

Faculty of Science & Humanities



Structure, Teaching Scheme and Syllabus of B.Sc. (Honours) Physics Sem -3 as per NEP-2020

Program Code: SC105

With effect from: 2023-24

Semester- III

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Solid State Physics & Quantum Mechanics
Course Code:	13-PHM205-2C
Pre-requisite Course:	Basics Physics up to 12 th Science.

Course Objectives:

- To understand the basic concept of atomic cohesion and crystal binding
- To understand the elastic energy density
- To understand the Basic concepts of Quantum Mechanics

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Subject contents:

Unit	Content	Lectures	Weightage
1	Atomic Cohesion and Crystal Binding: Cohesion of Atoms, Primary Bonds, The Covalent Bond, The Metallic Bond, The Ionic Bond, Mixed Bond, Secondary Bonds, The Vander wall's Bond, The Hydrogen Bond, The Cohesive Energy, Ionic Crystal, Noble Gas Crystal, Atomic Radii vs Lattice constants, Elastic constants of crystals, Elastic Stress, Elastic Energy density, Application to Cubic crystal, Bulk modulus and compressibility.	15	33%
2	Quantum Theory: Historical origin of quantum theory, difficulties with classical: models, optical spectra Black body radiation, frank-Hertz experiment, stationary states of atoms. The correspondence principal. Bohr atom, Spectroscopic series, quantization of the orbits. The elliptic orbits, Particle in a box, rigid rotator, harmonic oscillator, short coming of a old quantum theory, Compton effect, Particle diffraction, wave packets and Einstein de broge reation	15	33%
3	Heat and Thermodynamics: Reversible part of the second law(clausius theorm),Entropy, entropy of the ideal gas, TS diagram, application of the entropy of ideal gas,TS diagram, Application of the Entropy Principle. Pure substances: Volume expansitivity: cubic Expansion Coefficient, Compressibility, Mathematical methods in thermodynamics: Characterictics Functions, Enthalpy, Helmholtz & Gibbs fiunctions, two mathematical theorms, Maxwell realations, Tds equation, Internal energy equations, Heat energy equations, Heat capacity equations. Open system: Joule-Thomson expansion, Liquification of gases by the joule Thomson Expansion.	15	34%

Basic Reference book:

1. Introduction to solid state physics by C.Kittle(john Wiley)
2. Elements of solid state State Physics J.Psrivastava
3. Thermodynamics and Statistical Physics by Singhal, Agarwal and Prakash.
4. Physics- 301 semester 3 Nirav Prakashan

Physics Practical:

1. Coaxial Viscometer
2. To determine wave length of bright lines of mercury light Using Grating
3. R.P. of telescope
4. Searls Goniometer. Determination of cardinal Points and “do”
5. To Determine the high Resistance by equal method
6. To study bandwidth response of R C coupled common emitter (CE) Amplifier
7. Absolute Value of Capacity using B.G or S.G (spot Galvanometer)
8. To study elliptically polarized light using photo cell and quarter wave (Length) Plate

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=8jpqPu59edI&list=PL88pFy>
2. <https://www.youtube.com/watch?v=2WPA1L9uJqo>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the knowledge on the cohesion of atoms and crystal binding.	1 Remembering
CLO2	Discuss quantum theory	2 Understanding
CLO3	Solve the numerical related on internal energy of an ideal gas depends on its temperature	3 Applying
CLO4	Explain the Heat and thermodynamics	4 analyzing
CLO5	Justify the Joule Thomson Expansion	5 evaluating
CLO6	Design the refrigerator on the base of thermodynamics	6 creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1		2															3	
CLO2			1														2	
CLO3					3												3	
CLO4					2												1	
CLO5		1															2	
CLO6										2							2	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Plasma Physics & Electronics
Course Code:	13-PHM206-2C
Pre-requisite Course:	

Course Objectives:

1. Understand the behaviour of Plasma
2. To know the basic concept of Magnetostatics.
3. To develop an actual understanding of digital electronics

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Subject content:

Unit	Content	Total Hours	Weightage
1	The Basic concepts of Plasma: Introduction, Composition and Characteristics of a Plasma, Collisions, Elastic collisions, Inelastic collisions, Surface Phenomena, Transport Phenomena, Diffusion and Mobility, Viscosity, Conductivity, Recombination, Ohm's law, Gas Discharge, Composition of various natural and Man-made Plasma, Plasma diagnostics, Plasma waves and Instabilities Confinement of Plasma, Space Plasma.	15	34%
2	Motion of charge and velocity in Magnetic Field and electric Field Introduction: Microscopic and Macroscopic Approach, Maxwell equation of continuity, (i) Motion of charged Particle in electric and Magnetic field (ii) Larmour radius and Larmour frequency (iii) Kinetic energy, uniform magnetic field and oscillating electric field.	15	33%
3	Rectifier and filter circuits: The half wave rectifier, Voltage regulation, Ripple factor, Ratio of rectification, Transformer utilization factor, The full wave rectifier, The bridge rectifier, The inductor filter, The capacitor filter, Ripple factor, The choke input filter, Ripple factor in LC filter, Value of critical inductance, The CLC filter.	15	33%

Basic Reference book:

1. Electricity and Magnetism By K.K.Tiwari
2. Electronic Devices & Circuits by Allen Mottershead
3. Hand book of Electronics by Gupta & Kumar
4. Physics Paper 301 . semester 3, Nirav Prakashan
5. Plasma Physics By A. N. Goswami

Physics Practical:

1. Kundts tube . Determine of ‘Y’
2. Diffraction by Adser “A” Pattern
3. e/K by power Transistor
4. Absolute Value of Capacity (C1/C2) by desaulty Method
5. To determine resonant frequency and quality factor of the coil in series resonance circuits.
6. To determine resonant frequency and quality Factor of the coil in parallel resonant circuit.
7. To check truth Table of Half Adder using IC-7400
8. To check truth Table of full adder using IC-7400

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=kiuv6clAQFo&list=PLHa0rt1Ypa8oFDZGSRIfr59DpBrSerMci>
2. https://www.youtube.com/results?search_query=rectifier

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom’s Taxonomy Level
CLO1	Describe the knowledge of Plasma	1 Understanding
CLO2	Discuss Basics concept of Motion of charge and velocity in electric field and magnetic field.	2 remembering
CLO3	Solve the numerical based on rectifiers and filter circuits	3 Applying
CLO4	Compare Larmour radius and larmour frequency in plasma physics	4 Analyzing
CLO5	Evaluate the numerical part of plasma physics	5 evaluating
CLO6	Design the half wave and full wave rectifier	6 creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1		1															1	
CLO2					1												2	
CLO3	3																2	
CLO4		2			2												3	
CLO5																	2	
CLO6			3														3	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Electronics - I
Course Code:	13-PHM207-2C
Pre-requisite Course:	

Course Objectives:

1. To be able to know application of various transistor in different electronic circuit
2. Develop an actual understanding of the digital electronics
3. To be able to know the application of Solid state devices

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	-	25	100

Subject Contents:

Unit	Topic	Total Hours	Weightage
1	Digital Electronics: Introduction, Number systems used in Digital Electronics, Decimal, Binary, Hexadecimal and Octal, Binary Codes -(A) BCD, (B) Gray, (C) Excess-3 Codes, Arithmetic Circuits – Exclusive - OR Gate, Applications of X-OR Gate: (i) Binary to Gray Code Converter (ii) A Parity Checker (iii) The Half Adder (iv) The Full Adder (v) Parallel Adder (vi) Half subtractor, (vii) Full subtractor.	15	30%
2	Basic Transistors: (Review of Construction of Transistor) Transistor Current Component, Detailed Transistor Leakage Currents, (Collector to Base and Collector to Emitter Leakage Current, C-B configuration static (Input and Output) characteristics), Load Line, Operating Point. Transistor as a four pole, h-parameters with h-parameters equivalent circuit, Grounded Emitter Circuit - Mathematical analysis using h-parameters only, Comparative Study of three types of Amplifiers.	18	40%
3	Transistors Biasing and Stabilization: Bias Stabilization (Operating point stabilization), Stability factor, Stabilization by Collector Base Resistance, Stabilization by potential divider and Emitter resistor. Solid state Devices: JFET, UJT. A.C. Bridges: A.C. Bridges, Maxwell's Bridge, Schering Bridge	12	30%

Reference Books:

1. Electricity and Magnetism By K.K.Tiwari
2. Electronic Devices & Circuits by Allen Mottershead
3. Hand book of Electronics by Gupta & Kumar
4. Physics Paper 302 . semester 3, Nirav Prakashan

Physics Practical:

1. To determine Self inductance by Anderson bridge
2. Characteristics of a C.B transistor (PNP)
3. Characteristics of JFET & Determination of μ_{rd}
4. Construction of AND, OR, NOT Gates Using Nand & NOR Universal Gates
5. LDR Characteristics: Obtain characteristics of LDR
6. To determine value of an Unknown inductor by using Owens Bridge Circuits.
7. To determine wavelength of sodium light common light using Bi prism
8. To study the decay of Potential of a given capacitor and hence for determine the decay constant

List of Open Source Software/learning website:

1. https://www.youtube.com/results?search_query=digital+electronics
2. https://www.youtube.com/watch?v=_DZ7baOhNFQ

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe Various types of transistor	1 Remembering
CLO2	Discuss the Junction field effect transistor	2 Understanding
CLO3	Solve the numerical related to Transistor and Amplifier Circuits	3 Applying
CLO4	Compare about A.C bridges	4 Analyzing
CLO5	Evaluate h-parameter using Mathematical Analysis	5 Evaluating
CLO6	Design various circuits by using digital electronics	6 Creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1		2															2	
CLO2		2															2	
CLO3	3		1														3	
CLO4		2															3	
CLO5					2												1	
CLO6					3												2	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Vector space and Inner Product Space Linear Transformation
Course Code:	13-MDC232-2C
Pre-requisite Course:	

Course Objectives:

1. To understand the basic concept of Vector Space.
2. To understand the concept of Linear Transformations.
3. To be able to understand the concept of Inner Product Space.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	-	25	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Vector Space: Vector spaces, Subspaces, Span of a set, Linear dependence and Independence, Dimension and basis.	15	34%
2	Inner Product Space: Definition of inner product space, Norm, Orthogonality, Schwarz's & Triangular inequality, Parallelogram law, Orthonormal basis.	15	33%
3	Linear Transformations: Definitions and examples, Range and kernel of a linear map, Rank and nullity, Inverse of a linear transformation, The space $L(U, V)$, Composition of linear maps, Operator equations.	15	33%

Reference Books:

1. Vector Analysis, by Murry R. Spiegel.
2. An Introduction to linear algebra, by V. Krishnamurthy, JL Arora, East West Press Pvt Ltd, New Delhi.
3. Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mc Graw Hill.
4. Linear Algebra, S K Berberion, Oxford University Press.
5. Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut.
6. Linear Algebra, Gupta KP, Pragati Prakshan, Meerut.
7. Linear Algebra, G Paria, New Central book agency Ltd, Calcutta.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=uU2bT43wPJ8>
2. <https://www.youtube.com/watch?v=Li4PfR7v7n8>
3. <https://www.youtube.com/watch?v=HH2Md3dBlq4>

Practical

1. Application of Vector Space.
2. Application of Linear Transformation.
3. Application of Inner Product Space.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Use Concept of Vector Space and solve its applications.	3 Applying
CLO2	Discuss Linear Transformations.	2 Understanding
CLO3	Create various types of example depend on Inner Product Space.	6 Creating,
CLO4	Explain Schwarz's & Triangular inequality.	4 Analysing
CLO5	Define Subspaces and Solve examples depend on it.	1 Remembering 3 Applying
CLO6	Justify Linear dependence and Independence.	5 Evaluating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	1 1	1 2	1 3	1 4	1 5	1 6	PSO1	PSO2
CLO1		1		2	1				1									
CLO2	2	1	1	1			1		1									
CLO3	1	3	3	2	1	1	1			1								
CLO4	1	2	1				2		2									
CLO5		1		2	1				1									
CLO6		1		1	2	1		1		1								

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Title:	Reaction of Organic Chemistry-III
Course Code:	13-MDC233-2C
Pre-requisite Course:	

Course Objectives:

1. To develop the fundamental analytical and industrial skills to work effectively in the different fields of chemistry.
2. Learn the basic concepts of aromaticity and electrophilic aromatic substitution.
3. Learn the fundamentals of amino acids.
4. Learn and understand concepts of active methylene compounds.
5. Learn and perform the separation of binary water insoluble organic solid-solid component mixture.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	50	25	-	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Amino acids Introduction, Classification and nomenclature, Dipolar ion structure and Isoelectric point, Synthesis of amino acids (Gabriel Phthalimide, Straker, Fisher malonic ester), Reactions of amino acid.	15	33%
2	Aromaticity Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Aromaticity in benzenoid and non-benzenoid compounds and charged rings, annulenes, fulvenes, azulenes, antiaromaticity and homoaromaticity.	15	34%
3	Active methylene group compounds Introduction of tautomerism, Determination of keto-enol tautomerism, Difference between tautomerism and resonance, Synthesis and application of ethyl acetoacetate and malonic ester.	15	33%

Reference Books:

1. Organic reaction and mechanism, P.S.Kalsi, New Age international Publishers.
2. Organic Chemistry Vol. I & II, S.M.Mukherji, S.P.Singh, R.P.Kapoor.
3. Reaction mechanism in Organic Chemistry, S.M.Mukherji, S.P.Singh. 3rd edn, Macmillan.
4. Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4th edn, Himalaya Publication House.
5. Organic Chemistry, T.W.GrahamSolomons, 4th edn, John Wiley, 1998.

List of Open-Source Software/learning website:

1. <https://www.organic-chemistry.org>
2. <https://swayam.gov.in>
3. <https://nptel.ac.in>
4. <http://onlinelibrary.wiley.com>
5. https://en.wikipedia.org/wiki/Main_Page

List of Experiments:

Sr. No	Practical Exercise
1.	Separation of binary water insoluble organic solid-solid component mixture (Any 5 solid-solid mixture)

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn and understand about Huckel's rule for aromatic compounds and electrophilic aromatic substitution reactions	1-Remembering 2-Understanding
CLO2	Learn and understand the fundamentals of amino acids	1-Remembering 2-Understanding
CLO3	Learn and understand the basic concepts of active methylene group compounds	1-Remembering 2-Understanding
CLO4	Learn, understand and perform the separation of binary water insoluble organic solid-solid component mixture.	2-Understanding 3-Applying

Mapping of CLOs with POs

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1	2																	
CLO2		1			3							2						
CLO3								2										
CLO4			2								1							

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Grammar and Communication Skill-1
Course Code:	13-AEC203-2C
Pre-requisite Course:	Basics English Grammar Basics English up to F.Y.B.Sc.

Course Objectives:

1. To inculcate human values among the students through poems and prose.
2. To create an interest in literature and to develop language skills.
3. The students will become familiar with formal vocabulary that is common in academic texts.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	-	2	25	25	-	-	50

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	VOCABULARY&GRAMMARLINK Phrasal Verbs, Antonyms, Synonyms, Misspelled Words , Part Of Speech:- Noun, Pronoun, Verb, Adverb, Articles :- A, An ,The etc.	9	30%
2	SPEAKING Dialogues Writing:- 1.A dialogue between a doctor and a patient 2.A dialogue between a teacher and a student about studies 3.A dialogue between a country child and a town child 4.A dialogue between mother and daughter about studies 5.A dialogue between a shopkeeper and a customer 6.A dialogue between a traffic warden and a taxi driver 7.A dialogue between the two friends about the choice of profession	6	20%
3	READING&WRITING Letter writing (Personal & Business Letters) and invitations, Telegrams and notices, Paragraph Writing. Translation:- Translate the Accident/Incident Paragraphs given by your teacher from the English News Papers (Teacher has to give small paragraphs at least 5 to 6 paragraphs or more than that for the entire semester based on especially from the pages no. 3 & 4 of The Times of India)	6	20%
4	TEXT Glimpses of Life-An Anthology of Short Stories (Orient Black Swan) Lesson 3 to 7	9	30%

Text Books:

1. Glimpses of Life-An Anthology of Short Stories (Orient Black Swan)
2. Easy to learn English grammar by Dr.Jayesh Patel

Reference Books:

1. Very Useful Verbs book (Enka Publication)
2. Contemporary English Grammar Structure & Composition
3. Murphy R. Intermediate English Grammar(New Delhi: Cambridge University)
4. The Art of Public Speaking by Vijay Kumar.
5. The Times of India/The Indian Express 6. Business Correspondence and Report Writing by R.C Sharma & Krishna Mohan.

List of Open Source Software/learning website:

1. englishpage.com
2. epaper.timesofindia.com
3. epaperindianexpress.com
4. <https://www.youtube.com/watch?v=QdAgyD4xhY>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe how public speaking can be used to advocate or create change	1 Remembering
CLO2	Explain the goals and benefits of public speaking	2 Understanding
CLO3	Use parallel structures correctly and effectively.	3 Applying
CLO4	Identify strategies for researching and supporting a speech	4 Analyzing
CLO5	Recognize when to use visual aids	3 Applying
CLO6	Describe how public speaking can be used to advocate or create change	6 Creating

Mapping of CLOs with Pos & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1	2					3					2					3		
CLO2		1			2		1			3		1			2			
CLO3			3					2					2			2		
CLO4		2					2					2						
CLO5					2					2					2			
CLO6	1					1					1					2		

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Vacuum Pump, Pressure Gauge and Instruments
Course Code:	13-SEC210-2C
Pre-requisite Course:	Basic concept of instruments used in laboratory.

Course Objectives:

1. To Develop and actual understanding about various Instruments
2. To Know the Basic Application of Instruments
3. To Know the working of electrical instruments in Laboratory

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	-	-	50

Subject Contents:

Unit	Topic	Total Hours	Weightage
1	Vacuum Pumps, Pressure Gauges: Exhaust Pumps and their characteristics, Rotary Oil Pumps, Molecular Pump, Diffusion Pump, Other methods of Producing Low Pressures, Pressure Gauges - McLeod Gauge, Pirani Gauge, Thermocouple Gauge, Ionization Gauge, Errors in measurement: Errors of observations, Types of errors, Normal law of errors, Average, standard and probable errors, Percentage error.	15	50%
2	Instrument: Travelling Microscope, Cathetometer, and Optical bench. Objective and Eyepiece, Kellner's Eyepiece, Huygens Eyepiece, Ramsden Eyepiece, Comparison of Ramsden Eyepiece and Huygens Eyepiece, Gauss Eyepiece, Telescopes, Refracting Astronomical Telescope, Reflecting Telescope, Newton's Telescope, Other reflecting Telescopes. Electrical Instruments: Moving coil Galvanometer, Ballistic Galvanometer, Calibration of Ballistic Galvanometer using different methods, Multimeters, Digital multimeter, Earphone and Headphone. Basic Reference	15	50%

Reference Books:

1. An Advanced Course in Practical Physics by D.Chattopadhyay, P.C. Rakshit, B.SAHA, New Central Book Ltd.
2. A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu S.Chand.
3. Mechanics by D.S. Mathur S.Chand. (For Vacuum pumps)

List of Open Source Software/learning website:

1. <https://youtu.be/1Ol-O1UcqoM>
2. <https://youtu.be/MmlpgjuMRjY>
3. <https://youtu.be/YIUHndbwnZE>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the vaccum pumps and pressure gauge.	1 Remembering
CLO2	Discuss the various optical instruments used in practicals	2 Understanding
CLO3	Solve the errors in measurements.	3 Applying
CLO4	Explain various meters used in practicals.	4 Analyzing
CLO5	Justify the usage of various galvanometers in practicals.	5 Evaluating
CLO6	Design various vaccum pumps.	6 creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1		2															2	
CLO2			1														1	
CLO3	3																3	
CLO4			2														2	
CLO5			2														1	
CLO6			3														2	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Business Mathematics-III
Course Code:	13-SEC211-2C
Pre-requisite Course:	

Course Objectives:

1. To understand the concept of Logic and Set Theory.
2. To understand the basic concept of Permutation and Combinations.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	--	--	50

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Logic: [only examples] Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements. Set Theory: [only examples] Definition and methods of sets, types of sets, Venn diagrams, Operations on sets, De-Morgan's law, Finite and infinite sets.	15	50%
2	Permutations and Combinations: [only examples] Fundamental rules of counting, Definition of Permutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results and examples.	15	50%

Text Books:

1. HSC, Gujarat State Board.

Reference Books:

1. Business Mathematics by. D.C.Sancheti & V.K.Kapoor, Sultan Chad & Sons Publication, New Delhi.
2. Business Mathematics by. B.S.Shah Prakashsan, Ahmedabad.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=6kYngPvoGxU>
2. <https://www.youtube.com/watch?v=tnF9f3zCCKI>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain basic concept of Logic.	2 Understanding
CLO2	Discuss basic concept of Set Theory.	2 Understanding
CLO3	Solve example depend on Permutations.	3 Applying
CLO4	Describe Combinations.	1 Remembering
CLO5	Discuss Logical Statement and solve example of its.	2 Understanding 3 Applying
CLO6	Explain Circular Permutations.	4 Analysing

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1	1	2	1		1	1	1	1		1								
CLO2	1	1	2		1		1			1	1					1		
CLO3	1	2	1		1								1					
CLO4	1	1	1		1								1					
CLO5	2	1	1			1	1	1		1								
CLO6	1	2	1		1								1					

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Title:	Green Chemistry
Course Code:	13-SEC212-2C
Pre-requisite Course:	

Course Objectives:

1. To meet the growing demand of Specialization and Advanced Courses in applied science.
2. To make student understand about different terms use in green chemistry.
3. To learn about the basic concepts about green chemistry.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	-	2	25	25	-	-	50

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Introduction to Green Chemistry Basic Principles of Green Chemistry ; Challenges --pollution control and pollution, Green methods, green products, recycling of waste, International organizations promoting green chemistry, Importance of PTC, Ionic Liquids, Ultrasound assisted reactions.	15	50%
2	Designing Green Synthesis Choice of starting materials, choice of reagents, choice of catalysts, Bio catalysts, polymer supported catalysts, choice of solvents, Synthesis involving basic principles of green chemistry, Ultrasound assisted reactions: Esterification, saponification, substitution reactions, Alkylation, oxidation, reduction, coupling reaction, Cannizaro reaction, Strecker synthesis, Knoevenagel Reaction, Reformatsky reaction.	15	50%

Reference Books:

- 1.V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalaya Publishers (2005).
2. P.T. Anastas& J.K. Warner: Oxford Green Chemistry- Theory and Practical, University Press (1998).
3. A.S. Matlack: Introduction to Green Chemistry, Marcel Dekker (2001).

List of Open-Source Software/learning website:

1. <http://onlinelibrary.wiley.com>
2. https://en.wikipedia.org/wiki/Main_Page

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn and understand basic principles of green chemistry	1-Remembering 2-Understanding
CLO2	Learn and understand pollution control and waste management.	1-Remembering 2-Understanding
CLO3	Understand the impoprtants of green products and learn choice appropriate assemblies for synthesis.	1-Remembering 2-Understanding
CLO4	Learn different types of green reactions.	2-Understanding 3-Applying

Mapping of CLOs with POs

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2
CLO1	2																	
CLO2		1			2							2						
CLO3								1										
CLO4			1								1							

1: High, 2: Medium, 3: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Vedic Mathematics
Course Code:	13-IKS102-2C
Pre-requisite Course:	

Course Objectives:

1. To understand the basic concept of Subtraction by Mental Calculation.
2. To understand the concept of Multiplication by Mental Calculation.
3. To be able to understand the Mental Calculation and Questions of Reasoning.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
-	-	4	2	--	--	25	25	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Complement, Subtraction and Multiplication by specific numbers. • Complement of number • Starting Complements from the Middle of the Sum. • Leaving Complements in the middle of the Sum. • Some special and general case of subtraction. • Multiplication by 11 & 12 & 9 Key Words: Subtraction, Complement, Multiplication.	30	50%
2	Multiplication and Working Base Multiplication • Base Multiplication. • Multiplication of Numbers more than the Base. • Multiplication of One more and one less than the base number. • Working Base Multiplication. • Multiplication of 2, 3, 4 Digit number. Key Words: Multiplication, Base, Working base.	30	50%

Reference Books:

- 1) Vedic Mathematics for All Ages by Vandana Singhal: Motilal Banarsidass Publisher private limited-Delhi, 2008.
- 2) Vedic Mathematics by Bharti Krishna Tirthji Maharaj : Motilal Banarsidass Publisher private limited-Delhi, 1965.

List of Open Source Software/learning website:

1. https://www.youtube.com/watch?v=eyLsbv8E4Kg&list=PLVLoWQFkZbhUFSIAjbWPVv_mlAAX8BBD1
2. <https://www.youtube.com/watch?v=X98-TJRMZRk&pp=ygUzc3VidHJhY3Rpb24gYW5kIG11bHRpcGxpY2F0aW9uIGJ5IHZlZGljIG1hdGhlcWF0aWNz>