SURESH GYAN VIHAR UNIVERSITY, JAIPUR

Program Project Report (PPR)
Bachelor of Science

Table of Contents

Program Project Report

1 Program Mission and Objectives

Suresh Gyan Vihar University, Jaipur, established in 2008, is a leading private University of Rajasthan. SGVU**,** Jaipur is accredited with Grade A^+ by National Assessment and Accreditation Council (NAAC), offers courses like Engineering, Management, hotel Management, Pharmacy, Arts, Humanities, Law, Agriculture, B.lib etc. in conventional mode. SGVU is renowned for its innovative academic practices, brilliance in technical education and consultancy to high profile industries.

The program's mission is to impart, train and transform a student completely for high caliber competence through latest concepts and technology and equip the students as per the demands of the industry.

The program aims to achieve the following objectives

i. To provide an opportunity to get a B.Sc.(PCM) degree to those who find it difficult or even impossible to pursue regular B.Sc.(PCM) course at a university either due to their job commitments or certain other circumstances.

ii. To help the learners, study at their own pace, from their own chosen place.

iii. To develop skills in matters related to library Science.

iv. To create an additional avenue of self-employment and also to benefit various institutions by providing them with suitable qualified persons.

v. To develop Information Technology skills in the students, which now a days is essential in library science.

2 Relevance of the Program with Suresh Gyan Vihar University, Jaipur Mission and Goals

Suresh Gyan Vihar University (SVGU) was established with a vision to become a University with commitment to excellence in education, research and innovation aimed towards human advancement.

- The proposed program is highly relevant to the SVGU's mission i.e.

- Facilitate holistic education through knowledge sharing, skilling, research and entrepreneurial development.
- Integrate academic and industrial collaborations towards nation's development
- Mentor students' physical, mental, emotional, secular and spiritual attributes to become a valued human resource as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intakes in the conventional mode of education in the Universities
- Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners' ODL mode and in keeping with the aims and objectives of the University also ensures the industry and future skills relevance.

3 Nature of Prospective Target Group of Learners

The curriculum of B.S.C is designed in such a way that it helps the students to become not only more employable but also encourage them to become Professional. Primarily the target group of learners will be:

- Those deprived of admission in the regular mode due to limited intake capacity.
- Those employed in various organizations who desire to pursue higher education as a passion or as a means for movement up the promotional ladder.
- Drop outs primarily due to social, financial and economic compulsions as well as demographic reasons.
- Population of any age and those living in remote areas where higher education institutes are not easily accessible.

4 Appropriateness of program to be conducted in ODL mode to acquire specific skills and competence

Conducting a Bachelor of Science (B.Sc.) program in Open and Distance Learning (ODL) mode is highly appropriate and effective for acquiring specific skills and competencies in the field. A well-structured ODL program can effectively prepare students for professional roles in library science, equipping them with the necessary competencies to succeed in the field

Appropriateness of Program to be conducted in ODL mode to acquire specific skills and competence

The University has identified the following **Program Outcomes (PO)** and **Program Specific Outcomes (PSO)** as acquisition of specific skills and competence in B.Sc. Program.

Program Outcomes (PO)

- PO1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO2: Effective Communication: Transmit concepts and complex information effectively by written, computational and graphical means.
- PO3: Problem Solving: Utilize knowledge to solve theoretical and applied problems by understanding, analysis and synthesis.
- PO4: Scientific Temperament: Show scientific thought process in drawing conclusions from daily life experiences without letting it being affected by biases and prejudices.
- PO5: Ethics: Recognize different value systems including their own, understand the moral dimensions of their decisions, and accept responsibility for them.
- PO6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- PO7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning.

Program Specific Outcomes (PSOs)

- PSO1: Attain a systemic understanding of core concepts, principles and theories along with their applications.
- PSO2: Prepare to develop professionally through lifelong learning, higher education and accept the challenges in research and other creative pursuits in the area of specialization.

5 Instructional Design

Curriculum Design

The curriculum is designed by experts in the field of Bachelor of Science and have taken into account to include relevant topics that are contemporary and create environmental awareness. It is approved by the BoS (Board of Studies), the CIQA (Centre for Internal Quality Assurance),and the AC (Academic Council) of university.

Semester-I							
S. No.	**Course Code**	**Subject Name**	**Type**	**Credit**	**Continuous Assessment**	**Term End Exam**	**Total**
					Max. Marks	**Max. Marks**	
1	GE-101	General English	Core	4	30	70	100
2	ES-101	Environment Studies	Core	4	30	70	100
3	PH-101	Introductory Physics	Main	4	30	70	100
4	CH-101	Fundamental Chemistry- I	Main	4	30	70	100
5	MH-101	Calculus of Single Variables	Main	4	30	70	100
6	CHL-151	Chemistry Lab-I	PR	2	0	100	100

7	PHL-151	Physics Lab-I	PR	2	0	100	100
Total				24	150	550	700

Semester-II							
S. No.	**Course Code**	**Subject Name**	**Type**	**Credit**	**Continuous Assessment**	**Term End Exam**	**Total**
					Max. Marks	**Max. Marks**	
1	HV-102	Human Values and Professional Ethics	Core	4	30	70	100
2	ICA-102	Introduction to Computer Application	Core	4	30	70	100
3	PH-102	Atomic and Solid State Physics	Main	4	30	70	100
4	CH- 102	Basics of Chemistry	Main	4	30	70	100
5	MH-102	Introduction To Geometry	Main	4	30	70	100
6	PHL-152	Physics Lab-I	PR	2	0	100	100
7	CHL-152	Chemistry Lab-II	PR	2	0	100	100
Total				24	150	550	700

Semester-III							
S. No.	Course Code	Subject Name	Type	Credit	Continuous Assessment	Term End Exam	Total
					Max. Marks	Max. Marks	
1	CS-201	Communication Skills-I	Core	4	30	70	100
2	PH- 201	Wave Mechanics and Nuclear Physics	Main	4	30	70	100
3	CH- 201	Fundamental Chemistry- II	Main	4	30	70	100
4	MH- 201	Differential Equation	Main	4	30	70	100
5	CHL- 251	Chemistry Lab-III	PR	2	0	100	100
6	PHL- 251	Physics Lab-III	PR	2	0	100	100
Total				20	120	480	600

Semester-IV							
S. No.	**Course Code**	**Subject Name**	**Type**	**Credit**	**Continuous Assessment**	**Term End Exam**	**Total**
					Max. Marks	**Max. Marks**	
1	EN-202	English language	Core	4	30	70	100
2	PH-202	Energy Physic	Main	4	30	70	100
3	CH-202	Analytical Chemistry	Main	4	30	70	100
4	MH-202	Linear Algebra	Main	4	30	70	100
5	CHL-252	Chemistry Lab-IV	PR	2	0	100	100
6	PHL-252	Physics Lab-IV	PR	2	0	100	100
Total				20	120	480	600

Semester-V							
S.No.	**Course Code**	**Subject Name**	**Type**	**Credit**	**Continuous Assessment**	**Term End Exam**	**Total**
					Max. Marks	**Max. Marks**	
1	EM-301	Employability Skills - I	Core	4	30	70	100
2	PH-301	Electromagnetism	Main	4	30	70	100
3	CH-301	Quantum Chemistry	Main	4	30	70	100
4	MH-301	Numerical Methods	Main	4	30	70	100
5	PHL-351	Physics Lab-V	PR	2	0	100	100
Total				18	120	380	500

Semester-VI							
S. No.	**Course Code**	**Subject Name**	**Type**	**Credit**	**Continuous Assessment**	**Term End Exam**	**Total**
					Max. Marks	**Max. Marks**	
1	CS-302	Communication Skills-II	Core	4	30	70	100
2	PH-302	Elements of Quantum and Atomic & Molecular Spectra	Main	4	30	70	100
3	CH-302	Organometallics, Bioinorganic Chemistry	Main	4	30	70	100
3	MH-302	Complex Analysis	Core	4	30	70	100
4	PHL-352	Physics Lab- VI	Core	2	0	100	100

Total	18	120	380	500
TOTAL	**124**	**780**	**2820**	**3600**

Semester I

Subject Name: General English

Course Code: EN-101 **Credits: 4**

Course Objectives: Understanding the fundamental communication skills being integral to personal, social and professional interactions. To develop the ability to share thoughts, emotions and ideas through various means of communication: both verbal and nonverbal.

Course Outcomes

After completion the course, students will be able to develop correct pronunciation. They will be able to communicate effectively.

UNIT-I

ELEMENTS OF COMMUNICATION

1. Communication: Meaning, Importance, and Process
2. Barriers to Communication
3. Qualities of Good Communication

UNIT-II

GRAMMAR

1. Subject-Verb Agreement (Concord)
2. Linking Words (Conjunctions)
3. Preposition

UNIT-III

COMPOSITION

1. Précis Writing
2. Note Making
3. Paragraph Writing

UNIT-IV

ESSAYS

1. On the Rule of the Road: A. G. Gardiner
2. The Gandhian Outlook: S. Radhakrishnan
3. Our Own Civilization: C.E.M. Joad

UNIT-V

POEMS

1. Mending Wall: Robert Frost
2. No Men are Foreign: James Kirkup
3. If: Rudyard Kipling

Books Reference:

- Fluency in English part-1, Macmillan, Delhi,2005, Units 1-18
- Martin Hewing, Advanced English Grammar, CUP, New Delhi, 2010, Unit 1-60.

Language through Literature (forth coming). Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brat Biswas, Primus Books, Delhi 2005 Chapter 1-17.

Paper Code: ES-101

Paper Name: Environmental Studies **Credits: 4**

Course Outcomes:

Upon successful completion of this course, the student will be able to:

S. No.	Paper Outcomes (COs)	Cognitive Level
1.	**Recognize** key concepts ecology, environment and eco-sytem	Knowledge
2.	**Describe** the applications of alternative energy sources	Understand
3.	**Solve** the different types of environmental pollution problems	Apply
4.	**Categorize** current environmental issues	Analyze

5.	**Reframe** critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.	Evaluate

SYLLABUS

ENVIRONMENTAL STUDIES

UNIT I

INTRODUCTION TO ENVIRONMENTAL STUDIES

Introduction, meaning and definition, scope and importance, Relationship between Environmental Studies and other branches of science and social sciences, Need for Environmental awareness, Environmental education in present day, concept of Natural Resources and Challenges, Classification of resources, natural resources: Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources.

UNIT II

ECOSYSTEM AND BIODIVERSITY

Introduction, Concepts, Structure, Functions and Types, concept of Biodiversity and its conservation, Definition, genetic, species and ecosystem diversity, Bio geographically classification of India, Value of biodiversity, Bio diversity at global, National and local level, India as a mega-diversity nation, Hot-spot of biodiversity, Threats to biodiversity, Endangered, Threatened and endemic species of India, Conservation of biodiversity, Red Data Book.

UNIT III

ENVIRONMENTAL POLLUTION

Introduction, Definition, Causes, effects, control measures, Solid waste management, Role of an individual in prevention of pollution, Pollution case studies, Disaster management.

UNIT IV

ENVIRONMENT SUSTAINABILITY LAWS

Introduction, From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, water shed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible

solution, Climate change, global warming, acid rain ozone layer depletion, nuclear, accidents and holocaust, Waste land reclamation, Consumer is mand waste product, Sustainability acts, Issues involved in enforcement of environmental legislation, Public Awareness.

UNIT V

HUMAN POPULATION AND THE ENVIRONMENT

Introduction, Population growth, variation among nations, Population Explosion-Family Welfare Programme, Environment and Human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health.

Books Recommended/Suggested Reading:

1. "Environmental Studies", Smriti Srivastava, S.K. Kataria & Sons, Delhi.
2. "Environmental Science", H. Kaur, Pragati Prakashan, Meerut.
3. "Environmental Studies", Benny Joseph, Tata McGraw Hills-2005.
4. "Environmental Chemistry", V.P. Kudesia, Pragati Prakashan, Meerut.
5. "Environmental Chemistry & Pollution Control", S.S. Dara, S. Chand & Co.

Subject Name: Introductory Physics

Course Code: PH-101 **Credits: 4**

Course Objectives: To acquire basic knowledge about Newton's laws of motion, Rotational energy and rotational inertia, Central forces and Simple harmonic motion.

Course Outcomes: After learning this course, students will be able to 1. Explain the dynamics of system of particles.

2. Explain the rotational mechanics.
3. Define gravitation and central force motion.
4. Understand simple harmonic motion.
5. Illustrate wave motion.

SYLLABUS

INTRODUCTORY PHYSICS

Unit-1

Vector

Unit-2

Vector Calculus

Unit-3

Surface Tension

Unit-4

Simple Harmonic Motion

Unit-5

Wave Motion

Unit-6

Lissajous Figures

Unit-7

Entropy and Carnot Engine

Unit-8

Second law of thermodynamics

Unit-9

Gauss theorem and application

Unit-10

Magnetism

Unit-11

Semiconductor and semiconductor device

Recommended books- • EM Purcell, Ed: "Berkeley Physics Course, Vol. 1, Mechanics" (McGraw-Hill). • RP Feymman,RB Lighton and M Sands; "The Feymman Lectures in Physics", Vol.

1 (BI Publications, Bombay, Delhi, Calcutta, Madras).

- J.C. Upadhyay: 'Mechanics'. Ram Prasad Publications, Agra.
- D.S, Mathur "Mechanics". S Chand Publication, New Delhi.

Subject Name : Fundamental Chemistry- I
Course Code: CH-101 **Credit: 4**

Course Objective and Outcomes:

Learnes will gain an understanding of

- Molecular geometries, physical and chemical properties of the molecules.
- Current bonding models for simple inorganic and organic molecules in order to predict structures and important bonding parameters.
- This course gives a broader theoretical picture in multiple stages in an overall chemical reaction.
- It describes reactive intermediates, transition states and states of all the bonds broken and formed.

- It enables to understand the reactants, catalyst, stereochemistry and major and minor products of any organic reaction. It describes the types of reactions and the kinetic and thermodynamic aspects one should know for carrying out any reaction and the ways how the reaction mechanism can be determined.
- The chapter stereochemistry gives the clear picture of two-dimensional and threedimensional structure of the molecules, and their role in reaction mechanism. The course will also strengthen the knowledge of students regarding complete picture of states of matter that includes gaseous, liquid and solid states.

Syllabus Details

Block-1: Atomic structure and chemical bonding

Unit 1: Atomic structure

Idea of de Broglie matter wave, Heisenberg uncertainty principle, Schrodinger wave equation, significance of ψ and ψ^2 , quantum numbers, radial and angular wave functions and probability distribution curve, shape of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configuration of the elements, effecting nuclear charge.

Unit 2: Periodic Properties

The general idea of Modern periodic table, Atomic and ionic radii, ionization energy, electron affinity and electronegative- definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavior.

Unit 3: Chemical bonding –I

Covalent bond- Valence bond theory and its limitation, directional characteristics of covalent bond, types of hybridization and shape of simple inorganic molecule and ion. Valence shell electron pair repulsion theory (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3.ICl_2^- and H_2O. MO theory, homonuclear and heteronuclear (CO and MO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond

energy, percentage ionic character from dipole moment and electronegativity difference.

Unit 4: Chemical bonding –II

Hybridization, Bond length and bond angles, bond energy, localized and delocalized chemical bond, van der Waal interactions, Inclusion compounds, clatherates, charge transfer complexes, resonance, hyperconjution, aromaticity, Steric effect (Inductive. resonance/mesomeric, electromeric and field effect) hydrogen bonding.

Block-2: Organic reaction and stereochemistry Unit 5:

Mechanism of organic reactions

Curve arrow notation, drawing electron movements with arrows, half-headed and double headed arrows, homolytic and heterolytic bond cleavage. Types of reagents, recapulation of types of reagents.

Reaction intermediates- carbocations, carbanions, free radicals, carbenes, nitrenes and benzynes (with examples). Assigning formal charge on intermediates and other ionic species.

Unit 6: Stereochemistry- I

Concept of isomerism. Types of isomerism. Optical isomerism- elements of symmetry, molecular chirality, enantiomers, stereogenic centres, optical activity, properties of enantiomers , chiral and achiral molecules with two stereogenic centres, diastereomers threo and erythro diastereomers , meso compound, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rule, D& L and R& S system of nomencleature.

Unit 7: Stereochemistry- II

Geometrical isomerism- determination of configuration of geometrical isomers. E & Z system of nomenclature, geometrical isomerism in oximes and acyclic compounds. Conformational analysis of ethane and n- butane, conformation of cyclohexane, axial and equatorial bond, conformation of mono substituted cyclohexane. Newman projection and Sawhorse formula, Fischer and flying wedge formula. Difference between configuration and conformation.

Block-3: Aliphatic Hydrocarbon Unit 8: Alkane

IUPAC nomencleature of branch and unbranched alkanes, classification of carbon atoms

in alkanes. Isomerism of alkanes, sources, methods of formation (with special reactions, Kolbe's reaction, Corey-House reaction of alkanes.; Cycloalkanes- nomencleature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations.

Unit 9: Alkene

Nomencleature of alkenes, isomerism of alkenes, methods of preparation, Physical properties of alkenes. Chemical reaction of alkenes, mechanism involved in hydrogenation, electrophilic and free radical addition, Markownikoff's rule, hydroboration oxidation, oxymercuration reduction, ozonolysis and oxidation with $KMno_4$ and OSO_4. Polymerization of alkenes. Industrial application of ethylene and propene.

Nomencleature and classification of dienes; isolated, conjugated and cumulated dienes. Structure of allenes and butadienes. Methods of formation, polymerization. Chemical reactions -1,2 and 1,4 addition, Diels – Alder reaction.

Unit 10: Alkyne

Nomenclature, and classification, structure and bonding in alkynes. Methods of formation. Physical properties. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, oxidation and polymerization.

Block-4: State of matter Unit 11: State of matter –I Gases State

II

Molecular velocities; Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collosion number, mean free path and collision diameter. Liquification of gases (based on Joule Thomson effect).

Liquid state

Intermolecular forces, structure of liquid (a qualitative description). Structural differences between solid, liquid and gases. Liquid crystal: difference liquid crystal, solid and liquid. Classification, structure of nematic and cholesterol phases.

Unit12: State of matter –II

Definitation of space lattice, unit cell, Law of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry element in crystals. X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method)

Reference/Text Books:

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
2. Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, 3rd ed., Wiley.
3. Douglas, B.E., McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.
4. Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry:Principles of tructure and Reactivity, Pearson Education India, 2006.
5. Basic Inorganic Chemistry, F. A Cotton, G. Wilkinson, and Paul L. Gaus, 3rd Edition (1995), John Wiley & Sons, New York.
6. Concise Inorganic Chemistry, J. D. Lee, 5th Edition (1996), Chapman & Hall, London

Subject Name: CALCULUS OF SINGLE VARIABLES

Course Code: MH-101 **Credits: 4**

Course Objectives: To equip the students to understand the concepts, properties, fundamental theorems, and aspects of the differential and integral calculus of single variable functions.

Course Outcomes: On successful completion of this course, students shall be able to 1. Define limits, continuity and differentiability of single variable functions.

2. Explain mean value theorems, partial differentiation and applications of differential calculus.
3. Interpret curvature, asymptotes and tracing of curves.
4. Explain fundamental theorem of integral calculus along with properties of definite and indefinite integrals.
5. Utilize reduction formulae along with double and triple integrals.

Syllabus Details

1 The Transcendental functions

1.1 The natural logarithmic function

1.2 Inverse Functions

1.3 Exponential functions

1.4 General exponential and logarithmic functions .

1.5 Inverse trigonometric functions

1.6 Hyperbolic functions

1.7 Indeterminate forms and l'Hopital's rule

2 Infinite sequences and series

2.1 Improper Integral

2.2 Sequences .

2.3 Series

2.3.1 Geometric Series

2.3.2 The Harmonic Series

2.3.3 The Divergence Test .

2.3.4 Properties of Convergent Series

2.4 The Integral Test

2.5 The Comparison Tests .

2.5.1 The Comparison Test .

2.5.2 The Limit Comparison Test

2.6 Alternating Series

2.7 Absolute Convergence; the Ratio and Root Tests

2.7.1 Absolute Convergence

2.7.2 Ratio Test .

2.7.3 The Root Test .

2.7.4 Rearrangement of Series

3 Power series, plane curves and polar coordinates

3.1 Power series

3.2 Taylor and Maclaurin series .

3.3 Plane curves and Parametric equations .

3.4 The calculus of Parametric equations .

3.5 Polar coordinates .

3.6 Areas and Arc lengths in Polar coordinates .

4 Geometry of Space and Vector-valued function

4.1 Equations of Lines in Space

4.2 Surfaces in space

4.3 Cylindrical and spherical coordinates .

4.4 Vector-valued functions and space curves

4.5 Differentiation and integration of vector-valued functions

4.6 Arc length and curvature .

4.7 Velocity and acceleration .

4.8 Tangential and normal components of acceleration

Recommended Books:

- H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
- G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
- T. M. Apostol, Calculus Vol I, Wiley & Sons (Asia) Pvt. Ltd.
- Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad

Subject Name: Chemistry Lab -I

Course Code: CHL-151 **Credit: 2**

Course Objective: The objective of Chemistry Lab-I is to provide basic knowledge of experimental determination. The determination of various elements using different techniques, molecular weight determination of polymer and water quality analysis is also explain in details.

Course Outcomes: At the end of this study, students will be able to:

1. Determine the iron content using standard methods.
2. Explain the theory and practical of transition temperature.
3. Evaluate the molecular weight of polymer.
4. Understand the concept of surface tension and its determination.
5. Define the DO and BOD in water sample.

List of Experiments:

1. Spectro-photometric Determination of iron in water sample using standard addition method.
2. To determine the transition temperature of hydrated sodium bromide by solubility method.
3. Determination of molecular weight of a polymer (e.g. Polystyrene) by viscometric method.
4. To determine the surface tensions of methyl alcohol, ethyl alcohol & n-hexane at room
5. Temperature and also calculate the atomic parachors of C, H &; O.
6. To determine DO &; BOD of a given water sample.

Recommended Books:

1.Practicle Organic Chemistry F.G. Mann and B.C. Saunders " Pearson" 2. Elementary Practical Organic Chemistry I. Vogle Pearson"

Subject Name: Physics Lab-I

Course Code: PHL-151 **Credits: 2**

Course Objectives: To acquire basic knowledge about moment of inertia, the surface tension by Jaeger's method and rotational inertia, Central forces and Simple harmonic motion.

Course Outcomes: After learning this course, students will be able to

1. Explain the perpendicular axes for moment of inertia.
2. Experimental conformation of the moment of inertia of irregular body using inertial table apparatus.
3. Experimental understanding the surface tension by Jaeger's method.
4. Study of oscillations under a bi filar suspension.

Lab Experiment List

1. Moment of inertia of a flywheel
2. Moment of inertia of an irregular body by inertia table
3. Modulus of rigidity by statistical method (Barton's apparatus)
4. Modulus of rigidity by dynamical method (sphere / disc / Maxwell's needle)
5. Young's modulus by bending of beam
6. Young's modulus and Poisson's ratio by Searle's method
7. Poisson's ratio of rubber by rubber tubing
8. Surface tension of water by capillary rise method
9. Surface tension of water by Jaeger's method
10. Coefficient of viscosity of water by Poiseuille's method
11. Acceleration due to gravity by bar pendulum
12. Frequency of AC mains by Sonometer
13. Height of a building by Sextant
14. Study the wave form of an electrically maintained tuning fork / alternating current source with the help of cathode ray oscilloscope.

Suggested Readings:

1. B.L. Worsnop, H.T. Flint, "Advanced Practical Physics for Students", Methuen & Co., Ltd., London, 1962, 9e
2. S. Panigrahi, B. Mallick, "Engineering Practical Physics", Cengage Learning India Pvt. Ltd., 2015, 1e
3. R.K. Agrawal, G. Jain, R. Sharma, "Practical Physics", Krishna Prakashan Media (Pvt.) Ltd., Meerut, 2019
4. S.L. Gupta, V. Kumar, "Practical Physics", Pragati Prakashan, Meerut, 2014, 2e

SURESH GYAN VIHAR UNIVERSITY
Accredited by NAAC with 'A+' Grade

Semester II

Subject Name: Human Values and Professional Ethic

Course Code:: HV-201 **CREDIT: 4**

Unit-I

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, Self Exploration - its content and process; 'Natural Acceptance' and Experiential Validation, Continuous Happiness and Prosperity-Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit-II

Understanding Harmony in the Human Being-Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I', Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit-III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family, Understanding values in human- human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) , meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, harmony in the society , Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals ,Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family.

Unit-IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature. Inter connectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all pervasive Space. Holistic perception of harmony at all levels of existence

Unit-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values

Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, (b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models. Strategy for transition from the present state to Universal Human Order: (a). At the level of individual: as socially and ecologically responsible engineers, technologists and managers. (b). At the level of society: as mutually

enriching institutions and organization. Case studies related to values in professional life and individual life.

Subject Name: Introduction to Computer Applications

Course Code: CA-102 Credits: 4

Course Objective:

This is a basic paper for Business Administration students to familiarize with basic principles of computer system including computer arithmetic, hardware, operating system, software applications, internet and world-wide web and their applications in the relevant fields.

Course Learning Outcomes : After completing the course, the student shall be able to:

Course Outcome	**Cognitive level**
CO1-Define the concept of Computer Fundamentals.	Remember
CO2- Describe the conversion of one base to another base Number System.	Understand
CO3- Explain the needs of hardware and software required for a computation task.	Understand
CO4 - Demonstrate the use of Operating system.	Understand
CO5 -Demonstrate how a document to be prepared and formatted.	Understand

SYLLABUS

INTRODUCTION TO COMPUTERS

UNIT - I

COMPUTER FUNDAMENTALS

Introduction, Characteristics of computers, Computer Generations, Types of computer applications, Computer structure, Operating Systems, Types of processors, Computer uses in Business

UNIT - II

DATA COMMUNICATION AND NETWORKING

Introduction - Data communication components, Communication media, Types of communication services, Modem, Computer Networks, Benefits of Networks, Types of Networks, Networking Terms, Teleconferencing tools, Interconnection Communication Model

UNIT – III

OPERATING SYSTEM FUNDAMENTALS

Introduction Operating Systems, Windows Operating System history, Tasks of Operating system, Windows API, Drivers and Unicode, Components of windows OS

UNIT - IV

MICROSOFT OFFICE PACKAGE

Introduction, MS office package, MS office installation 2013, MS office 365

UNIT - V

ADVANCED EXCEL AND MULTIMEDIA

Introduction, Excel working, Microsoft Excel starter 2010, Excel Built in Functions.

Books Recommended/Suggested Readings:

1. Rajaraman, “Fundamentals of Computers”, Prentice Hall of India, 3rd Edition.
2. Alexis Leon and Mathews Leon,” Introduction to computers”, Leon Techworld.
3. Yashwant Kanetkar “Unix Shell Programming” BPB.

Subject Name: Atomic and Solid State Physics

Course Code: PH-102 **Credits: 4**

Objectives: To acquire the knowledge of Interference, Fresnel diffraction, Diffraction gratings and Polarization of a light.

Course outcomes:

- Explain the geometrical optics • Define the interference of light.
- Explain the diffraction.
- Outline polarization of light wave.

Syllabus Details

Atomic and Solid State Physics

BLOCK-I

Excitation of atoms – Critical Potential – Excitation Potential – Ionisation Potential – Experimental determination of critical potential – Frank and Hertz`s method – Sommerfield atom model – Qualitative treatment – Derivation of condition for the allowed elliptical orbits – Vector atom model - Quantum numbers associated with Vector atom model-Coupling schemes – L-S and J J coupling _ Pauli's exclusion principle and verification .

BLOCK -II

Magnetic dipole moments due to orbital and spin motion – Selection rule for electron transition – Intensity rules – Interval rule – Fine structure of D line – Zeeman effect – Normal and Anomalous (Experimental study and results) – Debye's theory of normal Zeeman effect – Lorentz theory of anomalous Zeeman effect - Stark Effect (definition only).

BLOCK-III

Origin of X-Rays – Polarization of x-rays-Absorption of X-Rays – Continuous, Characteristic X-Rays –Mosley's Law –Mosley's Law and its importance - Bragg's law – Bragg X-ray spectrometer –Powder crystal method –Rotating Crystal method-Compton Effect – Theory – Experimental Verification.

BLOCK-IV

Photo electric effect – laws of photoelectric emission -Einstein's photo electric equation-Richardson and Compton Experiment – Millikan's Experiment – verification of Einstein's equations –determination of Plank's constant-Photo electric cells - Photo Emissive, Photo Voltaic, Photo Conductive cells – Photo Multiplier – Applications of photo electric cells.

BLOCK-V

Types of solids – Crystalline and Amorphous solids - Space Lattice – The Basis and the crystal structure unit cell and Primitive lattice cell – Lattice parameter – Symmetry elements in a cubic crystals - Point groups – Bravais lattice in two dimension – Seven crystal systems – coordination number for SC, BCC and FCC - Miller Indices – Features of miller indices – Crystal Structure – Nacl, Diamond, Zinc Blende,KCl.

Recommended books:

- Fundamentals of Optics: Francis Arthur Jenkins and Harvey Elliott White, McGrawHill, 1976.
- Optics: Ajoy Ghatak, Tata McGraw Hill, 2008.
- Optics: Eugene Hecht and A R Ganesan, Pearson Education, 2002.

Light and Optics: Principles and Practices, Abdul Al-Azzawi, CRC Press, 2007.

Subject Name: Basics of Chemistry

Course Code: CH-102 **CREDIT: 4**

Course Objective:

Objective of this chapter is to provide students with a brief detail on the basic fundamentals of the organic chemistry. Topics covered in this chapter such as hybridization, delocalized bonding and electronic effects, isomerism, aliphatic and aromatic hydrocarbons. The chapter is developed to stimulate interest of the reader into the organic chemistry and at the same time to build the deep understanding of the fundamental concepts of organic chemistry.

Course Outcomes:

After learning this chapter, students will be able to:

1. Explain the Fundaments of Organic Chemistry
2. Define Isomerism
3. Classify Aliphatic Hydrocarbons
4. Illustrate Aromatic Hydrocarbons, Alkyl and Aryl Halides
5. Identify Alcohols, Phenols and Ethers

Syllabus Details

Block-I: Molecules and Bonding

Unit 1: Unit and dimentions

Introduction, basic units, derived unites, SI Prefixes. Grammatical Rules for Representing the SI Unites. Conversion of Non- SI unit to SI units

Unit 2: Atom and Molecules

Bohr's Atomic theory (only postulates), structure of an atom; nuclear particles, atomic number, mass number and Isotopes, Atomic orbitals, filling of electrons in various orbitals-Aufbau energy diagram, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity

Unit 3: Molecules and bonding

Molecules and chemical formulae, molar mass and Avogadro's number, ionic bond and ionic compounds, Covalent compounds-bonding, VSEPR concept and geometry, Valence Bond theory, Hybridization

Unit 4: Electronegativity and polarization of covalent bond

Electronegativity and polarization of covalent bond, inductive, mesomeric, electromeric effect, hydrogen bonding and its significance

Block-II: Periodic Properties and Gaseous State

Unit 5: Periodic Properties

Periodic table and periodic law, Periodic relationship among the elements, periodic properties-atomic size, ionization energy, electron affinity, electronegativity

Unit 6: Gaseous State

Pressure of a gas, pressure volume relationship-Boyle's law, the temperature volume relationship-Charle's law, Ideal gas equation, definition of acid and base

Block-III: Hydrocarbon and biomolecule

Unit 7: Hydrocarbons and functional groups

Alkanes, alkenes, alkynes, aromatic hydrocarbons, Preparation and properties of ethene and ethyne. Functional groups in organic compounds-alcohols, ethers, aldehydes, ketones and carboxylic acids.

Unit 8: Carbohydrates and nucleic acid

Carbohydrates: Classification and nomenclature. Monosaccharides, mechanism of osazone formation

Unit 9: Nucleic acid

Introduction, Nitrogen bases, purines, pyrimidines, nucleosides, nucleotides, structure of RNA and DNA molecule

Unit 10: Metal ion in biological syatem

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll.

Block-IV: Redox reactions and catalysis

Unit 11: Oxidation and reduction

Use of redox potential data- analysis of redox cycles, redox stability in water-Frost, Latimer and Pourbaix. Principles involved in the extraction of the element.

Unit 12: Catalysis

Catalysis, characteristics of catalyzed reactions, Classification of catalysis, miscellaneous examples.

Reference/Text Books:

1. Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. *Organic Chemistry*,John Wiley & Sons (2014).
2. McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
3. Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
4. Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
5. Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
6. Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. Organic Chemistry,John Wiley & Sons (2014).
7. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
8. Sykes, P. A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988).
9. Eliel, E.L. Stereochemistry of Carbon Compounds, Tata McGraw Hill education, 2000.
10. Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
11. Morrison, R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.
12. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.

Subject Name: INTRODUCTION TO GEOMETRY

Course Code: MH-102 **Credits: 4**

Course Objectives: The main objectives of this course are to introduce the students to the exciting world of Differential Equations and their applications.

Course Outcomes: At the end of the course Introduction to Geometry , student will

be able to

1. Define linear differential equations with constant coefficient
2. Explain first order differential equations including separable, homogeneous, exact and linear.
3. Apply the method of find the solution of Differential equations of the first order but not of the first degree
4. Explain Series solutions of second order differential equations, Legendre and Bessel functions (Pn and Jn only) and their properties
5. Apply the Method of separation of variables for Laplace equation in Cartesian and polar coordinates.

Syllabus Details

INTRODUCTION TO GEOMETRY

1.Conics

1.1 Conic Sections and Conics

1.1.1 Conic sections

1.1.2 Focus-Directrix Definition of the Non-Degenerate Conics

1.1.3 Polar Equation of a Conic .

1.1.4 Focal Distance Properties of Ellipse and Hyperbola

1.2 Properties of Conics

1.2.1 Tangents

1.2.2 Reflections

1.2.3 Conics as envelopes of tangent families .

1.3 Recognizing Conics

1.4 Exercises

2 AFFINE GEOMETRY

2.1 Geometry and Transformations

2.1.1 What is Euclidean Geometry?

3.3.3 Fundamental Theorem of Projective Ge-ometry

3.4 Use of Fundamental Theorem of Projective Ge-ometry

3.4.1 Desargues' Theorem and Pappus' Theorem

3.5 Cross-Ratio

3.5.1 Another Projective Property

3.5.2 Cross-Ratio on Embedding Planes

3.5.3 An Application of Cross-Ratio

3.6 Exercises

Recommended Books:

- Barnes, Belinda & Fulford, Glenn R. (2015). Mathematical Modeling with Case Studies, Using Maple and MATLAB (3rd ed.). CRC Press, Taylor & Francis Group.
- Edwards, C. Henry, Penney, David E., & Calvis, David T. (2015). Differential Equation and Boundary Value Problems: Computing and Modeling (5th ed.). Pearson Education.

Ross, Shepley L. (2004). Differential Equations (3rd ed.). John Wiley & Sons. India.

Subject Name: Chemistry Lab-II

Course Code: CHL-252 **Credits: 2**

Course Objective: The objective of Chemistry Lab-II is to provide basic knowledge of different types of elements, functional groups etc. The qualitative estimation of elements, functional group and determination of their physical properties is provided in this study.

Course Outcomes: At the end of this study, students will be able to:

1. Determine various types of elements.
2. Identify the functional group present in the compound.
3. Examine the inorganic mixture analysis.
4. Define the separation and identification of ions from Groups zero, I, II, III, IV, V and VI.

List of Experiments:

1. Qualitative Organic Analysis:

(A) Detection of elements (X, N,

S) (B) Detection of functional

groups :

[Ph–OH, –COOH, >C=O, –CHO, R–O–R, –OH, Hydrocarbons, Halogenscontaining compounds, $–CONH_2$, Ar-NH 2 , $Ar-NO_2$]

2. Qualitative Inorganic Mixture Analysis:

Inorganic mixture analysis, separation and identification of ions from Groups zero, I, II, III, IV, V and VI, not containing more than 5 ions (2 cations & 2 anions) including interfering anion.

Recommended Books:

1.Practicle Organic Chemistry F.G. Mann and B.C. Saunders " Pearson" 2.

Elementary Practical Organic Chemistry I. Pearson"

Subject Name: Physics Lab-II

Course Code: PHL-252 **Credits: 2**

Course Objectives: To acquire basic knowledge about interference of light, wavelength of sodium light by Newton's Rings and diffraction at a straight edge or a single slit and also understand the Resolving limit of a telescope system.

Course Outcomes: After learning this course, students will be able to

1. Explain the perpendicular axes for moment of inertia.
2. Experimental conformation of diffraction at a straight edge or a single slit Experimental understanding the surface tension by Jaeger's method.
3. Study of Resolving limit of a telescope system.

List of Experiments:

1. Study of interference of light (biprism or wedge film).
2. To determine the wavelength of sodium light by Newton's Rings.
3. To determine the wavelength of monochromatic light by plane diffraction grating.
4. Study of diffraction at a straight edge or a single slit.
5. Use of diffraction grating and its resolving limit.
6. Resolving limit of a telescope system.
7. Polarization of light by the reflection.
8. Study of optical rotation for any system.

Recommended Books

- D. P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
- S. P. Singh, "Advanced Practical Physics" (Pragati Prakashan,Meerut).
- Worsnop and Flint-Advanced Practical Physics for student.

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Semester III

Subject Name: Communication Skills-I

Course Code: CS-201 **Credit: 4**

Course Objectives: Cultivate and develop reading and writing habit to enhance their vocabulary. Understanding necessary communication skills for effective presentation and management.

Course Outcomes

By the end of the course, students will be able to build a professional tone. It will develop goodwill among customers and enhance business writing skills also would help them compete.

SYLLABUS

BUSINESS COMMUNICATION SKILLS

UNIT - I

ATTITUDES AND GOAL SETTING

Introduction, Attitude and Behavior, Structure of Attitude, the function of Attitude - Formation of Attitude, Strength of Attitude, Importance of Attitude, Steps in Developing Positive Attitude, Measuring Attitude, goal setting, Concept of Goals, Objectives and Aims, Timeline for Goals, Characteristics of Goals Importance of Goals, Significance of Goals, Activity in Goal Setting, Common Obstacles of Goals Achievement, Techniques to Achieve Goals

UNIT - II

TIME MANAGEMENT AND STRESS MANAGEMENT

Introduction, Importance of Effective Time Management Techniques, Significance of effective time Management Techniques, what is Time Management? Barriers to Effective Time Management, Time Management Tools and Techniques, Introduction, why is Stress created? Definition of Stress, Types of Stress, Stress Management Techniques, Why to Manage Stress Effectively? Sources of Stress, Stress Coping Ability, Measures to Manage Stress, Principles of Stress Management

UNIT - III

COMMUNICATION SKILLS AND PROCESS OF COMMUNICATION

Introduction, Definition of Communication, Significance of Business Communication, Proper selection of Means of Communication, Communication Gap, Communication Skills,

Introduction, Process of Communication, Feedback is a Key for Effective Communication, Guidelines to Effective Communication, Forms of Communication

UNIT – IV

BODY LANGUAGES AND EMOTIONAL INTELLIGENCE

Introduction, Concept of Body Language, Types of Body Language, Uses of Body Language, Effects of Positive Body Language at Workplace, Body Language – Postures and Interpretation, how your body language alters your state of mind? Introduction, Concept and Definitions, Elements of Emotional Intelligence, Organizational Application Conflict Management

UNIT – V

INTERPERSONAL COMMUNICATION AND LISTENING SKILLS

Introduction, Interpersonal Communication, Communication and Emotion, Definition of Interpersonal Communication, Significance of Interpersonal Relationships and Communication, Enhance Interpersonal Communication and Relationships, Introduction, Concept of Listening, Significance of listening, Types of listening - Listening Skills, Benefits of Listening.

Books Reference:

- Fluency in English part-1, Macmillan, Delhi,2005, Units 1-18
- Business English, Pearson, Delhi,2008, Units 1-3
- Language through Literature (forth coming). Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brat Biswas, Primus Books, Delhi 2005 Chapter 1-17

Martin Hewing, Advanced English Grammar, CUP, New Delhi, 2010, Unit 1-60.

Subject Name: Wave Mechanics and Nuclear Physics
Course Code: PH-201 **Credits: 4**

Objectives: The objective of this course is to understand the basic concepts of thermodynamics, second and third law of thermodynamics. Also, to understand the

thermodynamic relationships, blackbody radiation and different laws.

Course outcomes:

- Understand the basic concepts of thermodynamics
- Explain second and third law of thermodynamics
- Explain thermodynamic relationships
- Describe blackbody radiation
- Discuss about the different laws

BLOCK -II Magnetic dipole moments due to orbital and spin motion – Selection rule for electron transition – Intensity rules – Interval rule – Fine structure of D line – Zeeman effect – Normal and Anomalous (Experimental study and results) – Debye's theory of normal Zeeman effect – Lorentz theory of anomalous Zeeman effect - Stark Effect (definition only).

Syllabus
WAVE MECHANICS AND NUCLEAR PHYSICS

BLOCK-I

Dual nature of light –De' Broglie's concept of matter waves – De' Broglie wavelength – Wave and group velocity – Relation between wave and group velocity – Davisson and Germer experiment – G.P. Thompson experiments – Heisenberg's Uncertainity Principle.

BLOCK -II

Basic Postulates of wave mechanics – Quantum operators, Linear operator, Hermitian operator, Parity operators – Properties of wave Function – Orthogonal and normalized wave functions – Eigen Values and Eigen Functions – Schrodinger's Equations – Time Independent – Time Dependent – Application – Particle in a box-Rigid rotator.

BLOCK-III

Classification of Nuclei – General Properties of Nucleus – Size, Mass, Density Charge, Angular momentum and Dipole moments – Binding Energy – Packing fraction – Nuclear stability – Semi Empirical Mass formula – Liquid Drop Model – Shell Model.

BLOCK-IV

Radioactivity – Properties of Alpha, Beta and Gamma Rays – Geiger-Nuttal Law – Nuclear Isomerism – Soddy Fajan's displacement law – Radioactive disintegration Law – Half Life, Mean Life periods – Law of Successive disintegration-Linear Accelerator - Cyclotron-Betatron.

BLOCK-V

Types of Nuclear Reaction – Energy balance – Q value – Transmutation by Alpha, Proton, Deutrons and Neutrons – Artificial Radioactivity – Radio Isotopes – Applications – Nuclear Fission – Chain reaction – Nuclear Reactor –Fast Breeder reactor- Nuclear Fusion – Thermo Nuclear Reactions – Carbon-Nitrogen Cycle – Proton-Proton Cycle.

Subject Name: Fundamental Chemistry- II
Course Code: CH-201 **CREDIT: 4**

Course Objectives:

The objective of this course is to explain the different states of matter i.e. solid, liquid and gas. The smallest structural unit of all chemical substances in these states is molecule. How the molecules are arranged in a solid, liquid and gas, is the fundamental question before a chemist. It is the 'molecular model' of matter in these states which determine their physical behaviour. The theory which visualises that all substances, whether solids, liquids or gases are made of molecules in motion is called kinetic molecular theory of matter also discuss in this course. This course also illustrates the concept of chemical kinetics. This unit covers the following topics such as rate of reaction, order of reaction, rate law for different orders of reaction, Arrhenius theory and Catalyst and its effect on the rate of a reaction. The concept of equilibrium, conductivity, electrochemical cell and thermodynamics also discussed in this Course.

Course Outcomes:

Students will be able to:

1. Define State of Matter
2. Describe Chemical Kinetics
3. Identify Equilibrium
4. Explain Electrochemistry

5. Illustrate Thermodynamics

Syllabus Details

Block-1: Chemical bonding and periodic elements

Unit 1: Chemical bonding –III

Ionic solid- Ionic characters, radius ratio effect and coordination number, limitations of radius ratio rule, lattice defect, semiconductors lattice energy and Born-Haber cycle, Fajan's rule. Weak intrections- hydrogen bonding, van der Waal forces**.**

Unit 2: s- block elements

Alkali metals: General introduction, general characteristics and use (Flame Colouration), Oxides and Hydroxides, solubility and hydration. Complexation of alkali metal ions. Anomalous Behavior of Lithium.

Alkaline earth metals: General introduction, general characteristics and uses, Halides and Hydrides of Beryllium, complexation behavior. Anomalous Behavior of Beryllium.

Unit 3: p- block elements

Introduction, general characteristics and uses. Chemistry of hydrides, halides, oxides and oxyacids of p-block elements. Silicates, Boron nitrogen compounds (borazene and boron nitrides), interhalogen compounds

General introduction, general characteristics and uses. Compounds of Noble gases- Preparation, Properties and structures.

Block-2: Aromatic hydrocarbon and hydrocarbon derivatives

Unit 4: Arenes and Aromaticity

Nomenclatures of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Resonance and MO picture Aromaticity: the Huckel's rule, aromatic ions.

Unit 5: Reaction mechanism of aromatic hydrocarbon

Aromatic electrophilic substitution- general pattern of mechanism, role of σ and π complexes. Mechanism of nitration, halogenations, sulphonation, Friedel Craft reactions.

Activating and deactivating substituents, orientation and ortho/para ratio.

Reduction of benzene (Birch reduction).

Unit 6: Alkyl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides, SN1 and SN2 and SNI reaction with energy profile diagrams. Elimination reactions, types of elimination reactions. Polyhalogen compounds-Chloroform, carbon tetra chloride.

Unit 7: Aryl Halides

Nomenclature and classification of aryl halides. Methods of formation of aryl halides, nuclear and side chain reaction. Chemical reactions. Relative reactivity of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC. **Block-3: Chemical kinetics and Thermodynamics**

Unit 8: Chemical Kinetics

Chemical kinetics and its scope, rate of reaction, factors affecting the rate of reaction-concentration. Pressure, temperature, solvent, light, catalyst. Order of reactions, zero order, first order, second order, third order and pseudo order. Integrated rate law equation of zero and first order of reaction. Half life periods. Radioactive decay as a first order phenomenon, Concept of activation energy.

Unit 9: Colloidal State

Definitation of colloids, classification of colloids. Solid in liquid (sols): properties- kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquid in liquid (emulsion): types of emulsion, preparation. Emulsifire.

Unit 10: Thermodynamics I

Introduction, Definition of thermodynamics terms, System surrounds, Types of systems Intensive and extensive properties, States and path functions and their differentials, Thermodynamic, process, Concept of heat and work, First law of thermodynemics, Internal energy and enthalpy, Heat capacity, Heat capacity at constant volume and pressure, Jule Thomson effect, Jule Thomson coefficient, Calculation of w, q. dU and dH for the expansion of ideal gases.

Block-4: Equilibrium

Unit 11: Chemical equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction isotherm and reaction isochore- Clapeyron equation and Clapeyron Clapeyron-equation, applications

Unit12: Ionic equilibrium

Introduction, Electrolytes and Non-electrolytes: Aciss, Bases and Salts, ionic product of water, Common Ion Effect, Ionic Equilibria in weak Acids and Bases including Multistage Equilibria. pH Scale Exact treatment of Calculation of H^+ ions andc pH for HA and BOH. Hydrolysis- Salt hydrolysis, hydrolysis constant, pH calculation, Degree of hydrolysis, Titrations Acid- Base Titration Curve. Buffer solution, Buffer capacity, Handersion equation, Solubility and solubility product. Indicators. Common ion effect and the Solubility of a Sparingly soluble salt

Reference/text books:

1. Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
2. Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
3. Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry*, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
4. Mahan, B.H. *University Chemistry*, 3rd Ed. Narosa (1998).
5. Petrucci, R.H. *General Chemistry*, 5th Ed., Macmillan Publishing Co.: New York (1985).

Subject Name: Differential Equation

Course Code: MH-201 **Credits: 4**

Course Objectives: The objective of the course is to introduce the fundamental theory of groups and their homomorphisms. Symmetric groups and group of symmetries are also studied in detail. Fermat's Little theorem as a consequence of the Lagrange's theorem on finite groups.

Course Outcomes:

After completing this course, the student will be able to:

1. Recall the basic concepts of group actions and their applications.
2. Explain the significance of the notions of cosets, normal subgroups and integral domain.
3. Compute the expression of permutation groups by using permutation multiplication.
4. Understand the homomorphism by using the relationship between groups
5. Outline the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.

Syllabus Details

Subject Name: Differential Equation

Module-I

1.1: Some Basic Mathematical Models; Di-

1.2: Solutions of some Differential equations

1.3: Classification of Differential Equations

2.1: Linear Differential Equations; Method of Integrating Factors

2.2: Separable Differential Equations

2.3: Modelling with First Order Differential Equations

2.4: Differences Between Linear and Nonlinear Differential Equa-tions

2.6: Exact Differential Equations and Integrating Factors

2.8: The Existence and Uniqueness Theorem (proof omitted)

Module-II

3.1: Homogeneous Differential Equations with Constant Coeffi-cients

3.2: Solutions of Linear Homogeneous Equations; the Wronskian

3.3: Complex Roots of the Characteristic Equation

3.4: Repeated Roots; Reduction of Order

3.5: Nonhomogeneous Equations; Method of Undetermined Coef-ficients

3.6: Variation of Parameters

5.2: Series solution near an ordinary point, part1

5.3: Series solution near an ordinary point,part2

Module-III

6.1: Definition of the Laplace Transform

6.2: Solution of Initial Value Problems

6.3: Step Functions

6.5: Impulse Functions

6.6: The Convolution Integral

Module-IV

10.1: Two-Point Boundary Value Problems

10.2: Fourier Series

10.3: The Fourier Convergence Theorem

10.4: Even and Odd Functions

10.5: Separation of Variables; Heat Conduction in a Rod

10.7: The Wave Equation: Vibrations of an Elastic String

Recommended Books:

- Gallian, Joseph. A. (2013). Contemporary Abstract Algebra (8th ed.).
- Cengage Learning India Private Limited, Delhi. Fourth impression, 2015.
- Rotman, Joseph J. (1995). An Introduction to The Theory of Groups (4th ed.). Springer Verlag, New York.

Subject Name: Chemistry Lab-II

Course Code: CHL-251 **Credits: 2**

Course Objective: The objective of Chemistry Lab-II is to provide basic knowledge of different types of elements, functional groups etc. The qualitative estimation of elements, functional group and determination of their physical properties is provided in this study.

Course Outcomes: At the end of this study, students will be able to:

1. Determine various types of elements.
2. Identify the functional group present in the compound.
3. Examine the inorganic mixture analysis.
4. Define the separation and identification of ions from Groups zero, I, II, III, IV, V and VI.

List of Experiments:

1. Qualitative Organic Analysis:

(A) Detection of elements (X, N,

S) (B) Detection of functional

groups :

[Ph–OH, –COOH, >C=O, –CHO, R–O–R, –OH, Hydrocarbons, Halogenscontaining compounds, $–CONH_2$, Ar-NH 2 , $Ar-NO_2$]

2. Qualitative Inorganic Mixture Analysis:

Inorganic mixture analysis, separation and identification of ions from Groups zero, I, II, III, IV, V and VI, not containing more than 5 ions (2 cations & 2 anions) including interfering anion.

Recommended Books:

1.Practicle Organic Chemistry F.G. Mann and B.C. Saunders “ Pearson” 2. Elementary Practical Organic Chemistry I. Pearson”

Subject Name: Physics Lab-III

Course Code: PHL-251 **Credits: 2**

Course Objectives: To acquire basic knowledge about determination of temperature dependence of total radiation.

Course Outcomes: After learning this course, students will be able to

1. Explain Experimental determination of temperature dependence of total radiation.
2. Experimental conformation of Resistance thermometry
3. Experimental understanding the Charging and discharging in R.C. and R.C.L. circuits.
4. Study of A.C. Bridges.

List of Experiments:

1. Study of temperature dependence of total radiation.
2. Study of temperature dependence of spectral density of radiation.
3. Resistance thermometry.
4. Thermo-emf thermometry
5. Conduction of heat through poor conductors of different geometries.
6. To determine the coefficient of viscosity by capillary tube.
7. Charging and discharging in R.C. and R.C.L. circuits.
8. High resistance by leakage.
9. A.C. Bridges.
10. Half wave and full wave rectifiers.

Recommended Book:

- D.P. Khandelwal, "A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
- S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
- Worsnop and Flint- Advanced Practical physics for student

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Semester IV

Subject Name: Energy Physic

Course Code: PH-202 **Credits: 4**

Course Objectives: To acquire the knowledge of Growth and decay of currents through inductive resistances, Semiconductors, Transistor biasing circuits and oscillator.

Course outcomes:

- Describe resistance and circuits
- Understand semiconductors
- Explain transistors and amplifiers
- Explain about oscillators

Syllabus Details
ENERGY PHYSIC

BLOCK I: Introduction to Energy Sources

World's reserve of Commercial energy sources and their availability- India's production and reserves. Conventional and non-conventional sources of energy, comparison – CoalOil and natural gas. Conventional and non-conventional energy applications - merits and demerits.

BLOCK II: Solar Thermal Energy

Solar constant -Solar spectrum-Solar radiations outside earth's atmosphere –at the earth surface-on tilted surfaces – Solar Radiation geometry-Basic Principles of Liquid flat plate collector – Materials for flat plate collector – Construction and working- Solar distillation– Solar disinfection - Solar drying. Construction and working of Solar cooker(box type)- Solar water heating systems – Swimming pool heating.

BLOCK III: Photovoltaic Systems

Introduction-Photovoltaic principle-Basic Silicon Solar cell- Power output and conversion efficiency. Limitation to photovoltaic efficiency-Basic photovoltaic system for power generation-Advantages and disadvantages- Types of solar cells- Application of solar photovoltaic systems -

PV Powered fan – PV powered area - lighting system – A Hybrid System.

BLOCK IV: Biomass Energy

Introduction-Biomass classification- Biomass conversion technologies. Bio-gas generation-Factors affecting bio-digestion -Working of biogas plant- floating and fixed dome type plant - advantages and disadvantage of Bio-gas from plant wastes. -Methods for obtaining energy from biomass- Thermal gasification of biomass-Working of downdraft gasifier- Advantages and disadvantages of biological conversion of solar energy.

BLOCK V: Wind Energy and Other Energy Sources

Wind Energy Conversion-Classification and description of wind machines, wind energy collectors-Energy storage. Energy from Oceans and Chemical energy resources-Ocean thermal energy conversion-tidal power, advantages and limitations of tidal power generation- Energy and power from waves- wave energy conversion devices- Fuel cellsand application of fuel cells-batteries- advantages of battery for bulk energy storageHydrogen as alternative fuel for motor vehicles.

Recommended books:

- B.G. Streetman; “Solid State Electronic Devices”, IInTdi Edition (Prentice Hall of India, New Delhi, 1986).
- W.D. Stanley: “Electronic Devices, Circuits and Applications” (Prentice-Hall, New TTC’A 1flOO\ JL4y, JJI. 1OO).
- J.D. Ryder, “Electronics Fundamentals and Applications”, lI’’ Edition (PrenticeHall of India, New Delhi, 1986)

Subject Name: Analytical Chemistry

Course Code: CH-202 **CREDIT: 4**

Course Objectives:

The objective of this course is to acquire basic concepts, principles, and techniques of modern analytical chemistry that would empower students with an analytical mind set and the abilities to solve diverse analytical problems in an efficient and quantitative way that conveys the importance of accuracy and precision of the analytical results.

Course Outcomes:

After learning this course, students will be able to

6. Explain the Introduction to Analytical Chemistry.
7. Evaluate the Analytical Data
8. Define Equilibrium
9. Understand Gravimetric and Titrimetric Methods
10. Illustrate Spectroscopic Methods

Syllabus Details

Subject Name: Analytical Chemistry

Block-1: Qualitative and quantitative aspects of analysis Unit 1: Analytical approaches

Types of errors, precision & accuracy, Significant figures; significant figures in Arithmatics-addition, subtraction, multiplication and division. Mean and standard deviation.

Unit 2: Laboratory apparatus and measuring equipment

Laboratory Apparatus: Laboratory burner; Bunsen burner, obtaining warm gentle flame with the burner, hottest flame of the burner. Cutting and bending of glass tubing/glass rod, Measuring Equipmen**t:** Pipette, burette, chemical balance, least count

Unit 3: Chemical Concentration

Normality, morality, preparation of solution of defined normality/molarity of a given compound and from a given solution of different strength, percent composition, part per million (ppm), part per billion (ppb), calculations.

Unit 4: Titration:

Types of titrations, end point, equivalence point, Indicators-types and theory.

Unit 5: Solubility and Extraction

Solubility-Definition, predicting solubility behaviour, water as a solvent, organic solvents. Extraction-Theory, distribution coefficient, separation and drying agents.

Unit 6: Physical Constants

Melting points, melting point theory, mixture melting point, packing of melting point tube, Determination of melting point; decomposition, discoloration, softening, shrinking and sublimation. Boiling point, determination of boiling point.

Unit 7: Distillation

Simple distillation, distillation theory, fractional distillation, difference between simple and fractional distillation, vapour-liquid composition diagram, Raoult's Law, types of fractionating columns, column efficiency, azeotropes.

Block-2: Separation techniques Unit 8: General Aspects of Chromatography

Intorduction, Classification of chromatographic methods, Efficiency of techniques, Mechanism of Separation, Development of Chromatograms

Unit 9: Adsorption Chromatography

Introduction, classification, Principle, Efficiency of techniques, Mechanism of Separation, Development of Chromatograms

Unit 10: Ion Exchange Chromatography

Introduction, Principle, Ion exchange materials, Mechanism of Separation, Ion exchange capacity

Block 3: Spectroscopic Methods of Analysis Unit 11: UV-Visible Spectrometry

Properties, absorption of light, transmittance, absorbance and Beer's Law. Basic principles,

instrumentation for single and double beam instrument and its application.

Unit 12: Infrared Spectrometry

Basic principles, instrumentation for single and double beam instrument and its application.

Reference/Text Book

1. "A Text book of Soil Chemical Analysis" by Hessee P R
2. "Principles of Analytical Chemistry: A Textbook" by Miguel Valcarcel
3. “Analytical Chemistry: An Introduction” by Douglas A. Skoog, Donald M. West and F. James Holler.
4. “Analytical Chemistry: A Chemist and Laboratory Technician’s Toolkit” by Bryan M. Ham and Aihui MaHam.
5. “Principles and Practice of Analytical Chemistry” by Fifield, Gary H., and David Kealey

Subject Name: Linear Algebra

Course Code: MH-202 **Credits: 4**

Course Objectives: The course is designed to provide students with a deep and rigorous understanding of real numbers and of defining terms to prove the results about convergence and divergence of sequences and series of real numbers. It aims to develop the ability to analyze and reason about limits, continuity, and differentiability, and apply these concepts to solve problems.

Course Outcomes:

On successful completion of this course, students should be able to:

1. Analyze and apply fundamental properties of real numbers.
2. Evaluate and interpret sequences of real numbers.
3. Solve problems involving series of real numbers.
4. Apply principles of limits and continuity to functions.
5. Demonstrate understanding and application of differentiation concepts in real analysis.

Syllabus Details

Subject Name: Linear Algebra

1 Systems of Linear Equations and Matrices

1.1 Matrices and Matrix operations

1.2 Determinant .

1.3 Inverse of a matrix

1.4 Diagonal and triangular matrices .

1.5 Introduction to system of linear equations . .

1.5.1 Linear system in two and three unknowns

1.5.2 Non-homogeneous system . .

1.6 Gauss Elimination method for solving a system of linear equations . .

1.7 Homogeneous system of linear equations . .

1.8 More on linear systems .

4.8.1 Spectral Decomposition .

Recommended Books:

- R. G. Bartle and D. R. Sherbert: Introduction to Real Analysis, John Wiley and Sons, Singapore, 3rd Ed, 2003.
- S. C. Malik and S. Arora: Mathematical Analysis, New Academic Science Ltd, 5th Ed, 2017.
- W. Rudin: Principles of Mathematical Analysis, Third Edition, McGraw Hill, New York, 3rd Ed, 1976.
- T.M. Apostol: Mathematical Analysis, 2nd Ed., Narosa Distributor, New Delhi, 2002.

Course Name: Chemistry Lab-III

Course Code: CHL-252 **Credits:2**

Course Objectives: To acquire basic knowledge about Qualitative Organic Analysis and Detection of elements and Qualitative Inorganic Mixture Analysis.

Course Outcomes: After learning this course, students will be able to

1. Explain the Determination of iron in water sample.
2. Explain the Determination of molecular weight of a polymer.
3. Define the surface tension by Jaeger's method.
4. Understand determine DO &; BOD of a given water sample.

List of Experiments:

Analytical Chemistry

Qualitative Analysis: Identification of an organic compound through the functional group analysis, determination of melting point/boiling point and preparation of suitable derivatives.

Purification of organic compounds: By crystallization (from water or alcohol) and distillation.

Recommended Books:

1.Practicle Organic Chemistry F.G. Mann and B.C. Saunders " Pearson" 2. Elementary Practical Organic Chemistry I. Vogle Pearson"

Subject Name: Physics Lab-IV

Course Code: PHL-252 **Credits: 2**

Course Objectives: To acquire basic knowledge about Characteristics of a transistor in CE, CB and CC configurations and Frequency response of R.C. coupled amplifier and also verify different theorem .

Course Outcomes: After learning this course, students will be able to

1. Explain the perpendicular axes for moment of inertia.

2. Experimental conformation of different theorem
3. Experimental understanding the Characteristics of a transistor.
4. Study of Characteristics of a tunnel diode.

List of Experiments:

1. Characteristics of a transistor in CE, CB and CC configurations
2. Frequency response of R.C. coupled amplifier.
3. To verify the Norton's theorem.
4. To verify the Superposition's theorem.
5. To verify the Thevenin's theorem.

6. To determine the frequency of tuning fork.
7. To determine the velocity of sound in air by Kundt's tube.
8. Specific resistance and energy gap of a semiconductor
9. Characteristics of a transistor 10. Characteristics of a tunnel diode.

Recommended Books

- D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
- S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut). Worsnop and Flint- Advanced Practical physics for students.

Subject Name: ENGLISH LANGUAGE

Course Code: EN-202 **Credits: 4**

The syllabus aims at achieving the following objectives:

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation (sounds and word stress)
2. Reinforcing selected components of grammar and usage
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing.

Syllabus

Subject Name: English Language

UNIT I

PHONETICS AND TRANSLATION

Introduction, Phonetics, Translation, Phonetic Symbols, Phonetic Transcription

UNIT II

TRANSLATION OF WORDS AND SENTENCES

Introduction, Meaning and Definition of Translation, Translation as a Mediator, Nature of Translation, Translation of 5 Simple sentences from Hindi to English, Translation of 5 Simple sentences from English to Hindi, Translation of 05 Words from Hindi to English, Translation of 05 Words from English to Hindi

UNIT III

GRAMMAR AND TRANSFORMATION OF SENTENCES

Introduction, Grammar and Usage, Elements of a Sentence, Transformation of Sentences (Direct and Indirect Narration, Active and Passive Voice), Modals, Tense, Punctuation of a Short Passage

UNIT IV

AUTHORS AND THEIR THOUGHTS

Introduction, The Life of Sujata Bhatt, About the Poem 'Voice of the Unwanted Girl', The Life of Ruskin Bond, About the Novel 'Night Train for Deoli', The Life of M.K. Gandhi, About The Excerpt 'The Birth Of Khadi', The Life of J.L. Nehru, About the Speech 'A Tryst with Destiny', The life of A.P.J. Abdul Kalam, About the Novel 'Vision for 2020'

UNIT V

COMPOSITION

Introduction, Compositional Skills, Letters-Formal and Informal, CV's Resume and Job Applications, Report Writing, Paragraph Writing

Recommended Reading:

Sasi kumar,V., Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation

Books.2005.

Sawhney, Panja and Verma eds. English At the Workplace, Macmillan 2003.

Singh, R.P. Professional Communication.OUP. 2004

Judith Leigh. CVs and Job Applications.OUP.2004

Arthur Waldhom and Arthur Zeiger, English Made Simple. Upa and Co.

Guna shekared. A Foundation English Course for Undergraduates. Book I,CIEFL, Hyderabad.

Quirk and Greenbaum: A University Grammar of English Longman,1973

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Semester V

Subject Name: Quantum Chemistry Spectroscopy and Photochemistry
Course Code: CH-301 **Credits: 4**

Course Objectives:

The objective of this course is to explain the general concept of quantum mechanics, wave functions, postulates. An introduction to spectroscopy and photochemistry is also discussed in this chapter.

Course Outcomes: Students will be able to:

1. Define general introduction of quantum chemistry
2. Describe elementary quantum mechanics
3. Illustrate general introduction of spectroscopy
4. Identify different types of spectroscopies
5. Explain photochemistry and colligative properties

Syllabus

Subject Name: Quantum Chemistry Spectroscopy and Photochemistry

Block 1: Introduction to Quantum Mechanics

Unit 1: Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (without derivation) their solution of overall solution and its defects.

Unit 2: Compton effect, de-Broglie's hypothesis, the Heisenberg's uncertainty principle, Hamiltonian Operator. Schrödinger wave equation and its importance, physical interpretation of the wave function.

Unit 3: Postulates of quantum mechanics, particle in a one dimensional box. Schrödinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

Block II: Elementary Quantum Mechanics

Unit 4: Molecular orbital theory, basic ideas–criteria for forming M.O. from A.O., construction of M.O's by LCAO–H_2^+ ion.

Unit 5: Calculation of energy levels from wave functions, physical picture of bonding and anti-bonding wave functions, concept of, σ*,σ*orbitals and their characteristics, Hybrid orbitals–sp, sp^2, sp^3 calculation of coefficients of A.O's used in sp and sp^2 hybrid orbitals and interpretation of geometry.

Unit 6: Introduction to valence bond model of H2, comparison of M.O. and V.B. models.

Block III: Spectroscopy: An Introduction

Unit 7: Introduction: electromagnetic radiation, regions of the spectrum, basic features of different spectrophotometers.

Unit 8: Statement of the born-oppenheimer approximation, degrees of freedom, Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity. **Unit 9:** Distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Block IV: Infrared, Raman and Electronic Spectroscopy

Unit 10: Infrared Spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Unit 11: Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Unit 12: Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and FranckCondon principle. Qualitative description of σ, π and η M.O. their energy levels and the respective transition.

Block V: Photochemistry and Soliutions

Unit 13: Interaction of radiation with matter, difference between thermal and photochemical processes, Laws of photochemistry: Grothus – Drapper law, Stark–Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions–energy transfer processes (simple examples), Kinetics of Photochemical reaction.

Unit 14: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of vapor pressure, molecular weight determination, Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure, Elevation of boiling point and depression of freezing, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.

Unit 15: Experimental methods for determining various colligative properties. Abnormal molar mass, Van't Hoff factor, Colligative properties of degree of dissociation and association of solutes. Optical activity, polarization–(Clausius–Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment- temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties paramagnetism, diamagnetism and ferromagnetic, Magnetic susceptibility, its measurements and its importance.

References:

1. Banwell, C. N. & McCash, E. M. Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-Hill: New Delhi (2006).
2. Chandra, A. K. Introductory Quantum Chemistry Tata McGraw-Hill (2001).

3. House, J. E. Fundamentals of Quantum Chemistry 2 nd Ed. Elsevier: USA (2004).
4. Lowe, J. P. & Peterson, K. Quantum Chemistry, Academic Press (2005). Kakkar, R. Atomic & Molecular Spectroscopy: Concepts & Applications, Cambridge University Press (2015)

Subject Name: Electromagnetism

Course Code: PH-301 **Credits: 4**

Course Objectives: To acquire the knowledge of Dielectrics, Magnetic Properties of Matter, Electromagnetic Waves and Reflection by in osphere.

Course outcomes:

- Understand electrostatics.
- Understand magnetostatics.
- Explain EM waves
- Explain reflection of EM waves

]

Syllabus

Subject Name: Electromagnetism

Block I: Electrostatics

Unit-1: Dielectrics: Dielectric constant, polarization,

Unit-2: Electronic polarization, Atomic or ionic Polarization

Unit-3: Polarization charges, Electrostatic equation with dielectrics,

Unit-4: Field, force and energy in Dielectrics.

Block II: Magneto statics

Unit-5: Magnetic Properties of Matter: Intensity of magnetization and magnetic susceptibility

Unit-6: Properties of Dia, Para and Ferromagnetic materials, Curie temperature,

Unit-7: Hysteresis and its experimental determination.

Block III: EM Waves

Unit-8: Electromagnetic Waves: The wave', equation satisfied .by E and B, plane electromagnetic waves in vacuum,

Unit-9: Maxwell equations and their derivations, Displacement current,

Unit-10: Vector and Scalar potentials, Boundary conditions at interface between two different media,

Unit-11: Poynting vector and Poynting theorem

Block IV: Reflection of EM waves

Unit-12: Reflection at, a plane boundary of dielectrics,

Unit-13: Polarization by reflection and total internal reflection,

Unit-14: Faraday effect; waves in a conducting medium, **Unit-15:** Reflection and refraction by the ionosphere

Recommended books

- Berkeley Physics Course; Electricity and Magnetism, Ed. E.M. Purcell (Mc Graw Hill).
- Halliday and Resnik; "Physics", Vol 2.
- D J Griffith; "Introduction to Electrodynamics" (Prentice-Hall of India).
- Reitz and Milford; "Electricity and Magnetism (Addison-Wesley). • A S Mahajan and A A Rangwala; "Electricity and Magnetism" (Tata McGraw-Hill)

Subject Name: Numerical Methods

Course Code: MH-301 **Credits: 4**

Course Objectives: The goal of this paper is to acquaint students for the study of certain algorithms that uses numerical approximation for the problems of mathematical analysis. Also, the use of Computer Algebra Systems (CAS) by which the intractable problems can be solved both numerically and analytically.

Course Outcomes: On successful completion of this course, students shall be able to:

1. Analyze and solve several errors and approximation in numerical methods.
2. Discuss different methods of interpolation.
3. Determine numerical differentiation & integration.
4. Apply several methods to solve curve fitting and interpolation questions and its related techniques.
5. Apply several methods to solve the equations in one variable or simultaneous equation.

Syllabus

Subject Name: Numerical Methods

Block I: Errors and Significant Digits

Unit-1: Floating point representation and computer arithmetic,

Unit-2: Significant digits, Errors: Roundoff error, Local truncation error

Unit-3: Global truncation error, Order of a method,

Unit-4: Convergence and terminal conditions

Block II: Methods: Approximated Roots

Unit-5: Efficient computations Bisection method,

Unit-6: Secant method

Unit-7: Regula Falsi method and Newton Raphson method

Unit-8: Newton's method for solving nonlinear systems

Block III: Gauss Elimination

Unit-9: Gauss elimination method (with row pivoting)

Unit-10: Gauss Jordan method, Gauss Thomas method for tridiagonal systems

Unit-11: Iterative methods: Jacobi and Gauss-Seidel iterative methods

Block IV: Interpolation and Extrapolation Methods

Unit-12: Lagrange's form and Newton's form Finite difference operators

Unit-13: Linear interpolation, Cubic spline interpolation (only method)

Unit-14: Euler's method Modified Euler's methods

Unit-15: Heun method and Mid-point method, Runge-Kutta second methods:

Block V: Numerical differentiation and Integration

Unit-16: First derivatives and second order derivatives,

Unit-17: Richardson extrapolation Unit-18: Trapezoid rule, Simpson's rule (only method), Newton Cotes open formulas.

Recommended Books:

- Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
- M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012).
- Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e(2010).

Subject Name: Physics Lab-V

Course Code: PHL- 351 **Credits: 2**

Course Objectives: To acquire basic knowledge about Use of a vibration magnetometer to study a field and Measurement of low resistance by Carey-Foster bridge or otherwise and also Study of decay of currents in LR and RC circuits.

Course Outcomes: After learning this course, students will be able to

1. Explain the vibration magnetometer to study a field by experiment.
2. Experimental understanding of Lissajuous figures using a CR0Experimental understanding the Hall-probe method for measurement of magnetic field.
3. Study of field due to a current.

List of Experiments:

1. Use of a vibration magnetometer to study a field.
2. Study of field due to a current.
3. Measurement of low resistance by Carey-Foster bridge or otherwise.
4. Measurement of inductance using impedance at different frequencies.
5. Measurement of capacitance using impedance at different frequencies.
6. Study of decay of currents in LR and RC circuits.
7. Response curve for LCR circuit and resonance frequency and quality factor.
8. Characteristic of a choke.
9. Hall-probe method for measurement of magnetic field
10. Study of Lissajuous figures using a CR0.

Recommended Books

- D.P. Khandelwal, “A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
- S.P. Singh, “Advanced Practical Physics” (Pragati Prakashan, Meerut).

Subject Name: Employability Skills-I **Credits: 4**

Course Code: ES-301

Learning Outcomes

After completing this programme, participants will be able to:

1. Outline the importance of Employability Skills for the current job market and future of work
2. List different learning and employability related GOI and private portals and their usage
3. Research and prepare a note on different industries, trends, required skills and the available opportunities
4. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. that are required to be followed to become a responsible citizen
5. Discuss the role of personal values and ethics such as honesty, integrity, caring and respecting others, etc. in personal and social development
6. Identify and practice different environmentally sustainable practices
7. Discuss relevant 21st century skills required for employment
8. Highlight the importance of practicing 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life
9. Create a pathway for adopting a continuous learning mindset for personal and professional development
10. Use appropriate grammar and sentences while interacting with others
11. Read English text with appropriate articulation
12. Role play a situation on how to talk appropriately to a customer in English, over the phone or in person

13. Write a brief note/paragraph / letter/e -mail using correct English
14. Create a career development plan
15. Identify well-defined short- and long-term goals

Syllabus

Subject Name: Employability Skills-I

UNIT – 1

Communication Skills:

Writing Skills: Parts of Speech, Greetings and Introduction, Talking about Self, Verbal & Non-Verbal Communication.

UNIT – 2

Information and Communication Technology Skills:

Introduction to ICT, Basic Computer Operations, Communication and Networking, Basics of Internet & Browsing, Introduction to e-mail, Receiving and Replying to e-mails.

UNIT – 3

Self-Management Skills:

Introduction to Self-management, Strength and Weakness Analysis, Self-confidence, Positive Thinking, Grooming

UNIT – 4

Entrepreneurship Skills:

What is Entrepreneurship, Role of Entrepreneurship, Qualities of a Successful Entrepreneur, Types of Business Activities, Entrepreneurship Development Process

UNIT – 5

Green Skills:

Society and Environment, Conserving Natural Resources, Sustainable Development and Green Economy

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Semester VI

Subject Name: Organometallics, Bioinorganic Chemistry

Course Code: CH-302 **Credits: 4**

Course Objectives:

The objective of this course is to explain the general concept of organometallic compounds and its derivatives and basic knowledge of bioinorganic chemistry.

Course Outcomes: Students will be able to:

1. Define theories of coordination chemistry
2. Describe magnetic properties of transition metal complexes
3. Illustrate organometallic chemistry
4. Identify hard and soft acids and bases
5. Explain bioinorganic chemistry
6.

Syllabus

Subject Name: Organometallics, Bioinorganic Chemistry

Block I: Theories of coordination Chemistry

Unit 1: Metal-ligand bonding in Transition Metal Complexes Limitations of valance bond theory, an elementary idea of crystal field theory.

Unit 2: Crystal field splitting in octahedral, tetrahedral and square planner complexes, factors affecting the crystal- field parameters. Thermodynamic and Kinetic Aspects of Metal Complexes.

Unit 3: A brief outline of thermodynamics stability of metal complexes and factors affecting the stability, stability constants of complexes and their determination, substitution reactions of square planar complexes.

Block II: Magnetic Properties of Transition Metal Complexes

Unit 4: Magnetic Properties of Transition Metal Complexes, Types of magnetic behavior,

methods of determining magnetic susceptibility, spin-only formula, L-S coupling. **Unit 5:** Correlation of u_s and u_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit 6: Electronic spectra of Transition Metal Complexes, Types of electronic transitions, selection rules ford-d transitions, spectroscopic ground states, spectrochemical series, Orgelenergy level diagram for d^1 and d^9 states, discussion of the electronic spectrum of $[Ti(H2O)6]^{3+}$complexion.

Block III: Organometallic Chemistry

Unit 7: Organometallic Chemistry: Definition, nomenclature and classification of organometallic compounds.

Unit 8: Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn, metal carbonyls: 18 electron rule, preparation, structure and nature of bonding in the mononuclear carbonyls.

Unit 9: Silicones and Phosphazenes: Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in tri phosphazenes.

Block IV: Hard and Soft Acids and Bases

Unit 10: Hard and Soft Acids and Bases (HSAB): Classification of acids and bases as hard and soft.

Unit 11: Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis,

Unit 12: Theoretical basis of hardness and softness, electro negativity and hardness and softness.

Block V: Bioinorganic Chemistry

Unit 13: Bioinorganic Chemistry: Essential and trace elements in biological processes.

Unit 14: Metallo porphyrins with special reference to hemoglobin and myoglobin.

Unit 15: Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}.

References:

1. Basic Inorganic Chemistry, F. A Cotton, G. Wilkinson, and Paul L. Gaus, 3 rd Edition (1995), John Wiley & Sons, New York.
2. Concise Inorganic Chemistry, J. D. Lee, 5 th Edition (1996), Chapman & Hall, London.
3. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.L. Keiter.
4. Berg, J.M., Tymoczko, J. L. & Stryer, L. Biochemistry 7 th Edition, W. H. Freeman.
5. G. Odian: Principles of Polymerizations, 4 th Edition, Wiley, 2004.

Subject Name: **Elements of Quantum Mechanics and Atomic & Molecular Spectra**

Course Code: PH-302 **Credits: 4**

Objectives: To acquire the knowledge about Matter Waves, Schrodinger wave equation, Atomic spectra and Molecular spectra.

Course outcomes:

- Understand about the origin of quantum mechanics.
- Understand Schrodinger wave equation
- Explain atomic spectra
- Explain molecular spectra

Syllabus

Subject Name: Organometallics, Bioinorganic Chemistry

Block I: Origin of Quantum Mechanics

Unit-1: Matter Waves: Inadequacies of classical mechanics, Photoelectric

phenomenon, Compton effect, wave particle duality,

Unit-2: de- Broglie matter waves and their experimental verification,

Unit-3: Heisenberg's Uncertainty principle, Complementary principle, **Unit**-4: Principle of superposition, Motion of wave packets.

Block II: Schrodiner Wave Equation

Unit-5: Schrodinger wave equation and its Applications: Schrodinger wave equation, Interpretation of wave function,

Unit-6: Expectation values of dynamical variables, Ehrenfest theorem, Orthonormal properties of wave functions,

Unit-7: One dimensional motion in step potential, Rectangular barrier,

Unit-8: Square well potential, Particle in a box, normalization Simple Harmonic Oscillator.

Block III: Atomic Spectra

Unit-8: Atomic spectra: Spectra of hydrogen, deuteron and alkali atoms, spectral terms, doublet

Unit-9: Fine structure, screening constants for alkali spectra for s, p. d, and f states, selection rules.

Unit-10: Singlet and triplet fine structure in alkaline earth spectra, L-S and J-J couplings. Weak spectra: continuous X-ray spectrum and its dependence on voltage,

Unit-11: Duane and Haunt's law. Characteristics X-rays, Moseley's law, doublet structure and screening parameters in X-ray spectra, X-ray absorption spectra.

Block IV: Molecular Spectra

Unit-12: Molecular spectra: Discrete set of electronic energies of molecules,

Unit-13: Quantization of vibrational and rotational energies, determination of inter nuclear distance,

Unit-14: Pure rotation and rotation- vibration spectra,

Unit-15: Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra **Recommended books:**

- H. S. Mani and G K Mehta; “Introduction to Modern Physics” (Affiliated East-West Press 1989). • A Beiser, “Perspectives of Modern Physics”.
- H. E. White; “Introduction to Atomic Physics”. Barrow; “Introduction to Molecular Physics”.
- R. P. Feymann, R B Leighton and M Sands; “The Feynmann Lectures on Physics, Vol. III (B I Publications. Bombay. Delhi, Calcutta, Madras).

Subject Name: Complex Analysis

Subject Code: MH-302 **Credits: 4**

Course Objectives: This course aims to provide students with a comprehensive understanding of complex numbers and functions of a complex variable. Students will develop the ability to analyze and apply complex integration, sequence and series, and their significance in mathematical contexts, promoting problem-solving and analytical skills.

Course Outcomes:

1. Apply complex number concepts, including polar and exponential forms, to solve problems.
2. Analyze complex functions for limits, continuity and differentiability.
3. Apply the Cauchy-Riemann equations and understand analytic functions.
4. Evaluate contour integrals and theorems, such as Cauchy's and Morera's theorems.
5. Solve problems involving complex sequences, series and singular points, applying the residue theorem in mathematical analysis.

Syllabus

Subject Name: Complex Analysis

Block I: Analytical Functions

Unit 1: Functions of complex variable

Unit 2: Concepts of limits, continuity and differentiability of complex functions

Unit 3: Analytic functions, Cauchy-Riemann equations (Cartesian and Polar form), Harmonic Function,

Unit 4: Orthogonal system, Power Series as an analytic function.

Block II: Transformations

Unit 5: Elementary functions, Mapping by Elementary functions

Unit 6: Linear and Bilinear transformations

Unit 7: Fixed points, Cross ratio

Unit 8: Inverse points and critical points, Conformol Transformation.

Block III: Complex Integration

Unit 9: Complex Integration, Line integral,

Unit 10: Cauchy's fundamental theorem, Cauchy's integral formula,

Unit 11: Morera's theorem, Liouville theorem,

Unit 12: Maximum Modulus theorem.

Block IV: Series of Complex Numbers

Unit 13: Convergence of a series complex term, Power series

Unit 14: Region of convergence, Radius of convergence of power series

Unit 15: Taylor's and Laurent Theorem.

Block V: Important Theorems

Unit 16: Singularities and zeros of an analytic function

Unit 17: Rouche's theorem, Fundamental theorem of algebra

Unit 18: Analytic continuation

Unit 19: Residue theorem and its applications to the evaluation of definite integrals

Unit 20: Argument principle

Recommended Books:

1. Brown and Churchill, Complex variable and Applications, McGraw Hill.
2. A. R. Vashistha, Complex Analysis, Krishna Publication.
3. S. K. Sharma and A. K. Sharma, Complex Analytic Functions, New Age International Publications.
4. R. Roop Kumar, Complex Analysis, Pearson.

Subject Name :Physics Lab-VI

Course Code: PHL-352 **Credits: 2**

Course Objectives: To acquire basic Study of Lorentz force and discrete and continuous LC transmission lines and also Study of alkali or alkaline earth spectra using a concave grating and Analysis of a given band spectrum.

Course Outcomes: After learning this course, students will be able to

1. Explain the Lorentz force.
2. Experimental conformation of Zeeman effect for determination of Lande g-factor
3. Experimental plot graph showing the variation of magnetic field.

4. Study of alkali or alkaline earth spectra using a concave grating.

List of Experiments:

1. Study of Lorentz force.
2. Study of discrete and continuous LC transmission lines.
3. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron to proton).
4. Absorption spectrum of iodine vapour.
5. Study of alkali or alkaline earth spectra using a concave grating.
6. Study of Zeeman effect for determination of Lande g-factor.
7. Analysis of a given band spectrum.
8. Study of Raman spectrum using laser as an excitation source
9. To plot graph showing the variation of magnetic field.
10. To plot the characteristics of PN-junction diode.

Recommended Books:

- D.P. Khandelwal, “A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
- S.P. Singh, “Advanced Practical Physics” (Pragati Prakashan, Meerut).
- Worsnop and Flint- Advanced Practical physics for students.

Subject Name: Communication Skills-II

Course Code: CS-302 **Credit: 4**

Course Objectives: Cultivate and develop reading and writing habit to enhance their vocabulary. Understanding necessary communication skills for effective presentation and management.

Course Outcomes

By the end of the course, students will be able to build a professional tone. It will develop goodwill among customers and enhance business writing skills also would help them compete.

Syllabus

Subject Name: Communication Skills-II

Block I. Paragraph Writing

Unit- 1 Requisites of good paragraph writing

Unit- 2 Scientific writing skills

Unit- 3 Importance of listening and hearing

Unit- 4 Effective listening skills

Block II. Personal Skills

Unit- 5 Tips for before interview

Unit- 6 Tips for during and after interview

Unit- 7 Debates

Unit- 8 Role play

Unit- 9 Office etiquettes

Unit-10 Corporative behaviour

Unit-11 Group Discussion- Tips

Block III. Letter Writing: Types and Format

Unit-12	Formal letters
Unit-13	Informal letters
Unit-14	Business letters
Unit-15	Official letters
Unit-16	Job applications

Block IV. Communication Skills

Unit-17	Definition of Communication
Unit-18	Types of Communication
Unit-19	Level of Communication
Unit-20	Flow of Communication
Unit-21	Barriers to effective Communication

Block V. Scientific writing skills

Unit-22	Techniques of scientific writing
Unit-23	Plagiarism
Unit-24	Types of reports
Unit-25	Lay out of formal report**.**

Books Reference:

- Fluency in English part-1, Macmillan, Delhi,2005, Units 1-18
- Business English, Pearson, Delhi,2008, Units 1-3
- Language through Literature (forth coming). Dr. Gauri Mishra, Dr.

5. Procedure for Admission, Curriculum Transaction and Evaluation

The proposed program in ODL mode will be conducted by CDOE-SGVU with the support of various departments of the University. Eligibility criteria, course structure, detailed curriculum, duration of program and evaluation criteria shall be approved by Board of Studies and Academic Council, SGVU, Jaipur which are based on UGC guidelines for the program which comes under the purview of ODL and Online mode forward of Degree.

Details of Procedure for admission in which eligibility criteria for admission and fee structure of the course, Curriculum includes Program delivery, norms for delivery of courses in ODL mode, use of IT services to academic support services, course design academic calendar and Evaluation which includes Distribution of Marks in Continuous internal assessments, Minimum Passing criteria and system of Grading formats are given in detail as under.

Procedure for Admission

Students who will seek admission in B.Sc..(PCM)Program to apply through its website.

Minimum Eligibility Criteria for Admission

The minimum eligibility criteria for admission in ODL and Online B.Sc.(PCM). program is a passing 12th Class from any Recognized Board.

Program Fee and Financial Assistance Policy

Program fees for students for proposed B.Sc.(PCM) in various streams offered by CDOE-SGVU Jaipur is Rs. 21000 Per year, where 18, 000 is the tuition fees and 3000 is examination fees.

Curriculum Transactions

Program Delivery

The curriculum will be delivered through the Self Learning Materials (SLMs) supported by various learning resources including audio-video aids.

Academic Calendar

S.no	Name of the Activity	Tentative months schedule (specify months)during Year			
		From (Month)	To (Month)	From (Month)	To (Month)
1	Admission	Jul	Sep	Jan	Feb
2	Assignment Submission(if any)	Oct	Nov	April	May
3	Evaluation of Assignment	Nov	Dec	May	June
4	Examination	Dec	Jan	June	Jul
5	Declaration of Result	Feb	Mar	Aug	Sep
6	Re–registration	Jan	Feb	Jul	Sep
7	Distribution of SLM	Jul	Sep	Jan	Feb
8	Contact Program (Counseling ,Practical's ,etc.)	Nov	Dec	May	June

Evaluation

The evaluation shall include two types of assessments-

1. Continuous Assessment in the form of assignments (30% Weight age)

2. End Semester Examination, which will be held at the SGVU campus (70% Weight age).

Minimum Passing percentage

The students are considered as passed in a course if they score 40% marks in the Continuous Evaluation (Internal Assessment) and end-semester Examinations (External Assessment).

Marks and Grades

Grades & Grade Points

a. At the end of the Semester / Year every student is assigned a 'Letter Grade' based on his/her performance over the semester in all courses for which he/she had registered.

b. The letter grade and grade point indicate the results of quantitative and qualitative assessment of the student's performance in a course.

c. There are seven letter grades: **A+, A, B+, B, C+, C, D, E (E1 for internal back and E2 for external back), F** that have grade points with values distributed on a 10-point scale.

6. Requirement of the Laboratory Support and Library Resources

Library Resources

CDOE-SGVU has excellent library with all the books required for the course learning and reference books for the course of B.Sc.(PCM) Adequate online learning links and e-learning materials will also be provided to students which will be support students in their learning cycle.

7. Cost Estimate of the Program and the Provisions

The Estimate of Cost& Budget could be as follows(all figures on Annual basis):

i. Salaries: Rs. 60,00,000/- (Approx)
ii. Travel: Rs. 30,000/- (Approx)
iii. Seminars: Rs. 40,000/- (Approx)
iv. SLM Preparation, Printing, Distribution: Rs. 3,00,000/- (Approx)
v. Library: 1,25,000/- (Approx)
vi. Courier/Transportation: Rs. 50,000/- (Approx)
vii. Infrastructure: Rs. 1,50,000/- (Approx)
viii. Computer Labs & Leased Line: Rs. 1,00,000/- (Approx)

8. Quality assurance mechanism and expected Program Outcomes

The quality of the program depends on the course curriculum and syllabus which meets the requirement of the industry and creates the skillful learning in the students. The ultimate aim of B.Sc.(PCM) program in ODL Mode is to enhance skill soft he learners as managers ,entrepreneurs and seeing them excel in their profession and meeting global standards too by upgrading their career opportunities.

The CDOE, SGVU, Jaipur has constituted Centre for Internal Quality Assurance (CIQA) . The CIQA will do periodic assessment of the online learning course material and audio video tutorials and will assure that the quality of learning is maintained and time to time changes are made as per the requirement of the course. The CIQA will also access the quality of assignments, quizzes and end term assessment time to time and required changes will be assured by them to maintain the quality of the learning program. CIQA will assure that the learning is made a truly global experience for the learner along with inculcation of required skills in the learner as expected program outcome with CDOE, SGVU, Jaipur.

The university will work continuously for the betterment of processes, assessments, teaching methodology, e-learning material improvisation as per four quadrant approach and implementation of the same as per New Education Policy. The University is committed to deliver the best education in all the learning modes with adherence to NEP, UGC and other regulatory guidelines in truly global sense. To monitor quality of Student Support Services provided to the learners.