

SANKALCHAND PATEL UNIVERSITY, VISNAGAR

Faculty of Science & Humanities



**Structure, Teaching Scheme and Syllabus of
B.Sc. (Honours) Physics Sem 4 as per NEP-2020**

Program Code: SC105

With effect from: 2023-24

SEMESTER- IV

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Quantum, Classical and Mathematical Physics-I
Course Code:	14-PHM208-2C
Pre-requisite Course:	

Course Objectives:

1. To understand the basic concept of Mathematical physics
2. To know the basic concept of equation of classical mechanics
3. To understand the use of Schrödinger equations in various fields.

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	Total Hours	Weightage
1	Physical Interpretation and Condition on Ψ: Conservation of Probability, Expectation values, Ehrenfest's Theorem, Admissibility Condition on the Wave function. Stationary States and Energy Spectra Stationary states: The time Independent Schrödinger Equation, A particle in a square well potential, Bound States in a square well ($E > 0$), The square well: Non localized states ($E > 0$).	15	33%
2	Classical Mechanics: Equation of motion (a) Motion Under constant Force (b) Motion under a force which depend on time only (d) Case (1) Motion of Particle subjected to Resistive force Case (2) Motion of Particle falling under the action of gravity near the surface earth, Mechanics of system of Particles, Angular Momentum of the system, (a) Energy of the system, (b) Kinetic energy of the system, (c) Motion of system with variable mass, Related Examples	15	34%
3	Fourier series: Introduction, Periodic functions, Application of Fourier series, Average values of a function, Fourier Co-efficient, Dirichlet's conditions, Complex form of Fourier series, Parseval Theorem. Related examples	15	33%

Basic Reference book:

1. Introduction to classical mechanics by R.G Takwalwe and P.S.Purani.
2. Element of properties of metal By D.S Mathur
3. Quantum mechanics by P M Mathews
4. Mathematical Physics by B.D.Gupta
5. Physic Paper 402. Semester 4 Nirav Prakashan

Physics Practical:

1. Resonance Pendulum. Determination of 'l', 'r' & 'a'
2. Study of X-ray diffraction(Powder) Pattern
3. Decay of Temperature when body is allowed to cool.(thermocouple)
4. To study Characteristics of UJT. Plot graph $V_E - \rightarrow I_E$
5. Low resistance by projection method.
6. To find the wave length of given monochromatic Source (newton ring)
- 7.To find the frequency response of a R.C Coupled emitter
- 8.Melde experiments(i) to prove p^2 Constant

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=OKn6Mb9xtYU>
2. <https://www.youtube.com/watch?v=Mw3I-a-QOXo>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the Conservation of Probability	1 Remembering
CLO2	Discuss the Motion under constant force which depend on time only	2 Understanding
CLO3	Illustrate the numerical part related to Classical and Mathematical physics.	3 Applying
CLO4	Explain Mechanics of system of particles	4 Analyzing
CLO5	Justify the time independent Schrödinger equation	5 Evaluating
CLO6	Evaluate the complex form of fourier series	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			2														2	
CLO3	3																1	
CLO4			2														2	
CLO5			2														2	
CLO6			1														3	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Solid state and statistical mechanics-I
Course Code:	14-PHM209-2C
Pre-requisite Course:	Basics Physics up to 12 th Science.

Course Objectives:

1. To understand the basic concept of Crystallography
2. To know the basic concept of crystal structure
3. To understand the use of Statical ensemble in various fields.

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	Total Hours	Weightage
1	Crystallography: single and polycrystalline crystals, symmetry conditions, periodicity in crystals, unit cell, representation of Planes, spacing of Planes in crystal lattice, symmetry elements, symmetry groups, point groups, space group, characteristics of space group, determination of space group, classification of crystals, bravaice lattice on two dimensions, braviace lattice in three dimension	15	34%
2	Crystal diffraction: Different crystal structures, hexagonal closed packed structure, FCC, BCC and simple cubic structure, diamond structure. The incident beam, Bragg law, experimental diffraction, Laue method, Rotating crystal method, powder method, reciprocal lattice vector, diffraction condition, geometrical structure factor of simple cubic crystal, BCC and FCC Lattice	15	33%
3	Macroscopic and microscopic states: Macroscopic states, μ -space, r- spaces, postulate of equal a priori probabilities, ergodic hypothesis, density in phase and principle of conservationin Phase, condition for statistical equilibrium Statistical ensembles: Microcanonical ensemble, canonical ensemble, mean value and fluctuations, Grand canonical ensembles, Fluctuation in the number of particles of a system in a grand canonical ensemble	15	33%

Basic Reference book:

1. Introduction to solid state Physics by c. kittle, wiley Prakashan
2. solid state Physics by saxena, Pragati Prakashan
3. Solid state Physics By C.M ,Kachhawa
4. Physics Paper 401 semester 4. Nirav Prakashan
5. Statistical mechanics by B.B Laud

Physics Practical:

1. To determine λ using Hartzmann Formula
2. Activation Energy of semiconductor
3. Absorption Coefficient of Liquid using Photocell
4. Study of B.G: To Determine Current Sensitivity, volt sensitivity, figure of merit and R_g of B.G
- 5.to study variation I_c and V_{Ce} with temperature in fixed bias circuit and collector to base bias circuit
- 6.To study the characteristics of field effect Transistor
- 7.To check truth Table of Half adder using IC-7400
8. Melde experiments to prove P/L constant

List of Open Source Software/learning website:

1. https://www.youtube.com/watch?v=ZhneRTIQcJo&list=PLTRfC2ohxTauiO03RgT_ps_bicjD19Pbb
2. <https://www.youtube.com/watch?v=KMcsjCXfLQw&list=PLfIFNJ1DPG4nRlP5qsXn1UWTgAyyzE6>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the Single and polycrystalline Material	1 Remembering
CLO2	Discuss the Simple cubic structure	2 Understanding
CLO3	Application of Bragg laws in Crystallography	3 Applying
CLO4	Explain crystal diffraction, statistical ensemble and Macroscopic states	4 Analyzing
CLO5	Justify the methods use to find the crystal structure	5 Evaluating
CLO6	Demonstrate ensembles in statistical 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		1															1	
CLO2			2														2	
CLO3	3																2	
CLO4			2														3	
CLO5				2													2	
CLO6			3														3	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Title:	Nuclear Physics
Course Code:	14-PHM210-2C
Pre-requisite Course:	

Course Objectives:

- To understand the basic concept of radioactivity and nuclear reaction
- To know the basic concept of Atomic spectrum
- To understand the use of Nuclear instruments in various fields.

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	Nuclear instruments: Introduction. Interaction between particles and matter, detectors for Nuclear particles (i) proportional counter (ii) scintillation counter (ii) solid state or semiconductor detectors, Particle accelerators: Need for an accelerator of charged particles: (i) The cyclotron (ii) synchrotron	17	33%
2	Radioactivity: (Review of Radioactive decay laws, half life, mean life time etc.) Radioactive growth and decay, Ideal equilibrium Transient equilibrium and secular equilibrium Radioactive series The Q- Equation: Introduction, Types of Nuclear Reactions, The Balance of Mass and Energy in Nuclear Reactions, The Q-Equation, Solution of the Q-Equation.	11	34%
3	Atomic spectra: Hydrogen atom spectrum, orbital and Magnetic dipole moment. Space quantization, electron spin, vector model of atom, spectroscopic terms and their notations, Stark effect, Zeeman effect, Pauli exclusion principle. Zeeman effect normal Zeeman effect and anomalous Zeeman effect, explanation of normal Zeeman effect, explanation of anomalous Zeeman effect, Paschen-Bach effect, Stark effect, characteristics of x-ray Spectrum, Moseley's law, width of spectral lines	17	33%

Reference Books:

1. Elements of Nuclear Physics by M.L.Pandya & R.P.S.Yadav Kedarnath Ramnath Meerut
2. Nuclear physics by Kaplam
3. Nuclear Physics By S.B.Patel
4. Atomic Physics by J.B.Rajam (5th Edition -1960) S.Chand & Co
5. Physics Paper 402 Semester 4 Nirav Prakashan

Physics Practical:

1. High Resistance by equal deflection Method
2. Low Resistance by Carry Foster Bridge
3. To Determine Low value of 'C' using Schering Bridge
4. Characteristics of UJT & Determination of RBB, VD & η
5. Characteristics of a photodiode
6. To Verify De Morgan Theorems Using IC-74
7. To measure h- parameter of Transistor using CE Configuration
8. To determine the wave length of Prominent lines of Mercury spectrum by grating

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=m2jp0klZHEE>
2. <https://www.youtube.com/watch?v=xNz5FBfUUDY>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the Radioactivity.	1 Remembering
CLO2	Discuss the detector and accelerator for Nuclear Physics.	2 Understanding
CLO3	Solve the Numerical Part related to the nuclear physics and radioactivity	3 Applying
CLO4	Compare various Particle accelerators	4 Analyzing
CLO5	Evaluate the Q-Equation	5 Evaluating
CLO6	Learning of the electromagnetic radiation of atoms during Atomic spectra	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															2	
CLO2			2														2	
CLO3	3																2	
CLO4			2														3	
CLO5			1														2	
CLO6				2													3	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Abstract Algebra
Course Code:	14-MAE203-2C
Pre-requisite Course:	

Course Objectives:

1. To understand the concept of Group.
2. To be able to understand concept of Transportation and Cycle.
3. To understand concept of Kernel of Homomorphism.

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	Definition of a Group and illustrations, Elementary property of a Group, Equivalent definitions of a Group, Generalized form of Associative Law, Finite Groups and their tables, Definition of a Subgroup and illustrations, Lagranges theorem and its applications.	15	34%
2	Properties of a cycle groups, Isomorphism of cyclic groups, Subgroup of a cycle group, Generator of a cycle group, Definition of a Homomorphism and its illustrations, Kernel of Homomorphism, Cayley's Theorem, Isomorphism of group, Groups of order four and six.	15	33%
3	Definition of a Permutation and illustrations, Transpositions and cycle, definition of a Normal subgroup and illustrations, Quotient group, Definition of an isomorphism of a group and its illustrations.	15	33%

Reference Books:

1. Abstract Algebra, I H Sheth, Prentice Hall of India (PHI) Publication.
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
3. Basic Algebra Vol I & II, N. Jacobson, Hindustan Publishing company.
4. A text book of Modern Algebra, Shanti Narayan, S. Chand & Co.
5. Basics Abstract Algebra, (second Edition), P.B.Bhattacharya, S.K.Jain, S R Nagpal, Cambridge University Press.
6. University Algebra, N.S. Gopalkrishna, Wiley Eastern, New Delhi
7. Algebra, MacLane Saunders and Birkhoff Garrett, MacMillan, New York.
8. Introduction to Topology and Modern Analysis, G.F.Simmons, MacGraw Hill Inc., U.S.A.
9. Abstract Algebra, 3rd edition, David S. Dummit, Richard M. Foote, John Wiley & Sons Inc.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=JGBBEPLHXYU>
2. <https://www.youtube.com/watch?v=ePALDom47TQ>
3. <https://www.youtube.com/watch?v=FvRevDhelkA>

Practical

1. Application of Group and Subgroup.
2. Application of Lagrange's theorem.
3. Application of Permutation, Transpositions and cycle.
4. Application of Normal subgroup.
5. Application of Homomorphism of group.
6. Application of Isomorphism of group.
7. Application of Cyclic of group.

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Use Group Theory and solve its applications.	3 Applying
CLO2	Discuss Permutation, Normal subgroup and Quotient group.	2 Understanding
CLO3	Create various examples of Homomorphism.	6 Creating,
CLO4	Justify Group and Subgroup.	5 Evaluating
CLO5	Describe Isomorphism of cyclic groups.	1 Remembering
CLO6	Explain Cayley's Theorem.	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	1		1				1									
CLO2	1		1	1	2		1		2									
CLO3	1	3	3	1	2	1	2		1	1								
CLO4	1	2		1	2	1	1		1									
CLO5	1	1		1					1									
CLO6		1		1	1													

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Title:	Chemistry of Organic Compound-III
Course Code:	14-CHE203-2C
Pre-requisite Course:	Basic Chemistry up to S.Y.B.Sc. (Semester-3)

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 cycloalkanes.
3. Learn the fundamentals of ultraviolet spectroscopy.
4. Learn and understand concepts of carbohydrates.
5. Learn and understand and perform the binary water soluble/insoluble organic solid-solid/solid-liquid/liquid-liquid 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	Ultraviolet-Visible Spectroscopy: Type of electronic transitions, Effect of conjugation, Concept of Chromophore and Auxochrome. Bathochromic, Hypsochromic, Hyperchromic, and Hypochromic shifts, Woodward –fisher rules, Problems of conjugated enes, enones and aromatic ketones, aldehydes, acids and esters using empirical rules.	15	34%
2	Saturated Cyclohydrocarbons: Nomenclature, Physical and Chemical properties, Preparation methods, Bayer's Strain theory, Orbital picture of angle strain [Coulson and Moffitt's modification (Bent bond/Banana bond)], Sachse Mohr's Concept of Strainless Rings Theory, Heats of combustion and relative stabilities of Cycloalkane.	15	33%
3	Carbohydrates: Introduction, Definition, Classification of Mono Sacharides, Nomenclature, Reactions of Glucose and Fructose (Methylation, Acetylation, Oxidation with Br ₂ water and Conc.HNO ₃ , Reaction with HCN, NH ₂ OH, Osazone formation and Epimerization.	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.Mukhergi, 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.Graham Solomons, 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 soluble/insoluble organic solid-solid/solid-liquid/liquid-liquid component mixture (Any 5 solid-solid/solid-liquid/liquid-liquid 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 basic concepts of cycloalkanes.	1-Remembering 2-Understanding
CLO2	Learn and understand the fundamentals of Ultraviolet spectroscopy.	1-Remembering 2-Understanding
CLO3	Learn and understand the basic concepts of carbohydrates.	1-Remembering 2-Understanding
CLO4	Learn, understand and perform the binary water soluble/insoluble organic solid-solid/solid-liquid/liquid-liquid 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	1																	
CLO2		1			2							2						
CLO3								1										
CLO4			2								1							

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
ProgramCode:	SC105
CourseName:	Grammar and Communication Skill-II
CourseCode:	14-AEC204-2C
Pre-requisiteCourse:	Basics English Grammar Basics English up to S.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 Prefix-Suffix, Gerund and Participle, Concord, Apply capitalization and comma use rules. Sentences: Simple Sentences, Compound Sentences, Complex Sentences.	9	30%
2	SPEAKING conversations:- College/School related conversations:- Parent – teacher, Advice from a teacher, Admission to a college , Getting ready for a school trek. Family conversations:- A family get together , Cleaning the house , Sharing the day's experiences Job related Enquiries:- Job seekers' course , Job seekers - a discussion , Job opportunities , Short courses during a vacation	6	20%
3	READING&WRITING:Paragraph Writing. List of Topics for Paragraph Writing: Personal: (a) My Ambition in Life (b) India - My Country (c) College Life (d) My Favorite Movie State/ nation/ media: (a) My City/ Village (b) My Favorite Sports person (c) Gandhi Ashram (d) Importance of English in India Environment/ social life: (a) Pollution (b) Traffic Awareness (c) Trees – Our Best Friends (d) Gender Discrimination 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 8 to 12	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	3					2					2					3		
CLO2		2			2		1			2		1			2			
CLO3			3					1					3			2		
CLO4		2					3					2						
CLO5					2					2					3			
CLO6	1					1					1					2		

3:High, 2:Medium, 1:Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Sound Engineering
Course Code:	14-SEC215-2C
Pre-requisite Course:	

Course Objectives:

1. Develop and actual Understanding about acoustics
2. To Know the basic Factor effecting acoustic of Building and their remedies
3. To know Microphone appliances in physical world.

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	Sound: Microphones,CarbonMicrophone,Condenser,Microphone,Loudspeaker-(i) Fixed coil or moving iron type loudspeaker and (ii) Moving coil type loudspeakerRecording of sound: Miller Phonodiek, phonograph-recording and reproduction	15	50%
2	Architectural Acoustics: Introduction Classification of sound, Classification of audible sound Intensity Intensity level, LoudnessAbsorption coefficient, Reverberation and reverberation time. Measurement of aborsption coefficient , Factors Affecting Acousticas of Building and their Remedies	15	50%

Reference Books:

1. A Textbook of Oscillations, Waves and Acoustics
2. Engineering Physics by G Vijayakumari, Vikas Publishing house pvt LTD
3. Engineering Physics by N. Avadhanulu, S. Chand & company

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=yQL5b-aNCKU>
2. <https://www.youtube.com/watch?v=11w5zELCaTg>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the Microphones.	1 Remembering
CLO2	Discuss the construction of Loud speaker.	2 Understanding
CLO3	Compare the Carbon MicroPhone, Condenser and Loud speaker	3 Applying
CLO4	Explain the loudness of Absorption coefficient	4 Analyzing
CLO5	Evaluate the factors affecting Acoustics of Building and their Remedies	5 Evaluating
CLO6	Design the auditorium using Acoustic Effect of sound	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		3															2	
CLO3					2												3	
CLO4						1											1	
CLO5					2												2	
CLO6			3														3	

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
Program Code:	SC105
Course Name:	Business Mathematics-IV
Course Code:	14-SEC216-2C
Pre-requisite Course:	

Course Objectives:

1. To understand basic concept of Laplace Transforms and its Properties.
2. To understand basic concept of Inverse Laplace Transforms.
3. To know about Convolution Theorem.

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	Laplace transform- Definition and its properties. Rules of manipulation. Laplace transform of derivatives and integrals.	15	50%
2	Properties of inverse Laplace transform. Convolution theorem. Solve Differential equation using Laplace Transforms.	15	50%

Reference Books:

1. The Laplace Transform: Theory and applications, by Joel L. Schiff.
2. Schaum's outline of Laplace Transforms, by Murray Spiegel.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=9RJml41PFn>
2. https://www.youtube.com/watch?v=FdVS3tSilZ4&list=PLNKD1qB9pptsco8EAskJWARKrXQze2r_Y

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe basic concept of Laplace Transforms and its Properties.	1 Remembering
CLO2	Explain Laplace Transforms for derivatives and Solve its example.	4 Analysing 3 Applying
CLO3	Illustrate Laplace Transforms for Integrals.	3 Applying
CLO4	Describe Properties of Inverse Laplace Transforms.	1 Remembering
CLO5	Discuss Convolution theorem.	2 Understanding
CLO6	Solve Differential equation using Laplace Transforms.	3 Applying

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	1			1	1												
CLO2	2	2			1	1												
CLO3	2	1			1	1												
CLO4	1	2			1	1												
CLO5		1			1	1												
CLO6	1	2			1	2												

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Physics
ProgramCode:	SC105
CourseName:	Environmental Science
CourseCode:	14-VAC202-2C
Pre-requisiteCourse:	Basic knowledge of 11-12 th Science

Course Objectives:

1. To provide students with a broad interdisciplinary liberal arts framework for understanding the relationship between humans and their environment.
2. To prepare students for careers, citizenship and environmental stewardship through experiential curricular and co-curricular opportunities.
3. To equip students with the knowledge and skills necessary to pursue professional careers and advanced study related to the multi-faceted nature of environmental studies.
4. Students by offering this course will get proper understanding of important aspects that affects environment and ecology

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	Content	Total Hours	Weightage
1	Introduction to Environment and Environmental Studies: Definition and Components of Environment, Relationship between the different components of Environment, Man and Environment relationship, Impact of technology on Environment, Environmental Degradation, Multidisciplinary nature of the Environment studies, its scope and importance in the present day Education System Ecology and Ecosystems: Introduction: Ecology- Objectives and Classification , Concept of an ecosystem- structure and functions of ecosystem Components of ecosystem- Producers, Consumers, Decomposers Bio-Geo- Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs ,Ecological Pyramids Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem, Estuarine Ecosystem.	15	50%
2	Human Population and Environment: Population Growth, World and Indian scenario, Population and Environmental Degradation, Malthusian theory, Optimum theory, Population explosion – Causes, Effects and Control. Urbanization: Urban population growth and Environmental problems Environmental pollution: Types of Environmental Pollution: 1) Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution: Industrial ,Agricultural, Municipal; Classification of water pollutants, Effects of water pollutants, Eutrophication 2)Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO ₂ , NO _x , Natural & Anthropogenic Sources, Effects of common air pollutants 3) Land Pollution: Land uses ,Land degradation: causes, effects and control, soil erosion 4) Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects 5) Thermal Pollution: Causes and effects Role of individual in the prevention of pollution	15	50%

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.

Reference Books:

1. Basics of Environmental Studies by Prof Dr N S Varandani ,2013 Publisher: LAP -Lambert Academic Publishing, Germany
2. Environmental Studies by Anindita Basak ,2009 Publisher: Dr ling Kindersley (India) Pvt. Ltd Pearson
3. Textbook of Environmental Studies by Deeksha Dave & S SKateva, Cengage Publishers.
4. Environmental Sciences by Daniel B Botkin& Edward A Keller Publisher: John Wiley & Sons.
5. Environmental Studies by R. Rajagopalan, Oxford University Press
6. Environmental Studies by Benny Joseph, TMH publishers
7. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S K Kataria& Sons New Delhi
8. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill

List of Open Source Software/learning website:

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=0Xvq9yUM2ILDrJ07FvIArQ==>
2. <https://nptel.ac.in/courses/120108004>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Use critical thinking, problem-solving, and the methodological approaches of the social sciences, natural sciences, and humanities in environmental problem solving	3 Apply
CLO2	Demonstrate an integrative approach to environmental issues with a focus on sustainability;	2 Understanding
CLO3	Communicate complex environmental information to both technical and non-technical audiences.	2 Understanding 3 Apply
CLO4	Understand and evaluate the global scale of environmental problems.	1 Remembering 2 Understanding
CLO5	Predicting the consequences of human actions on the web of life, global economy and quality of human life	1 Remembering 2 Understanding
CLO6	Adopting sustainability as a practice in life, society and industry	2 Understanding

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													3	1				
CLO2		2			3	1						2		1				
CLO3				1						3				1		2		
CLO4	1											3		1				
CLO5							2							1				
CLO6			3					1						1				

3: High, 2: Medium, 1: Low

Branch Name:	B. Sc Physics
Program Code:	SC105
Course Title:	Integrated Personality Development Course
Course Code:	14-VAC203-2C
Pre-requisite Course:	Zeal to Learn the Subject

Course Objectives:

1. To provide students with a holistic education – focused on increasing their intelligence quotient, spiritual quotient, emotional quotient and physical quotient.
2. To provide students with hard and soft skills, making them more marketable when entering the workforce.
3. To educate students on their social responsibilities as citizens of India and have a greater sense of social responsibility.
4. To provide students with a value-based education this will enable them to be successful in their family, professional, and social relationships by improving their moral and ethical values.
4. To teach self-analysis and self-improvement exercises to enhance the potential of the participants.
5. To have a broader sense of self-confidence and a defined identity

Teaching and Examination Scheme:

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

Course Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: The Need for Values Remaking Yourself: Restructuring Yourself, Power of Habit Learning from Legends: Tendulkar & Tata From House to Home: Listening & Understanding	20	34%
2	Facing Failures: Welcoming Challenges, Significance of Failures My India My Pride: Glorious Past - Part 1, Glorious Past - Part 2 Learning from Legends: A.P.J. Abdul Kalam Soft Skills: Networking & Leadership, Project Management	20	33%
3	Remaking Yourself: Handling Social Media Facing Failures: Power of Faith From House to Home: Bonding the Family Selfless Service: Seva	20	33%

Text Books:

1. IPDC Workbook-1 (Presented by B.A.P.S. Swaminarayan Sanstha)

Reference Books:

1. Thomas Edison's factory burns down, New York Times Archives, Page 1, 10/12/1914
2. Playing It My Way: My Autobiography, Sachin Tendulkar, Hodder & Stoughton, 2014
3. The Rise of Civilization in India and Pakistan, Raymond Allchin, Bridget Allchin, Cambridge University Press, 1982
4. Seven Habits of Highly Effective Teens, Sean Covey, Simon & Schuster, 2012

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

CLO	Description	Bloom's Taxonomy Level
CLO1	To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.	1 Remembering 2 Understanding 3 Applying
CLO2	To give the students the tools to develop effective habits, promote personal growth, and improve their wellbeing, stability, and productivity.	1 Remembering 2 Understanding 3 Applying
CLO3	To allow students to establish a stronger connection with their family through critical thinking and devolvement of qualities such as unity, forgiveness, empathy, and effective communication.	1 Remembering 2 Understanding 3 Applying
CLO4	To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.	1 Remembering 2 Understanding 3 Applying
CLO5	To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.	1 Remembering 2 Understanding 3 Applying
CLO6	To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.	1 Remembering 2 Understanding 3 Applying

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	1			1			
CLO2		1		2			1				1	2			2			
CLO3		1	2				1				2	2	1		2			
CLO4											3	1	2		1			
CLO5								2			1	2		3	2			
CLO6								1			2	3						

3: High, 2: Medium, 1: Low