5. Credit points in a Course/Subject will be assigned only if, the student obtains at least a C grade in midterm and EoSE examination of a Course/Subject.

Syllabus: UG0101/02   - B.Sc. (Pass Course)

CHEMISTRY
Semester – I (2023-2024)

Course Code	Course Title	Duration	Maximum Marks	Minimum Marks
CHM-51T-101	Structure-bonding, Mathematical concept and States of matter	CA - 1 Hr. EoSE - 3 Hrs.	CA - 20 EoSE - 80	CA - 08 EoSE - 32
CHM-51P-102	Chemistry Lab-I	CA - 2 Hrs. EoSE - 4 Hrs.	CA - 10 EoSE - 40	CA - 04 EoSE - 16
Prerequisites/Eligibility	12th standard pass in science from CBSE, RBSE or a recognized board of education.			

Course Objectives: The aim of this course is to provide students with a theoretical understanding of the basic constituents of matter; atoms, ions and molecules in terms of their electronic structure and chemical bonding of these are to be explained by applying basic quantum chemistry. The objective of this course is to explain the basic concepts of mathematics and to explain the structural differences and transformations between states of matter. In addition, the laboratory course is designed to provide students with practical experience in basic qualitative analytical techniques, the use of laboratory techniques, and the determination of physical properties of matter.

Course Outcomes: By the end of this course, students will have a clear understanding of various concepts related to atomic and molecular structure, chemical bonding, mathematical concepts, and states of matter. Students will also have practical experience in calibration of glassware, qualitative analysis of radicals, identification of functional groups in organic compounds, determination of various physical properties of substances, crystallization and preparation of standard solutions of different concentrations.

Syllabus

CHM-51T-101: **Structure-bonding, Mathematical concept and States of**
(4 Hrs./week) **matter.**

Duration	Maximum Marks	Minimum Marks
1 Hour	CA – 20 Marks	CA – 08 Marks
3 Hours	EoSE – 80 Marks	EoSE – 32 Marks

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Unit-I

Ionic Solids: General characteristics of ionic bonding, Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, Lattice enthalpy and Born-Lande equation for calculation of Lattice Enthalpy (no derivation), Born-Haber cycle and its applications, Solvation enthalpy and solubility of ionic solids, polarizing power and polarizability, Fajan's rule. lattice defects, semiconductors.

Metallic bond: Free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, Van der Waals forces.   **15 Lecture**

Unit-II

Covalent Bond: Valence bond theory and its limitations, Directional character, Hybridization. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2^-, H_2O.

Molecular Orbital Theory: LCAO method, bonding, nonbonding and antibonding MOs and their characteristics for combinations of atomic orbitals, MO treatment of homonuclear and heteronuclear (CO and NO) diatomic molecules. Comparison of VB and MO approaches.

Multicenter bonding in electron deficient molecules, bond strength and bond energy, ionic character in covalent compounds, calculation of percentage ionic character from dipole moment and electronegativity difference.   **15 Lecture**

Unit-III

Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculations of slopes, differentiation of functions like k_x, e^x, x^n, sinx and log x; maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions; permutations and combinations, factorials, probability. Matrices and Determinant.

Liquid State: Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid.

Solid State: Definition of space lattice, unit cell.

Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals.

Basic concept of X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure of NaCl and CsCl (Laue's method and powder method.). Defects in solids.

15 Lecture

Unit- IV

Gaseous State: Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of state.

Critical Phenomenon: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities: Root mean square, average and most probable velocities. Qualitative

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discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect.)

Colloidal State: Definition of colloids, classification of colloids.

Solids in liquids (sols): properties - kinetic, optical and electrical, stability of colloids. Protective action, Hardy-Schulze law, gold number.

Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier.

15 Lecture

Suggested Books and References:
1. Lee, J.D. Concise Inorganic Chemistry Wiley, India.
2. Housecroft, Catherine E. & Sharpe, Alan G. Inorganic Chemistry, Pearson Education Ltd.
3. Tuli, G. D. Advanced Inorganic Chemistry, S. Chand, New Delhi.
4. Satya Prakash Advanced Inorganic Chemistry, S. Chand, New Delhi.
5. Adams, D. M. Inorganic Solids – Introduction to Concepts in Solid-state Structural Chemistry, John Wiley, London.
6. Puri, Sharma & Kalia, Principles of Inorganic Chemistry, S. Chand, New Delhi.
7. Puri, B. R., Sharma, L. R. & Pathania, M. S. Principles of Physical Chemistry, Vishal Publishing Co.
8. Gurdeep Raj, Advanced Physical Chemistry, Goel Publishing House.
9. Atkins, W. Physical Chemistry, Oxford University Press.
10. Silby, R. J. & Alberty, R. A. Physical Chemistry, John Wiley & Sons.
11. Barrow, G.M. Physical Chemistry, Tata McGraw-Hill.
12. Kapoor, K. L. A Textbook of Physical Chemistry, (Volume I) Macmillan India Ltd.

Syllabus

CHM-51P-102: Chemistry Lab I   **(4 Hrs./week)**

Duration	**Maximum Marks**	**Minimum Marks**
2 Hours	CA – 10 Marks	CA – 04 Marks
4 Hours	EoSE – 40 Marks	EoSE – 16 Marks

Inorganic Chemistry   **10 marks**

Separation and identification of six radicals (3 cations and 3 anions) in the given inorganic mixture including special combinations.

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Organic Chemistry

Laboratory Techniques   **3 marks**

(a) Determination of melting point (naphthalene, benzoic acid, urea, etc.); boiling point (methanol, ethanol, cyclohexane, etc.): mixed melting point (urea-cinnamic acid, etc.).

(b) Crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling water, naphthalene from ethanol etc.; Sublimation of naphthalene, camphor, etc.

Qualitative Analysis   **7 marks**

Identification of functional groups (unsaturation, phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide, nitro and hydrocarbon) in simple organic compounds (solids or liquids) through element detection (N, S and halogens).

Physical Chemistry

Viscosity and Surface Tension: **10 marks**

a) To determine the viscosity/surface tension of a pure liquid (alcohol etc.)   at room temperature. (Using the Ostwald viscometer/stalagmometer).

b) To determine the percentage composition of a given binary mixture (acetone and ethyl methyl ketone) by surface tension method.

c) To determine the percentage composition of a given mixture (non- interacting systems) by viscosity method.

d) To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

Viva voce   **5 marks**

Practical Record   **5 marks**

Syllabus: UG0101/02   -B.Sc. (Pass Course)

CHEMISTRY
Semester – II (2023-2024)

Course Code	Course Title	Duration	Maximum Marks	Minimum Marks
CHM-52T-103	Reaction mechanism, Stereochemistry, Aromatic hydrocarbons and Chemical kinetics.	CA - 1 Hr. EoSE - 3 Hrs.	CA - 20 EoSE - 80	CA - 08 EoSE - 32
CHM-52P-104	Chemistry Lab-II	CA - 2 Hrs. EoSE - 4 Hrs.	CA - 10 EoSE - 40	CA - 04 EoSE - 16
Course Objectives: The objective of this course is to provide students with a theoretical understanding of the types of organic reactions and their mechanisms, generation and stability				

of various intermediates, determination of rection mechanism, stereochemistry of organic compounds with an understanding of the enantiomers, diastereomers, D/L and R/S nomenclature. The aim of this course is to explain the structure and reactivity of aromatic hydrocarbons, and to explain the order and molecularity of the reactions, the rate law and order of reactions determination. In addition, the laboratory course is designed to provide students with practical experience in basic quantitative analytical techniques including volumetric analysis, qualitative analytical techniques, and the determination of kinetic parameters of reactions.

Course Outcomes: By the end of this course, students will have a clear understanding of drawing logical and detailed reaction mechanisms for various fundamental reactions of aliphatic and aromatic hydrocarbons, methods of determining the reaction mechanisms, classifying the molecules as chiral or achiral, determining the D/L and R/S nomenclature of stereoisomers and identifying the formation of racemic mixture or optically active compounds during the reactions. Students will also have an understanding about order and molecularity of reactions, rate law and methods determining of order and kinetic parameters of reactions. Students will also have practical experience in quantitative analytical techniques including volumetric analysis, identification of organic compounds by determination of functional groups, determination of order and rate constant of various reactions.

Syllabus

CHM-52T-103: **Reaction mechanism, Stereochemistry, Aromatic**
(4 Hrs./week) **hydrocarbons and Chemical kinetics.**

Duration	Maximum Marks	Minimum Marks
1 Hour	CA – 20 Marks	CA – 08 Marks
3 Hours	EoSE – 80 Marks	EoSE – 32 Marks

Unit-I

Introductory Concept and Mechanism of Organic Reactions: IUPAC nomenclature of organic compounds, Dipole moment, Inductive and field effects, electromeric effect, conjugation, resonance and resonance energy, hyperconjugation. Homolytic and heterolytic bond cleavage. Type of reagents, electrophiles and nucleophiles. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (generation, reactions and stability). Types of organic reactions. Markovnikov's rule, Anti-Markovnikov's rule, Saytzeff's rule and Hofmann elimination. Energy considerations. Methods of determination of reaction mechanism (product analysis, intermediates, isotope labelling, kinetic and stereochemical studies), isotope effects.

15 Lecture

Unit-II

Stereochemistry of Organic Compounds: Concept of isomerism, Types of isomerism, Difference between configuration and conformation, Flying wedge and Fischer projection formulae.

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules, D / L and R / S systems of nomenclature.

Geometrical Isomerism: Determination of configuration of geometric isomers - cis / trans and E / Z systems of nomenclature. Geometrical isomerism in oximes and alicyclic compounds.

Conformational Isomerism: Newman projection and Sawhorse formulae, Conformational analysis of ethane, *n*-butane and cyclohexane.   **15 Lecture**

Unit-III

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram.

Aromaticity: Huckel rule, aromatic ions-three to eight membered.

Aromatic electrophilic substitution: General pattern of the mechanism, role of sigma and pi complexes. Mechanism of nitration, halogenation, sulphonation, mercuration, chloromethylation and Friedel crafts reactions. Energy profile diagrams. Activating and deactivating substituents. Directive influence orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.   **15 Lecture**

Unit- IV

Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction: concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions - zero order, first order, second order and pseudo-order; half-life and mean-life. Determination of the order of reaction - differential method, method of integration, method of half-life period and isolation method.

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, (polarimetry) and spectrophotometric method. Theories of chemical kinetics. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model transition state theory (equilibrium hypothesis). Expression for the rate constant bases on equilibrium constant and thermodynamic

aspects.   **15 Lecture**

Suggested Books and References:
1. Gupta, S. S. Organic Chemistry, Oxford University Press.
2. Ahluwalia, V. K. Organic Reaction Mechanisms, Narosa Publishing House, New Delhi.
3. Agarwal, O. P. Organic Chemistry – Reactions and Reagents: Covering Complete Theoretical Organic Chemistry, Goel Publishing House, Meerut.
4. Morrison R. T. & Boyed R. N. Organic Chemistry, Prentice Hall.
5. Finar, I. L. Organic Chemistry (Vol. I & II) ELBS.
6. Bahl A. & Bahl B. S. Advanced Organic Chemistry, S. Chand.
7. Jain, M.K. & Sharma, S.C. Modera Organic Chemistry, Vishal Publishing Co.
8. March, J. & Smith, M. B. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure, Wiley.
9. Ahluwalia, V. K. Stereochemistry of Organic Compounds, Springer.
10. Puri, B. R., Sharma, L. R. & Pathania, M. S. Principles of Physical Chemistry, Vishal Publishing Co.
11. Gurdeep Raj, Advanced Physical Chemistry, Goel Publishing House.
12. Kapoor, K. L. A Textbook of Physical Chemistry, (Volume 5) Macmillan India Ltd.

Syllabus

CHM-52P-104:   Chemistry Lab II   **4 Hrs./week**

Duration	Maximum Marks	Minimum Marks
2 Hours	CA – 10 Marks	CA – 04 Marks
4 Hours	EoSE – 40 Marks	EoSE – 16 Marks

Inorganic Chemistry
Volumetric Analysis   **10 marks**
   (a) Determination of acetic acid in commercial vinegar using NaOH
   (b) Determination of alkali content in antacid tablet using HCl
   (c) Estimation of calcium content in chalk as calcium oxalate by permanganometery.
   (d) Estimation of hardness of water by EDTA
   (e) Estimation of ferrous and ferric by dichromate/permanganate method.
   (f) Estimation of copper using thiosulphate by iodometric method.

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Organic Chemistry

Qualitative Analysis   **10 marks**

Identification of organic compound through the functional group analysis, determination of melting point, boiling point and specific test.

Physical Chemistry

Chemical Kinetics: **10 marks**

    a) To determine the specific reaction rate of the hydrolysis of methyl acetate/ ethyl acetate catalyzed by hydrogen ions at room temperature.

    b) To study the effect of acid strength on the hydrolysis of an ester.

    c) To compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

    d) To study kinetically the reaction rate of decomposition of iodide by H_2O_2.

Viva voce   **5 marks**

Practical Record   **5 marks**

Syllabus
[UG0102-Three/Four Year Bachelor of Science (Maths Group)] - [UG0102-MAT-51T-101] - [Discrete Mathematics & Optimization Techniques-I]
I-Semester - [Mathematics]

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Passing Marks (CA + EoSE)
Theory	UG0102-MAT-51T-101 Discrete Mathematics & Optimization Techniques-I	1 Hrs-CA 3 Hrs-EoSE	30 Marks-CA 120 Marks-EoSE	12 Marks-CA 48 Marks-EoSE

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
I	UG0102-MAT-51T-101	Discrete Mathematics & Optimization Techniques-I			5	6

Level of Course	Type of the Course	Credit Distribution			Course Delivery Method
		Theory	Practical	Total	
Introductory	UG	6	0	6	Lecture, Ninety lectures

List of Programme Codes in which Offered as Minor Discipline	
Prerequisites	Mathematics courses of XIIStd. Of Central Board of Secondary Education or equivalent.
Objectives of the Course:	The objective of the course is to expose discrete structures and involved topology, an optimization of real world problems.

Detailed Syllabus
[UG0102-MAT-51T-101] - [Discrete Mathematics & Optimization Techniques-I]

Unit - I

Relations on a set, Equivalence class, partial order relations, Chains and Anti-chains. Lattices, Distributive and Complemented Lattices. Boolean algebra, conjunctive normal form, disjunctive normal form. Principle of inclusion and exclusion. Propositional calculus, Basic logical operations, Truth tables, Tautologies and contradictions. **(22 Lectures)**

Unit -II

Discrete numeric functions, Generating functions, Recurrence relations, linear recurrence relation with constant coefficients and their solutions: Total solutions, Solution by the method of generating functions. Basic concepts of graph theory, Types of graphs, Walks, Paths & Circuits, Shortest path problem.

(23 Lectures)

Unit -III

Planar graphs, Operations on graphs (union, join, products). Matrix representation of graphs, Adjacency matrices, Incidence matrices. Hamiltonian and Eulerian graphs. Tree, Spanning tree, Minimum spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree.

(22 Lectures)

Unit-IV

Linear programming problems. Feasible solution, Basic feasible solution. Some basic properties and theorems on convex sets. Simplex algorithm, Transportation problems. Assignment problems.

(23 Lectures)

Suggested Books and References –

1. V.K.Balakrishnan, Introductory Discrete Mathematics, Prentice-Hall, 1996.
2. N. Deo, Graph Theory with Applications to Computer Science, Prentice-Hall of India.
3. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, 1986.
4. Kenneth H. Roson, Discrete Mathematics and Its Applications, Tata Mc-GrawHiils, New Delhi, 2003.
5. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
6. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.

Suggested E-resources:

1. Online Lecture Notes and Course Materials

Course Learning Outcomes:

The course would enable the student
1. To understand the ideas in discrete structures viz. Partially ordered sets, Lattices , Graphs etc. and allied conceptual intricacies with applications.
2. To understand mathematical formulation of optimization problems and allied theoretical concepts for solution methodologies for linear programming problems, Transportation problems and assignment problems.

Syllabus
[UG0102-Three/Four Year Bachelor of Science (Maths Group)] - [UG0102-MAT-52T-102] - [Calculus]
II-Semester - [Mathematics]

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Passing Marks (CA + EoSE)
Theory	UG0102-MAT-52T-102 Calculus	1 Hrs-CA 3 Hrs-EoSE	30 Marks-CA 120 Marks-EoSE	12 Marks-CA 48 Marks-EoSE

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
II	UG0102-MAT-52T-102	Calculus			5	6

Level of Course	Type of the Course	Credit Distribution			Course Delivery Method
		Theory	Practical	Total	
Introductory	UG	6	0	6	Lecture, Ninety lectures
List of Programme Codes in which Offered as Minor Discipline					
Prerequisites		Mathematics course of XII std. of Central Board of Secondary Education or equivalent.			
Objectives of the Course:		The objective of the course is to provide students with a comprehensive understanding of the fundamental concepts of calculus as a tool for dynamic systems, diverse topics which find applications in many branches of science.			

Detailed Syllabus

[UG0102-MAT-52T-102] -

[Calculus]

Unit - I
Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of sin(x), cos(x), e^x, $\log_e(1+x)$, $(1+x)^n$. Derivative of the length of an arc. Pedal equations. Curvature: Various formulae, Centre of curvature and Chord of curvature.

(22 Lectures)

Unit -II
Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions. Envelopes: One parameter family of curves when two parameters are connected by a relation. Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers.

(23 Lectures)

Unit -III
Asymptotes: Definition, Parallel to coordinate axes, General rational algebraic curves, inspection method, Intersection of a curve and its asymptotes. Multiple points. Curve tracing of Cartesian, Polar and parametric curves. Beta and Gamma functions.

(22 Lectures)

Unit-IV
Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral. Rectification, Area, Volume and Surface of solids of revolution.

(23 Lectures)

Suggested Books and References –

1. Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand & Co., N. D., 2013.
2. H.S.Dhami, Differential Calculus, Age Int. Ltd., New Delhi, 2012.
3. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
4. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
5. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

Suggested E-resources:

1. Online Lecture Notes and Course Materials:

Course Learning Outcomes:

By the end of the course, students should be able to:
1. Understand the concept of curvature, padel equations, partial differentiation, envelope, asymptotes.
2. Understand the concept of maxima-minima, curve tracing, double triple integration and their applications.

Name of College	Raj. Rishi Govt. Autonomous College Alwar (Rajasthan)
Name of Faculty	UG. -B. Sc. (Maths Group)
Name of Discipline	Physics

SEMESTER-WISE PAPER TITLES WITH DETAILS

Syllabus

Semester-I

Mechanics & Oscillation

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	UG0102, PHY-51T-101 Mechanics & Oscillation	1 Hrs...-MT 3 Hrs.- EoSE	20 Marks-MT 80 Marks-EoSE	8 Marks-MT 32 Marks-EoSE
Practical	UG0102, PHY-51P-102 Physics Lab-I	2 Hrs.-MT 4 Hrs.- EoSE	10 Marks-MT 40 Marks-EoSE	4 Marks-MT 16 Marks-EoSE

Level of Course	Type of Course	Delivery of the Course
Introductory	Major/Minor	Lecture, Sixty Lectures (4 Hrs.. in a week) including diagnostic and formative assessment during lecture hours.
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.	
Objectives of the Course	Objectives of the Course in Mechanics: The objective of the course is to provide students with a comprehensive understanding of classical mechanics, including the laws of motion, frames of reference, forces, motion of particles and rigid bodies, oscillations, and central forces. The course aims to develop their knowledge and skills in analyzing and solving problems related to these topics, using appropriate mathematical formalism and physical concepts.	

Unit-I

Physical Law and frame of Reference:

Inertial and non-inertial frames, Coordinate transformation: transformation of displacement, velocity, acceleration between different frames of reference involving translation motion, Galilean transformation and invariance of Newton's laws.

    (a) The Special theory of relativity: Postulates of STR (Special theory of relativity), the Lorentz transformation, transformation of velocity, acceleration, Length contraction, time dilation and its experimental evidence.

    (b) Coriolis Force: Transformation of displacement, velocity and acceleration between rotating frame, Pseudo forces, Coriolis force, motion relative to earth, Foucault's pendulum.

    (c) Conservative Forces: Introduction about conservative and non-conservative forces, rectilinear motion under conservative forces, discussion of potential energy curve and motion of a particle. **(15 Lectures)**

Unit-II

Centre of Mass: Introduction about Centre of Mass, Centre of Mass Frame: Collision of two particles in one and two dimensions (elastic and inelastic), Slowing down of neutrons in a moderator, Motion of a system with varying mass, Angular momentum concept, conservation and charge particle scattering by a nucleus.

Rigid body: Equation of a motion of a rigid body, Inertial coefficient, Case of J not parallel to ω, the kinetic energy of rotation and the idea of principal axes, the processional motion of the spinning top. **(15 Lectures)**

Unit -III

Motion under Central Forces: Introduction about Central Forces, Motion under central forces, Gravitational interaction, inertia and gravitational mass, General solution under gravitational interaction, Kepler's laws, Discussion of trajectories: Cases of elliptical and circular orbits, Rutherford scattering.

Damped Harmonic Oscillations: Oscillations in a potential well, Damped force and motion under damping, Damped Harmonic Oscillator, Power dissipation, Anharmonic oscillator and simple pendulum as an example. **(15 Lectures)**

Unit-IV

Driven Harmonic Oscillations: Driven harmonic oscillator with damping, Frequency response, Phase relation, Quality factor, Series and parallel of LCR circuit, electromechanical system: (Ballistic galvanometer). **Coupled Oscillations:** Equation of motion of two coupled Harmonic Oscillators, Normal modes, motion in mixed modes and transient behavior, Dynamics of many number of oscillators. **(15 Lectures)**

Suggested Books and References –

1. Mechanics, Berkeley Physics, Vol.1, Kittel, Knight, et.al. 2007, Tata McGraw-Hill
2. An introduction to Mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill
3. Feynman Lectures, Vol. I, R.P. Feynman, R.B. Leighton, M. Sands, 2008, Pearson Education.
4. Course of Theoretical Physics, Vol-I Mechanics, L.D. Landau, E.M. Lifshitz, Butterworth-Heinemann
5. Mechanics, D.S. Mathur, S. Chand and Company Limited,
6. Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.
7. Introduction to Classical Mechanics: With Problems and Solutions, David Morin
8. Classical Mechanics, Herbert Goldstein, Charles P. Poole, and John L. Safko
9. Classical Mechanics, John R. Taylor
10. Mechanics, Keith R. Symon
11. The Physics of Waves & Oscillations, Bajaj
12. Waves, A. P. French

Suggested E-resources:

Online Lecture Notes and Course Materials:

1. MIT Open Course Ware: Classical Mechanics - This resource provides lecture notes, problem sets, and solutions for a complete course on classical mechanics: https://ocw.mit.edu/courses/physics/8-01sc-classical-mechanics-fall-2016/
2. Hyper Physics - This online resource provides concise explanations and interactive simulations for various topics in mechanics: http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

04/10/24

Syllabus

Physics Lab-I

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
I	UG0102, PHY-51P-102	Physics Lab-I	5	2

Level of Course	Type of Course	Delivery of the Course		
Introductory	Major/Minor	Lecture, Sixty Lectures (4 Hrs.. in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.			
Objectives of the Course	The objective of the physics Lab-I, with the mentioned experiments, is to provide students with hands-on experience in conducting experiments related to oscillations, damping, coupled oscillators, and properties of materials. The lab aims to reinforce theoretical concepts learned in the classroom, develop practical skills, and enhance the understanding of physics principles through experimentation.			

The colleges are free to set new experiments of equivalent standards. This should be intimated and approved by the Convener, Board of Studies before the start of the academic session. It is binding on the college to have an experimental set-up of at least ten experiments listed below. In case the number of experiments performed by the student is less than eight, his marks shall be scaled down in the final examination on a pro-rata basis. Laboratory examination paper will be set by the external examiner out of eight or more experiments available at the center

Exam Scheme-

Students will have to perform one practical in the exam. The duration of practical exam will be 4 hours.

Marks distribution

Student category	Experiments	Viva-voice	Record	Maximum marks
Regular Student	20	10	10	40

Marking distribution in practical

Student category	Theory/formula	Figure/circuit	Observation	Calculation	Results/Error	Precautions
Regular	3	2	6	5	3	1

Physics Lab - I

List of Experiments:

1. Study the variation of the time period with amplitude in large-angle oscillations using a compound pendulum.
2. To study the damping using a coupled pendulum.
3. To study the excitation of normal modes and measure frequency splitting into two coupled oscillators.
4. To study the frequency of energy transfer as a function of coupling with mass using coupled oscillators.
5. To study the viscous fluid damping of a compound pendulum and determiner the damping coefficient and quality factor of the oscillator.
6. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.
7. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
8. To determine Young's modulus by bending of the beam method.
9. To determine Y, σ and η by Searle's method
10. To determine the modulus of rigidity of a wire using Maxwell's needle.
11. To determine the moment of Inertia of a fly-wheel.
12. To find the motion of a spring and calculate (a) Spring constant (b) Acceleration due to gravity (g) (c) Modulus of Rigidity.

Suggested Books and References -

Suggested E-resources:

Course Learning Outcomes:

Through these experiments, students will develop practical skills in experimental techniques, data collection, analysis, and interpretation. They will also enhance their understanding of fundamental concepts and principles in oscillations, damping, coupled oscillators, and material properties. The lab experiences will foster critical thinking, problem- solving abilities, and the application of theoretical knowledge to real-world scenarios.

Syllabus

Semester-II

Electromagnetism

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
II	UG0102PHY-52T-103	Electromagnetism	5	4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Major/Minor	Lecture, Sixty Lectures (4 Hrs. in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.			
Objectives of the Course	Objectives of the Course in Electromagnetism: Objectives of the Course: The objective of the course is to provide students with a comprehensive understanding of the fundamental concepts and principles of electromagnetism. It aims to develop their knowledge and skills in analyzing scalar and vector fields, electric and magnetic fields, and their interactions, as described by Maxwell's equations. The course will also cover important topics such as electric potential, polarization, magnetostatics and electromagnetic waves.			

Unit I

Scalar and Vector Fields: Concept of Field, Scalar and Vector Fields, Gradient of scalar field, Physical significance of Gradient, Divergence and Curl of a vector field, Cartesian co-ordinates system, Problems based on Gradient, Divergence and curl operators.

Concept of Solid angle, Gauss divergence and Stoke's theorem. Gauss law from inverse square law. Differential form of Gauss law.

Electric Field and Potential Energy: Invariance of Charge, Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distribution, Energy required to built a uniformly

charged sphere, classical radius of electron, Electric field due to a short electric dipole, Interaction of electric dipole with external uniform and non-uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics, Electric field measured in moving frames, Electric field of a point charge moving with constant velocity. **(15 Lectures)**

Unit II

Electric field in matter: Multipole expansion, definition of moments of charge distribution, Dielectrics, Induced dipole moments, polar and non-polar molecules, Free and bound charges, Polarization, Atomic polarizability, electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (i) outside the sphere (ii) at the surface of the sphere (iii) inside the sphere, Electric field due to a dielectric sphere placed in a uniform electric field (a) outside the sphere (b) inside the sphere, Electric field-due to a charge placed in dielectric medium and Gauss law, Clausius-Mossotti relation in dielectrics. **(15 Lectures)**

Unit III

Magnetostatics and Magnetic field in matter: Lorentz force, properties of magnetic field, Ampere's law, field due to a current carrying solid conducting cylinder (a) outside (b) at the surface and (ii) inside the cylinder, Ampere's law in differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Deduction of Biot-Savart law using Magnetic Vector potentials, Atomic magnet, Gyromagnetic ratio, Bohr-magneton, Larmor frequency, induced magnetic moment and dia-magnetism, spin magnetic moment, Para and ferro magnetism, Intensity of Magnetization, Magnetic permeability and Susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and Non- uniformly magnetized material. **(15 Lectures)**

Unit IV

Maxwell's Equations and Electromagnetic waves: Displacement current, Maxwell's Equations, Electromagnetic waves, Electromagnetic waves in an Isotropic medium, Properties of electromagnetic waves, Energy density of Electromagnetic waves, Pointing vector, Radiation pressure of free space, Electromagnetic waves in Dispersive medium, Spectrum of Electromagnetic waves.   **(15 Lectures)**

Suggested Books and References -

1. Berkeley Physics Course, Vol II
2. Feynman in Physics Vol. II
3. An Introduction to Electrodynamics by Griffiths
4. Fundamental University Physics Vol. II: Fields and Waves; M. Alonso and E.J. Finn: Addison-Wesley Publishing Company

Suggested E-resources-

1. MIT Open Course Ware: Electricity and Magnetism - This resource offers lecture notes, assignments, and exams for a complete course on electricity and magnetism: https://ocw.mit.edu/courses/physics/8-02sc-physics-ii-electricity-and-magnetism-spring- 2011/
2. Hyper Physics - This online resource provides concise explanations and interactive simulations for various topics in electrostatics and electric fields: http://hyperphysics.phy- astr.gsu.edu/hbase/hframe.html

Course Learning Outcomes:

By the end of the course, students should be able to:

1. Understand the concept of scalar and vector fields and their physical significance.
2. Demonstrate knowledge of gradient, divergence, and curl operators and their applications in electromagnetism.

3. Apply Gauss divergence and Stoke's theorems to analyze electric and magnetic fields.
4. Explain the behaviour of electric fields and potential energy in different charge distributions.
5. Analyze the interaction of electric dipoles with external electric fields and calculate the resulting potentials.
6. Solve problems related to Poisson's and Laplace's equations in electrostatics.
7. Describe the behaviour of electric fields in different types of matter, including dielectrics and polarized spheres.
8. Understand the concept of electric displacement, susceptibility, and dielectric constant.
9. Analyze the behaviour of magnetic fields in various materials and the effects of currents on magnetic fields.
10. Apply Ampere's law and the magnetic vector potential to calculate magnetic fields in different scenarios.
11. Explain the properties of electromagnetic waves and their behavior in isotropic and dispersive media.
12. Calculate the energy density and radiation pressure of electromagnetic waves

Syllabus

Physics Lab-II

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
II	UG0102PHY-52P-104	Physics Lab-II	5	2

Level of Course	Type of Course	Delivery of the Course		
Introductory	Major/Minor	Lecture, Sixty Lectures (4 Hrs. in a week) including Diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or Equivalent.			
Objectives of the Course	1. To provide hands-on experience in conducting experiments related to electricity and magnetism. 2. To develop practical skills in using various electrical components and instruments. 3. To reinforce theoretical concepts learned in the corresponding lecture course through practical applications. 4. To enhance problem-solving and analytical skills by analyzing experimental data and interpreting results. 5. To promote scientific inquiry, critical thinking, and the ability to design and execute experiments. 6. To foster teamwork and collaboration in conducting experiments and analyzing results. 7. To develop skills in accurately measuring and recording experimental data.			

The colleges are free to set new experiments of equivalent standards. This should be intimated and approved by the Convener, Board of Studies before the start of the academic session. It is binding on the college to have an experimental set-up of at least ten experiments listed below. In case the number of experiments performed by the student is less than eight, his marks shall be scaled down in the final

examination on a pro-rata basis. Laboratory examination paper will be set by the external examiner out of eight or more experiments available at the center.

Exam Scheme-

Students will have to perform one practical in the exam. The duration of practical exam will be 4 hours.

Marks distribution

Student category	Experiments	Viva-voice	Record	Maximum marks
Regular Student	20	10	10	40

Marking distribution in practical

Student category	Theory/formula	Figure/circuit	Observation	Calculation	Results/Error	Precautions
Regular	3	2	6	5	3	1

List of Experiments -

1. To study the Faradays Law of electromagnetic induction.
2. To study the variation of power transfer by two different loads by a D.C. source and to verify the maximum power transfer theorem.
3. To study the variation of charge and current in an RC circuit with a different time constant (using a DC source).
4. To study the behaviour of an RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
5. To study the rise and decay of current in an LR circuit with a source of constant emf.
6. To study the voltage and current behaviour of an LR circuit with an AC power source. Also determine power factor, impedance and phase relations.
7. To study the magnetic field along the axis of a current-carrying circular coil. Plot the necessary graph and hence find the radius of the circular coil.
8. To study the frequency response of a series LCR series circuit and to estimate the

resonant frequency and find out Q-factor and band width.

9. To study the frequency response and to find resonant frequencies of L-C-R parallel circuits. And find out Q-factor and band width.

10. To determine the specific resistance of a material and determine the difference between two small resistance using Carey Fosters Bridge.

11. To convert a galvanometer into an ammeter of a given range.

12. To convert a galvanometer into a voltmeter of a given range.

Suggested E-resources:

Course Learning Outcomes:

By the end of the course, students should be able to:

1. Demonstrate proficiency in using various electrical components and instruments required for conducting experiments.

2. Apply theoretical concepts of electricity and magnetism to design and execute experiments.

3. Analyze experimental data using appropriate mathematical and statistical techniques.

4. Interpret experimental results and draw conclusions based on data analysis.

5. Develop skills in accurately measuring physical quantities and recording experimental observations.

6. Communicate experimental procedures, results, and conclusions effectively in written reports.

ENGLISH - I

The Question paper shall be of one half hours duration.

MM: 40

Objectives:

- Reinforcing selected components of grammar and usages.
- Facilitating comprehension of a prosepassage.

Unit – I(Vocabulary)   05 Marks

- Antonyms and Synonyms
- Word formation: Prefix and suffix.

Unit – II(Grammar and Usage – I)

Transformation of sentences.   05 Marks

- Direct and Indirect Narration.
- Active and Passive Voice.
- Interchange of Degrees of Comparison.

Unit – III(Grammar and Usage – II)   05 Marks

- Sequence of Tenses.
- Prepositions.

Unit – IV(Grammar and Usage – III)

- Modal Auxiliaries.   05 Marks
- Articles.

Unit – V(Comprehension)20 Marks

- Comprehension of a passage from the prescribed book(Essential Language Skills by Macmillan)

  Following essays and Stories in Essential Language Skills revised edition compiled by Macmillan for General English B.A./B.Com./B.Sc.

Richarfeen
27-9-23
Dr. Richa Meena   27-9-23   Bheefpath

Bhoopath
Based Meeoy   27/09/2023
29/9/23

William Blake	The Little Black Boy
Sujata Bhatt	Voice of the Unwanted Girl
Ruskin Bond	Night Train at Deoli
M.K. Gandhi	The Birth of Khadi
J.L.NehruA Tryst with Destiny	
A.P.J.AbdulKalam	Vision for 2020

Five Questions to be answered from the texts mentioned.

Suggested Reading:

1. A University Grammar of English by Quirk and Greenbaum.
2. A Foundation English Course for Undergraduates. Ed. Gunashekhar
3. Prose for Pleasure and Comprehension by H G SuryanarayanRao.
4. A Guide to Patterns and Usage by AS Hornby.

Dr. Richa Meena
27-9-23

C.B. meena
27-9-23

(Bhagirath Parsad Meena)
27/9/23

(प्रो० उमेश कुमार राय)
27/07/2023

B.Sc. (Math & Bio Group, chemistry & Mathematics) Semester II & IV

ENGLISH - II

The Question paper shall be of One e Half hour duration.

MM: 40

Objectives:

- Introducing students to Phonetics, correct their pronunciation and word stress.
- Strengthening compositional skills.
- Introducing students to writing of notices

Unit – I(Phonetics)

10 Marks

- Transcription of Phonetic symbols.
- Word stress.
- Translation of 5 sentences from Hindi to English
- Translation of 10 words from Hindi to English

Unit – II(Writing Skills)

10 Marks

- CV''s and Job Applications.
- Precis Writing.

Unit – III(Compositional Skills)

- Letter Writing (Formal and Informal)

10 Marks

- Paragraph Writing.

Unit – IV(Writing Skills)

- Notice Writing.

10 Marks

Suggested Reading:

1. CVs and Job Applications by Judith Leigh.
2. English at Workplace. Eds: Panja, Sawhney&Verma.
3. Professional Communication by R P Singh.
4. English made simple by Arthur Waldhorn and Arthur Zeiger.
5. The Written Word by Vandana R Singh.
6. Technical Writing by Sunder Rajan.

Richa Meena
27-9-23
C.B. Meena
27-9-23
Dr. Richa Meena

27/09/2023

SEC- Computer Fundamentals

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
I	SEC	Computer Fundamentals		S	2

Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Hours Theory
Prerequisites	XII Pass				

Objectives of the Course:	Objectives of the Course-
	I. To provide students with a comprehensive understanding of information Technology and its evolution, including the different generations of computers and types of computer systems.
	2. To familiarize students with the architecture of a computer system, encompassing the CPU, ALU, memory, input/output devices, and hardware- software interactions.
	3. To introduce students to various operating systems, such as UNIX, Linux. Windows, and their types, enabling them to comprehend the significance of operating systems in computing.
	4. To acquaint students with different programming languages, including low- level and high-level languages, procedural programming, object-oriented programming, functional programming, scripting **languages.** and their respective applications.
	5. To enable students to utilize the Internet effectively, including web browsing, understanding domain names and URLs, utilizing email services, participating in online communication, and exploring e-commerce· and m-commerce platforms.
	6. To educate students about social, legal, and ethical aspects of information technology, raising awareness about cyber threats, cybercrime prevention, and the importance of data security.
	7. To provide insights into various cyber threats and attacks, such as computer viruses, malware, identity theft, phishing, and SQL injection, and to equip students with preventive measures against such threats.

Examination Scheme-

Type	Paper code and Nomenclature	Duration of examination	Maximum Marks (Midterm+ EoSE)	Minimum Marks (Midterm + EoSE)
Theory	SEC-001 -Computer Fundamentals ,	I Hrs.-MT I Hrs.-EoSE	10 Marks-MT 40 Marks-EoSE	4 Marks-MT 16 Marks-EoSE

Detailed Syllabus SEC-001
Computer Fundamentals
Unit-I

Introduction to Information Technology: Evolution and generation of computers, Type of computers, Micro. Mini, mainframe and Super computer. Architecture of a computer system: CPU, ALU. Memory (RAM. ROM families, Cache Memory. Input/Output Devices. Pointing Devices, Hardware and Software

Operating System and Programming Languages: Concept of Operating System, Need, Types of Operating Systems, Batch, Single User, Multi-Processing, Distributed and Timeshared operating systems, Introduction to UNIX, Linux, Windows, Window NT, Virtual Machine, Programming Languages, Low Level and High Level, Generation of Languages, 3 GL and 4 GL languages. Procedural Programming Languages, Object Oriented Programming languages, Functional Programming Languages, Scripting Languages, Logic Programming Languages, Command Line Interface and Graphical User Interface

(8 Lectures)

Unit -II

The Internet: History and Functions of the Internet, Working with Internet, Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names, Uses of Internet, Search for Information, Email, Chatting, Instant Messenger Services, News Group, Teleconferencing. Video Conferencing, E-Commerce and M-Commerce, E-services -Online Banking, Online Payment Modes, Mobile Wallets, Social Networking Sites, E-Learning/ Online Educations, Cloud-Based Storage, Digital Signature Manage an E-Mail Account, E-Mail Address, Configure E-Mail Account, Login to an Email, Receive Email, Sending Email, Sending Files as Attachments, Address Book, Downloading files.

(8 Lectures)

Unit -III

Social, Legal, Ethical Matters and Network Security: Types of Cyber Threats, how to identify Sate Websites/ Portals, Secure Seals (Verisign/Trust pay etc.), Secure Browsing Habits and Mailing Etiquettes, Social, Legal and ethical aspect of IT, Effects on the way we work Socialize, Operational Areas, Cyber Crime, Prevention of Cyber Crime, Cyber Law. Indian IT Act, Intellectual Property Right, Software Piracy, Copy right and Patent, Software Licensing, Proprietary Software, Free and Open-Source Software. GPL License. **(7 Lectures)**

Unit-IV

Cyber Security Threats: Security Threats and Attacks (Passive. Active). Types and Effects. Computer Virus, Malware. Adware. Ransomware, Spyware. Emote!. Identity Theli. Denial of Service, Man in Middle. Phishing. MySQL/SQL Injection, Password Attacks
Network Security: Risk Assessment and Security Measures. Assets and Type (Data. Applications System and Network). Security issues and Security Measure (Firewall. Encryption/Decryption)'. Prevention.

(7 Lectures)

Syllabus

SEC – Application of Computer Science

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
II	SEC-	**Application of Computer Science**		S	4
Level of Course	Type of the Course	**Credit Distribution**		Offered to NC Student	**Delivery Type of the Course**
		Theory	**Practical**		
Introductory	**Skill Enhancement**	2	2	Yes	30 Hours Theory

Examination Scheme

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (Midterm+ EoSEl	Minimum Marks (Midterm+ EoSE)
Practical	SEC- Application of Computer Science	I Hrs.-MT I Hrs.-EoSE	10 Marks-MT 40 Marks-EoSE	4Marks-MT 16 Marks-EoSE

The Practical examination Scheme for **Introduction to Office Productivity Software** should be as follows-
- Three Practical Exercise of 10 Marks each from each Unit -30 Marks
- Viva-Voce – 10
- Marks Record - 10 Marks

Duration of Practical Examination will be of I Hours.

Detailed Syllabus
Applications of Computer Science

Unit-I

Word Processing Tools:
Text Basics: Typing the text, Alignment of text, Editing Text: Cut, Copy, Paste, Select All, Clear, Find & Replace, **Text Formatting and saving file:** New, Open, Close, Save, Save As, Formatting Text: Font Size, Font Style, Font Colour, Use the Bold, Italic, and Underline, Change the Text Case, Line spacing. Paragraph spacing. Shading text and paragraph. Working with Tabs and Indents, **Objects:** Shapes, Clipart and Picture, Word Art, Smart Art. Columns and Orderings - To Add Columns to a Document, Change the Order of Objects, Page Number. Date & Time. Inserting Text boxes, Inserting Word art. inserting symbols, Inserting Chart, **Header & Footers:** Inserting custom Header and Footer, insening objects in the header and footer, add section break to a document **Bullets and numbered lists:** Multilevel numbering and Bulleting. Creating List, Customizing List style, Page bordering, Page background. **Tables:** Working with Tables, Table Formatting, Table Styles, Alignment option, Merge and split option, **Styles and Content:** Using Build- in Styles. Modifying Styles, Creating Styles, Creating a list style, Table of contents and references, Adding internal references, Adding a

Footnote, Adding Endnote **Merging Documents:** Typing new address list, Importing address list from Excel file, Write and insert field. Merging with outlook contact, Preview Result, Merging to envelopes, Merging to label, Setting rules for merges, Finish & Merge options **Sharing and Maintaining Document:** Changing Word Options, Changing the Proofing Tools, Managing Templates, Restricting Document Access. Using Protected View, Working with Templates. Managing Templates. Understanding building blocks **Proofing the document:** Check Spelling As You Type, Mark Grammar Errors As You Type, Setting AutoCorrect Options **Printing:** Page Setup, setting margins. Print Preview, Print.

<center>**(20 Hours Practical)**</center>

<center>Unit-II</center>

Electronic Spreadsheet,

Introduction to spreadsheet: Introduction. Understanding rows and columns, Naming Cells, Working with excel workbook and sheets. **Formatting excel work book::** New, Open. Close, Save, Save As, Formatting Text: Font Size, Font Style. Font Color. Use the Bold, Italic, and Underline, Wrap text, Merge and Centre. Currency, Accounting and other fonts, Modifying Columns. Rows & Cells. **Perform Calculations with Functions:** Creating Simple Formulas, Setting up your own formula, Date and Time Functions, Financial Functions, Logical Functions, Lookup and Reference, Functions Mathematical Functions, Statistical Functions, Text Functions, **Sort and Filter Data:** Sort and filtering data, Using number filter. Text filter. Custom filtering. Removing filters from columns, Conditional fonnatting. **Create Charts:** Create an effective chart with Chart Tool. Design. Format and Layout options. Adding chart title. Changing layouts. Chart styles. Editing chart data range. Editing data series. Changing chan. **PivotTables and Pivot Charts:** Understand PivotTables. l'reate a PivotTable. Framework Using the PivotTable and PivotChart. Pivot Chart from pivot Table. Inserting slicer. Creating calculated fields **Protecting and Sharing the work book:** Protecting a workbook with a password, Allow user to edit ranges, Track changes. Working with Com) J} ents, Insert Excel Objects and Charts in Word Document and Power point Presentation. Use Macros to Automate Tasks: Creating and Recording Macros. Assigning Macros to the work sheets. S<1ving Macro enabled workbook **Proofing and Printing:** Page setup. Setting print area. Print titles. Inserting custom Header and footer, inserting objects in the header and footer, page Setup. Setting margins. Print preview, Print enables background error checking, setting auto correct option. **(20 Hours Practical)**

<center>Unit -III</center>

POWERPOINT:

Setting Up PowerPoint Environment: New, Open, Close, Save, Save As, Typing the text Alignment of text, Formatting Text: Font Size, Font Style Font Color, Use the Bold, Italic, and Underline, Cut, Copy, Paste, Select All, Clear text, Find & Replace, Working with Tabs and Indents, **Creating slides and Applying themes:** Inserting new slide, Changing layout of slides, Duplicating slides, Copying and pasting slide, Applying themes to the slide layout, Changing theme color ,Slide background, Formatting slide background ,Using slide views, **Working with bullets and numbering:** Multilevel numbering and Bulleting, Creating List, Page bordering, Page background, Aligning text, Text directions, Columns option **Working with Objects:** Shapes, Clipart and Picture, Word Art, Smart Art Change the Order of Objects, Inserting slide header and footer, Inserting Text boxes, Inserting shapes, using quick styles, Inserting Word art Inserting symbols, Inserting Chart, **Hyperlinks and Action Buttons:** Inserting Hyperlinks and Action Buttons, Edit Hyperlinks and Action Button, Word Art and Shapes Working With Movies and Sounds: Inserting Movie From a Computer File, Inserting Audio file , Audio Video playback and format options, Video options, Adjust options, Reshaping and bordering Video, **Using SmartArt and Tables:** Working with Tables, Table Formatting, Table Styles, Alignment option, Merge and split option, Converting text to smart art, **Animation and Slide Transition:** Default Animation, Custom Animation, Modify a Default or Custom Animation, Reorder Animation Using Transitions ,Apply a Slide Transition, Modifying, Transition, Advancing to the Next Slide, **Using slide Master:** Using slide master, Inserting layout

option, Creating custom layout, Inserting place holders, Formatting place holders, **Slide show** option: Start slide show, Start show from the current slide, Rehearse timing, creating custom slide show, Proofing and Printing: Check Spelling As You Type, Setting Auto Correct Options, Save as video, Save as JPEG files, Save as PowerPoint Show file, Print Preview, Print

(20 Hours Practical)

Suggested Books and References -
1. Microsoft Office for Beginners by M,L Humphrey
2. Microsoft Word 2016 Step by Step by Joan Lambert and Curtis Frye
3. Excel 2016 Bible by John Walkenbach
4. PowerPoint 2016 For Dummies by Doug Lowe
5. Microsoft Office 2016 In Practice by Randy NordeH

Course Learning Outcomes:
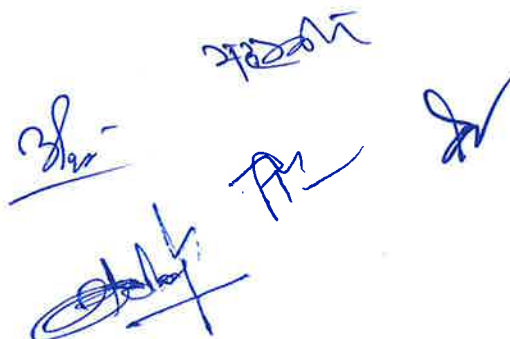By the end of the course, students should be able
1. **Word Processing:**
   * Format documents using advanced text styling and alignment,
   * **Manipulate text with cut, copy, paste, and find & replace functions.**
   * Enhance document layout with headers, footers, and page numbering,
   * Create visually appealing content using tables, objects, and styles,
   * Efficiently merge documents and manage templates for streamlined work,
2. **Electronic Spreadsheet:**
   * Apply formatting and calculations using a variety of functions,
   * Organize and analyze data through sorting, filtering, and charts_
   * Automate tasks with macros and protect workbooks with passwords,
   * Create dynamic pivot tables for data visualization and analysis,
3. **PowerPoint:**
   * Design captivating presentations with themes. formatting, and multimedia
   * Incorporate interactive elements like hyperlink and active button
   * Apply animations and transitions, for engaging, slide shows,
   * Customized Master slides tor consistent and polished presentations.

GERIATRIC WELLNESS AND CARE

Programme Objective:

The course shall give the student an understanding of role of geriatric care assistance and shall equip the student to be an effective care giver. The student shall be understand the importance of the general, medical and psychological problems faced by the elderly and be able to learn about basic first aid for elderly. An understanding of the current health scenario in the country and globally will be imparted.

Course content

UNIT-I

Introduction to healthcare of Geriatric population: Health care delivery system in India at primary, secondary and tertiary care, Community participation m health care delivery system. Basic medical and nutrition related terminologies. Role of a Geriatric Care Assistant, Do's and Don'ts Requirements to become a Certified Geriatric Care Assistant.

UNIT-II

Introduction to Geriatric Care Assistants: Basics of emergency care and life support skills- Vital signs, first aid and triage, Identifying signs and taking measures for elderly emergency conditions.

UNIT-III

Personal Hygiene and Health of elderly: Understanding and procedures of hygiene and prevention of infection including effective hand washing, bathing, drying, grooming etc. Vaccination protocol against common Infectious diseases: immunization to reduce the health risks for care giver and patients.

UNIT-IV

Basic applied knowledge for geriatric care: Understanding working system for geriatric care like old age home. Basic first-aid for elderly population.

Suggested Books/References/Web-links:

(l) NurseAssistantTrainingTextAmericaRedcross2013
(2) Draft Short Term, Training Curriculum Handbook of General Duty Assistant MOHFW. Govt. of India.
(3) Draft of S.TIC Hand book of Hons. Health Aide MOHFN,GOI.
(4) Manual on Geriatric care, MOHFW, Dept. of Ayush, GOI.

Programme Outcome

1. Understanding the health care in India.
2. Understanding the role of a Geriatric care Assistant.
3. Skilled and Trained caretakers for geriatric population.

ENVIRONMENTAL STUDIES

Programme Objective:

To make students aware about the importance of physical environment and its various components. The students realize their role in the protection and maintenance of a healthy environment for sustainable development. To understand the significance and issues related to natural resources, ecosystems, biodiversity to encourage them to explore ways of managing/ conserving natural resources. To develop understanding of causes and sources of environmental pollution and their impact on quality of life. To encourage to adopt sustainability as a practice in life, society, and industry.

Course content

UNIT-I

Definition Scope and importance relationship between environmental studies and other branches of science and social science. Need for environmental awareness, environmental education in present day context.

Forest resources: Use and over exploitation, deforestation, case studies. Limber extraction, mining, dams and the fleet on forest and tribal people.

Water recourses: Use and over-libation of fund groundwater, floods, drought conflicts or water, duress benefits in problems.

Energy resource: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II

Biodiversity and its conservation, Introduction. Biogeographical classification of India. Threats to biodiversity, habitat loss, pouching of wildlife, man-wild life conflicts, Endangered, Threatened and endemic species of India.

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, Red Data Book

UNIT-III

Environmental Pollution and Control Measures, Definition, Causes, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Nuclear Hazards

UNIT-IV

Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns.

Climate change, global warming, acid rain ozone layer depletion accidents and holocaust. Disaster management: floods earthquake, cyclone and landslides. Environment and Human health.

Suggested Books/References/Web-links:

1. Chauhan. Surendra Singh 2004 Environmental Protection and Management: From Stockholm to Rio and After, Kalinga Publications, New Delhi.

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2. Diwan A.P. and Arora D.K. 1995. Human Ecology Anmol Publication Pvt. Ltd., New Delhi.
3. Dubey, R.M. 1992. Human Ecology and Environmental Education, Chaugh Publications, Allahabad.
4. Goudie, Andrew. The Human Impact.
5. Husain Maxin 1994 Human Geography, Rawat Publication, Jaipur.
6. Malik, S. L. and Bhattacharya D. K. 1986. Aspects of Human Ecology, Northern Book Center, New Delhi.
7. Smith, Dlanne, 1984.Urban Ecology.George Allen, London.
8. Swarnkar, R.C 1985. Indian Tribes Printwell out.
9. Tivy, Joy and O'Hugegreg, 1985. Human Impact on the Ecosystem Edinburgh George Allen Boyd.

Programme Outcome

1. Gain in-depth knowledge on natural processes and resources that sustain life and govern economy.
2. Develop critical thinking to shape strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, protection of natural resources and sustainable development.
3. Understand and predict the consequences of human actions on the environment and quality of human life. Acquisition of values and attitudes towards understanding complex environmental economic-social challenges, and actively participate in solving current environmental problems and preventing the future ones.

(Dr. C. P. Mahendra).

(Dr. Ram Nath Khanwul)