Reno)

11-06-18
Hari Shanker Prasad Pandey

MICROBIOLOGY

BSc-1st

Paper- I: General Microbiology & Basic Technique

UNIT-1: Fundamental, History & Developments

Introduction to major groups of microorganisms and fields of Microbiology; Historical development, Contributions of Pioneers (Louis Pasteur, Edward Jenner, Anton Von Leewenhoeck and Alexander Flemming). Beneficial and harmful microbes and its role in daily life.

UNIT-2: Basic Microbial Techniques

Methods of studying microorganism; Sterilization Techniques (Physical & Chemical Sterilization). Pure culture isolation Technique: Streaking,Waksman serial dilution and plating methods. cultivation, maintenance and preservation of pure cultures. Culture media & conditions for microbial growth. Staining technique: simple staining, Differential (gram staining), negative staining and acid fast staining.

UNIT-3: Virology & Bacteriology

Diversity of microbial world; Principle and classification of Viruses and Bacteria. Structure, Multiplication and Economic importance of viruses (TMV, Influenza virus & T_4-Phage). Structure & Functional organization of Bacteria, Cell wall of Gram Positive & **G**ram Negative bacteria; Economic importance of Bacteria.

UNIT-4: Mycology

General characteristics and classification of Fungi; Structure and Reproduction of fungi (*Rhizopus, Penicillium, Aspergillus, Yeast & Agaricus*). Common fungal disease of crops (Late & Early blight of potato, Smut of Rice, Tikka and Red rot of Sugarcane). Structure, reproduction and economic aspect of Lichens.

UNIT-5: Phycology & Protozoology

General characteristics and classification of Algae and Protozoa; General account & economic importance of Cyanobacteria (*Microcystis, Ocillitoria, Nostoc & Anabaena)* and Protozoa *(Amoeba, Paramoecium, Euglena and plasmodium).*

Text Books Recommended:

1. General microbiology; Vol I & II, Powar C. B. and Daginawala H. I., Himalaypub.house, Bombay.
2. A textbook of Microbiology; Dubey &Maheshwari.
3. Microbiology: An Introduction; G. Tor tora, B. Funke, C. Benjamin Cummings.
4. General Microbiology; Seventh edition by Hans G Schlegel, CambridgeUniversity Press.
5. Practical Microbiology; Dubey and Maheshwari.
6. Handbook of Microbiology; Bisen P.S., Varma K., CBS Publishers and Distributors, Delhi. General Microbiology by Brock.
7. General Microbiology by Pelzar et al.
8. Introduction on Microbial Techniques by Gunasekaran.

Paper- II: Biochemistry and Physiology

UNIT-1: CARBOHYDRATES AND PROTEINS

Structure, classification and properties of Carbohydrates – Monosaccharide, Oligosaccharides (Disaccharides) and Polysaccharides. Structure, classification and properties of Protein - Amino acids, peptides and Proteins (Primary, Secondary, Tertiary and Quaternary structure).

UNIT-2: LIPIDS AND NUCLEIC ACIDS

Structure, classification and properties of Lipids; Saturated and Unsaturated fatty acids. Structure and properties of Nucleotides. Structure and forms of DNA; Replication of DNA. Types, Structure and Function of RNA.

UNIT-3: ENZYMES

Structure, Nomenclature, Classification and Properties of Enzymes. Mechanism of enzyme action, Enzyme kinetic: Michaelis-Menten. Equation & derivation, Enzyme inhibition, Lineweaver-Burk Plot (LB plot). Co-enzymes and their role; Allosteric enzymes and Isoenzyme. Extracellular enzymes and their role.

UNIT-4: MICROBIAL METABOLISM

Bacterial photosynthesis and Chemosynthesis: Glycolysis, TCA cycle and Oxidative Phosphorylation. Anaerobic catabolism of glucose; Fat Biosynthesis,alpha and beta oxidation of fatty acids. Deamination, trasns-amination and Urea cycle.

UNIT-5: GROWTH PHYSIOLOGY & TRANSPORT SYSTEM

Bacterial cell division, Genome replication and Growth Phases, Conditions for growth. Plasma membrane & Transport system, types of transport (Passive and active). Diffusion (simple & facilitated), Concept of Uniport, Antiport and Symport;

Text Books Recommended:

1. General Biochemistry by A.C. Deb.
2. Biochemistry by Lehninger (Kalyani publication)
3. Biochemistry by U. Satyanarayan.
4. Microbiology by Anantanarayan and Panikar.
5. Fundamentals of Biochemistry; J L Jain, Sunjay Jain, Nitin Jain; S. Chand & Company Ltd
6. Practical Biochemistry: Principles and Techniques; *5th Edition*; Keith Wilson and John Walker
7. Biophysical Biochemistry: Principles and Techniques; AvinashUpadhyay, KakoliUpadhyay and Nirmalendu Nath; Himalaya Publishing House.

PRACTICAL

M. M. 50

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Basic information about autoclave, hot air oven, laminar air flow and other laboratory instruments

Preparation of solid/liquid culture media.
Isolation of single colonies on solid media.
Enumeration of bacterial numbers by serial dilution and plating.
Simple and differential staining.
Measurement of microorganism (micrometry) and camera Lucida drawing of isolated organism.
Determination of bacterial growth by optical density measurement.
General and specific qualitative test for carbohydrates
General and specific qualitative test for amino acids
General and specific qualitative test for lipids
Estimation of protein
Estimation of blood glucose
Assay of the activity of amylases
Assay of the activity of Phosphates

Scheme of Practical Examination

Time - 4 hours M.M. 50

1. Exercise on Microbiological methods	10
2. Exercise on Biochemical tests	10
3. Exercise on staining method	05
4. Spotting (1-5)	10
5. Viva-Voce	05
6. Sessional	10
Total	50

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B.A./B.Sc. –I
Subject-Statistics
Paper – I (Paper Code-0803)
PROBABILITY THEORY

Unit-I

Important concepts in probability: Random experiment: trial, sample point and sample space, event, Operations of events, concepts of mutually exclusive and exhaustive events. Definition of probability: classical and relative frequency approach. Richard Von Misses, Cramer and Kolmogrove approachesto probability, merits and demerits to these approaches, any general idea to be given. Discrete probability space, Properties of probability based on axiomatic approaches, Independence of events, Conditional probability, total and compound probability rules, Baye's theorem and its applications.

Unit-II

Random variables: Definition of discrete random variable (rv); probability mass function (pmf) and cumulative distribution function (cdf). Joint pmf of several discrete rvs. Marginal and conditional pmfs. Independence of rvs. Idea of continuous random variables, probability density function, illustration of random variables and its properties. Expectation of a random variable and its properties -moments, measures of location and dispersion, skewness and kurtosis, Moment generating function, raw and central moments, Probability generating function (pgf) and, their properties and uses.

Unit-III

Standard univariate discrete distributions: degenerate, discrete uniform, hypergeometric, Poisson, geometric and negative binomial distributions. Marginal and conditional distributions, Distributions of functions of discrete rvs, reproductive property of standard distributions.

Unit-IV

Univariate continuous distributions and their properties: Uniform, Beta, Gamma, Exponential, Normal, Cauchy, Lognormal. Moment generating function (mgf) : its properties and applications.
Tchebycheff's inequality and applications, statements and applications of weak law of large numbers and central limit theorems.

Unit-V

Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES

1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Chung, K.L. (1979). Elementary Probability Theory with Stochastic Processes, Springer International Student Edition.
3. Edward P.J., Ford J.S. and Lin (1974): Probability for Statistical Decision-Marketing. Prentice Hall
4. Goon A.M., Gupta M.K. and Dasgupta B.(1999): Fundamentals of Statistics, Vol. I , World Press, Calcutta
5. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, Mc. Graw Hall.

ADDITIONAl REFERENCES:
6. Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7.David Stirzaker (1994). Elementary Probability, Cambridge University Press.
8.Feller, W. (1968). An Introduction to Probability Theory and its Applications, Wiley.
9. Hoel P.G. (1971): Introduction to Mathematical Statistics
10. Mayer P.L. (1970): Introductory Probability and Statistical Applications, Addition Wesley
11.Mukhopadhyay, P. (1996). Mathematical Statistics, New Central Book Agency, Calcutta.
12.Parzen, E. (1960). Modern Probability Theory and its Applications, Wiley Eastern.
13Pitman, Jim (1993). Probability, Narosa Publishing House.

Paper – II(Paper Code-0804)
DESCRIPTIVE STATISTICS

Unit - I
Origin and Development of statistical importance, uses and limitations of Statistics. Types of Data: Concepts of a statistics population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data.
Collection and Scrutiny of Data; Primary data – designing a questionnaire and a schedule; checking their consistency. Secondary data – their major sources including some government publications. Complete enumeration, controlled experiments, observational studies and sample surveys. Scrutiny of data for internal consistency and detection of errors of recording. Ideas of cross-validation.

Presentation of Data: Construction of tables with one or more factors of classification. Diagrammatic and graphical representation of non-frequency data. Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation – column diagram, histogram, frequency polygon and ogives. Stem and leaf chart. Box plot.

Unit -II
Analysis of Quantitative Data: Univariate data: Concepts of central tendency or location, and their measures; arithmetic, geometric and harmonic mean, median and mode.

Unit -III
Dispersion and relative measures of dispersion, skewness and kurtosis, and their measures including those based on quartiles and moments. Sheppard's corrections for moments for grouped data (without deviation).

Unit -IV
Bivariate data: Scatter diagram. Product moment correlation coefficient and its properties. Coefficient of determination. Correlation ratio. Concepts of regression. intra-class correlation coefficient with equal and unequal group sizes. Rank correlation – Spearman's and Kendall's measures. Correlation index. Principle of least squares. Fitting of linear and quadratic regression and related results. Fitting

of curves reducible to polynomials by log and inverse transformation. Multivariate data: Multiple regression, multiple correlation and partial correlation in 3 variables. Their measures and related results.

Unit V

Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES

1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Croxton FE, Cowden DJ and Klein S: Applied General Statistics (1973): Prentice Hall of India.
3.Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Vol. 1(1991) & Vol. 2(2001). World Press, Calcutta.
5.Gupta V.K. and Kapor S.C. : Fundamentals of Mathematical Statistics S. Chand and Sons.

ADDITIONAl REFERENCES:

6.Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, McGraw Hill.
8.Snedecor GW and Cochran WG: Statistical Methods (1967) : Lowa State University Press.
9.Spiegel, MR (1967): Theory & Problems of Statistics (1967): Schaum's Publishing Series.

Paper III:
Practical : Practicals Based on Paper I & II

1. Presentation of data by Frequency tables, diagrams and graphs.
2. Calculation of Measures of Central Tendency, dispersion , skewness and kurtosis
3. Product Moment Correlation and Correlation Ratio
4. Fitting of Curves by the least square method
5. Regression of two variables
6. Spearman’s Rank correlation Coefficient
7. Multiple regression of three variables
8. Multiple correlation and partial correlation
9. Evaluation of probabilities using addition and multiplication theorems, conditional probabilities and Bayes theorems
10. Exercises on mathematical expectations and finding measures of central tendency, dispersion, skewness and kurtosis of univariate probability distributions
11. Fitting of univariate and conditional distributions