

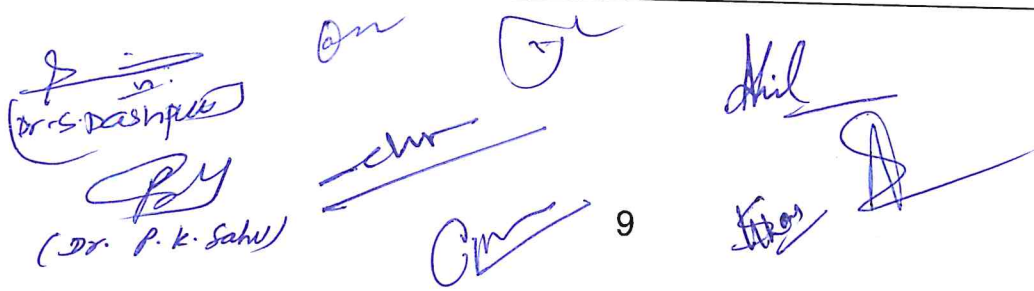
FOUR YEAR UNDER GRADUATE PROGRAM(2024-25)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction		
Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - IV
		Session:2024-2025
1	Course Code	MASC-04
2	Course Title	Abstract Algebra
3	Course Type	Discipline Specific Course (DSC)
4	Pre-requisite(if any)	Knowledge of algebra, vector space and inner product space.
5	Course Learning Outcome (CLO)	<ul style="list-style-type: none"> ➤ Understand of Homomorphism, Isomorphism of Group ➤ Understand Cyclic and Permutation Groups. ➤ Understand vector spaces, subspaces, basis, dimension and their properties. ➤ Learn about properties of linear transformation and isomorphism theorems. ➤ Understand the concept of linear transformations.
6	Credit Value	4 C
7	Total Marks	1Credit = 15 hours- Learning and Observation
		Maximum Marks : 100
		Minimum Passing Marks:40

Part B: Content of the Course

Total no of teaching – learning period =60 Periods (60 Hours)

UNIT	Topics	No of Periods
I	Isomorphism Theorems , Cyclic and Permutation Groups : Group homomorphism and isomorphism with properties; First, second and third isomorphism theorems for groups, Cyclic groups and properties, Classifications of subgroup of cyclic groups, Permutation group and properties, Even and odd permutations, Cayley's theorem.	15
II	Ring, Field and Integral Domain, Ideals: Definition and properties of a ring, example of rings, Subrings, Integral domain and fields, characteristic of ring and field. Ring Homomorphism, Ideals and Quotient Rings. Field of Quotients of an Integral Domain, Euclidean Rings, Polynomial Rings, Polynomials over the Rational Field. The Eisenstein Criterion, Polynomial Rings over Commutative Rings, Unique factorization domain. R unique factorization domain implies so is $R[x_1, x_2, \dots, x_n]$.	15
III	Vector Spaces: Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces, Linear span. Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.	15



 (Dr. S. Dashputra)

 (Dr. P. K. Sahu)

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IV	Linear Transformation: Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bi-dual space and natural isomorphism. Adjoint of a linear transformation.	15
Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Text Books Recommended-		
<ol style="list-style-type: none"> 1. Nathan Jacobson (2009). <i>Basic Algebra I</i> (2nd edition). Dover Publications. 2. Nathan Jacobson (2009). <i>Basic Algebra II</i> (2nd edition). Dover Publications. 		
Reference Books Recommended-		
<ol style="list-style-type: none"> 3. I. M. Gel'fand (1989). <i>Lectures on Linear Algebra</i>. Dover Publications. 4. Kenneth Hoffman & Ray Kunze (2015). <i>Linear Algebra</i> (2nd edition). Prentice-Hall. 5. Serge Lang (2005). <i>Introduction to Linear Algebra</i> (2nd edition). Springer India. 6. Gilbert Strang (2014). <i>Linear Algebra and its Applications</i> (2nd edition). Elsevier 		
E-resources: https://onlinecourses.nptel.ac.in https://epqp.inflibnet.aci.in https://swayam.gov.in https://www.mooc.org		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks		
Continuous Internal Assessment (CIA):		30 Marks
End Semester Examination (ESE):		70 Marks
Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
End Semester Examination (ESE)	Two Section-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-



 Dr. S. Rashpreet
 Dr. P. K. Sahu
 Dr. Anil Kumar Khatiwala
 Dr. Anil
 M. White
 C. M.
 A.

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - IV	Session:2024-2025
1	Course Code	MASE-02	
2	Course Title	MECHANICS	
3	Course Type	Discipline Specific Elective (DSE)	
4	Pre-requisite(if any)	Basic idea of Statics and Dynamics	
5	Course Learning Outcome (CLO)	<p>This Course will enable the students to:</p> <ul style="list-style-type: none"> ➤ The object of the paper is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces. ➤ Learn about a nul point, a nul line, and a nul plane with respect to a system of forces acting on a rigid body together with the idea of central axis. ➤ Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body. Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight. ➤ Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles. Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton. ➤ Understand the reduction of force system in three dimensions to a resultant force acting at a base point and a resultant couple, which is independent of the choice of base of reduction. 	
6	Credit Value	4 C	1Credit =15 hours-Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course		
Total no of teaching – learning period =60 Periods (60 Hours)		
UNIT	Topics	No of Periods
I	Analytical conditions of equilibrium of Coplanar Forces. Forces in three dimensions, Poinot's central axis, Wrenches, Null lines and planes.	15
II	Virtual work, Stable and Unstable equilibrium, Catenary.	15
III	Velocities and accelerations along and transverse directions, and along tangential and normal directions, Simple harmonic motion, Motion under other law of forces. Elastic strings.	15

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(Dr. P. K. Sahu)

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IV	Motion in resisting medium, Constrained motion, Motion on smooth and rough plane curves. Motion of particles of varying mass, Central orbit, Keplers laws of motion, Rocket motion, Motion of particle in three dimensions.	15
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Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. R.S. Verma (1962). a text books of statics Pothishala Pvt. Ltd.
2. P.L. Shrivastava (1964). Elementary dynamics. Ram Narayan Lal, Beni Prasad Publishers Allahabad

Reference Books Recommended-

3. A.S. Ramsey (2009), Statics, Cambridge University Press
4. A.S. Ramsey (2009), Dynamics, Cambridge University Press
5. S.L. Loney (2006) , An Elementary Treatise on the dynamics of a partical and of rigid bodies. .
6. J.L. Synge an Griffith (1949). Principal of Mechanics, McGraw-Hill.

E-Recourses:

- <https://onlinecourses.nptel.ac.in>
<https://epqp.inflibnet.aci.in>
<https://swayam.gov.in>
<https://www.mooc.org>

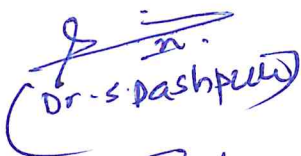
Part D: Assessment and Evaluation

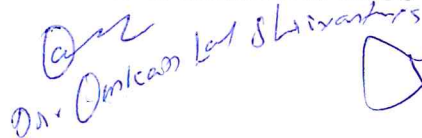
Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	30 Marks
End Semester Examination (ESE):	70 Marks

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
	Assignment/Seminar- 10 Marks	
End Semester Examination (ESE)	Two Section-A&B	
	Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks	
	Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-


(Dr. S. Dashputra)

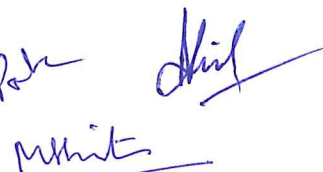

Dr. Ankan Lal Shrivastava


(Dr. P. K. Sahu)








M. K. S. S.



FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION			
Program: Bachelor in Science (Diploma/ Degree/ Honors)		Semester: IV	
		Session: 2024-25	
1	Course Code	PHSC-04T	
2	Course Title	Waves and Optics	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if any)	As per Program	
5	Course Learning Outcomes (CLO)	After going through the course, the student should be able to: <ul style="list-style-type: none"> ➤ Analyze the behavior of waves propagating through different mediums and predict how factors such as density, elasticity, and temperature affect wave propagation. ➤ Demonstrate an understanding of interference phenomena, including constructive and destructive interference, and apply this knowledge to solve problems involving wave superposition. ➤ Explain the concept of diffraction and its implications for wave propagation, including how waves bend around obstacles and spread out after passing through narrow openings. ➤ Describe the polarization of waves, including linear, circular, and elliptical polarization, and apply polarization concepts to analyze and manipulate electromagnetic waves. 	
6	Credit Value	03 Credits 1 Credit= 15 Hours - Learning & Observation	
7	Total Marks	Maximum Marks: 100	Minimum Pass Marks: 40
PART – B: CONTENT OF THE COURSE			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Contribution of C. V. Raman: Brief biography of C. V. Raman with his contribution in field of acoustics and optics. Waves in Medium: Speed of transverse waves on uniform string, Speed of longitudinal waves in a fluid, Energy density and energy transmission in waves. Group velocity and phase velocity and relationship between them. Reflection, refraction and diffraction of sound: Acoustic impedance of a medium, percentage reflection & refraction at a boundary, diffraction of sound, principle of a sonar system.		11
II	Interference: Principle of superposition, Division of wavefront and division of amplitude, Young's Double Slit experiment. Fresnel's Biprism, Phase change on reflection, Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings, measurement of wavelength and refractive index. Michelson's Interferometer, Formation of fringes, Determination of wavelength, Wavelength difference.		12
III	Diffraction: Fresnel Diffraction; Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Fraunhofer diffraction; Single slit, Double slit. Multiple slits & Plane Diffraction Grating, Resolving Power of Grating.		11
IV	Polarization: Polarized light and its mathematical representation, Electromagnetic theory of double refraction, Nicol Prism, Double image prism, Polaroid, Phase retardation plates, Circular and elliptical polarization. Polarization by double refraction and Huygens's theory, Rotation of plane of polarization, Biquartz polarimeter.		11
Keywords:	<i>Longitudinal and transverse waves, principle of superposition, Haidinger Fringes, Fresnel Diffraction, Fraunhofer diffraction, Polarization</i>		

Signature of Convener & Members (CBoS) :

PART – C: LEARNING RESOURCES

Text Book, Reference Book and Others

Text Books Recommended-

1. Berkely Physics Course: Vol.-III, 'Waves and Oscillations'
2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing
3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, S. Chand Publication
4. Physical Optics, A.K. Ghatak
5. Unified Physics- II, R. P. Goyal, Shivalal Agrawal Publications
6. Unified Physics- II, Navbodh Publications

Reference Books Recommended

1. Concepts of Physics by H.C. Verma
2. Fundamentals of Physics by R. Shankar
3. Optics by Ajoy

Online Resources (e-books/ learning portals/ other e-resources)

1. Wave an introduction <https://youtu.be/SuQE7eUEriU>
2. Interference <https://youtu.be/hvpYKPyT-vc>
3. Diffraction <https://youtu.be/3RZZQvEVrEA>
4. Polarization https://youtu.be/nELYaf_N528
5. Waves and Oscillations- <https://archive.nptel.ac.in/courses/115/106/115106119/>
6. Optics- <https://archive.nptel.ac.in/courses/115/107/115107131/>

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

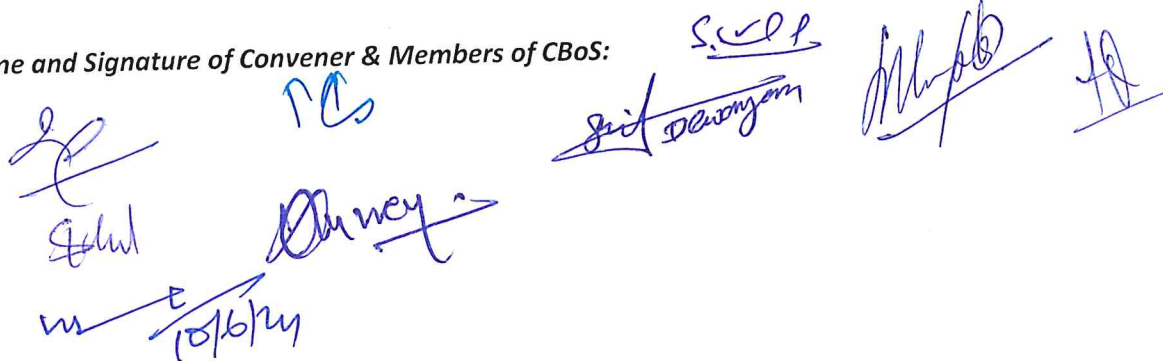
Maximum Marks: 100Marks

Continuous Internal Assessment (CIA):30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): 20 20 Assignment/ Seminar (1): 10 Total Marks: 30	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
End Semester Examination (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type, 1out of 2 from each unit-4x10=40 Marks	

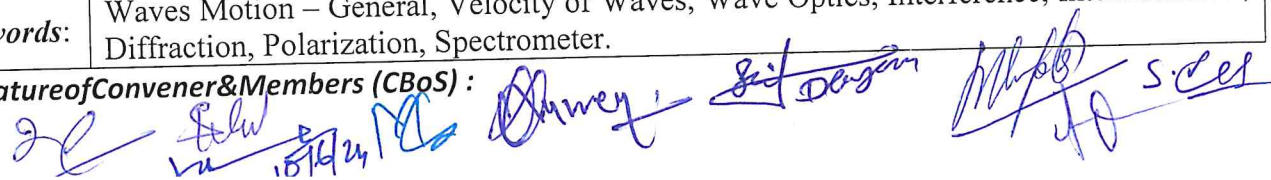
Name and Signature of Convener & Members of CBoS:



FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION			
Program: Bachelor in Science (Diploma/ Degree/ Honors)		Semester: IV	
		Session: 2024-25	
1	Course Code	PHSC- 04P	
2	Course Title	Waves and Optics	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	<p>After the completion of the course, Students are expected to understand laws and principles behind various optical phenomena, specially related to wave nature of light. The students will also be able to</p> <ul style="list-style-type: none"> ➤ Gain proficiency in operating laboratory equipment such as light source i.e. mercury, sodium and Laser, spectrometers, polarimeter, demonstrating competence in setting up experiments, calibrating instruments, and collecting accurate data. ➤ Develop a deep understanding of optical principles such as refraction, diffraction, dispersion, and interference, as well as their applications in various scientific disciplines ➤ Analyze recorded data and formulate it to get desired results. 	
6	Credit Value	01 Credit	1 Credit = 30 Hours Laboratory Work
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20
PART – B: CONTENT OF THE COURSE			
Total No. of learning-Training/performance Periods -30 Periods (30 Hours)			
Sr. No.	Objects (At least 10 of the following or related Experiments)	No. of Period	
1	To determine the Frequency of AC mains with the help of Sonometer.	30	
2	Determination of angle of prism using spectrometer.		
3	To determine the Refractive Index of the Material of a given Prism using Spectrometer.		
4	To determine Dispersive Power of the Material of a given Prism using Spectrometer		
5	To determine the value of Cauchy Constants of a material of a prism.		
6	To determine the Resolving Power of a Prism.		
7	To determine wavelength of sodium light using Fresnel Biprism.		
8	To determine wavelength of sodium light using Newton's Rings Method.		
9	To determine the wavelength of Laser light using Single Slit Diffraction.		
10	To determine wavelength of Sodium light by laser diffraction.		
11	To determine wavelength of spectrum of Mercury light using plane diffraction Grating and Spectrometer.		
12	To determine the Resolving Power of a Plane Diffraction Grating.		
13	To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.		
14	Determination of resolving power telescope.		
15	Study of polarization of sugar solution using polarimeter.		
Keywords:	Waves Motion – General, Velocity of Waves, Wave Optics, Interference, Interferometer, Diffraction, Polarization, Spectrometer.		

Signature of Convener & Members (CBoS) :



PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.
5. Practical Physics B.Sc II : R P Goyal, Shivrul Publications

Reference Books Recommended

1. Practical Physics by S.L. Gupta and V. Kumar
2. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint
3. B.Sc. Practical Physics by C.L. Arora
4. Experimental Physics: Modern Methods by R.A. Dunlap

Online Resources (e-books/ learning portals/ other e-resources)

1. Link for e-Books for Physics:Physics Practical : <https://egyankosh.ac.in/handle/123456789/82374>;
https://www.lightandmatter.com/lab_223.pdf;
2. Virtual Lab : <https://vlab.amrita.edu/index.php?sub=1&brch=281>
3. <https://www.compadre.org/books/?ID=70&FID=63273>
4. <https://www.edutech.com/category/higher-education/engineering-labs/virtual-labs-1>
5. <https://phet.colorado.edu/en/simulations/wave-interference>
6. <https://egyankosh.ac.in/handle/123456789/82374>

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

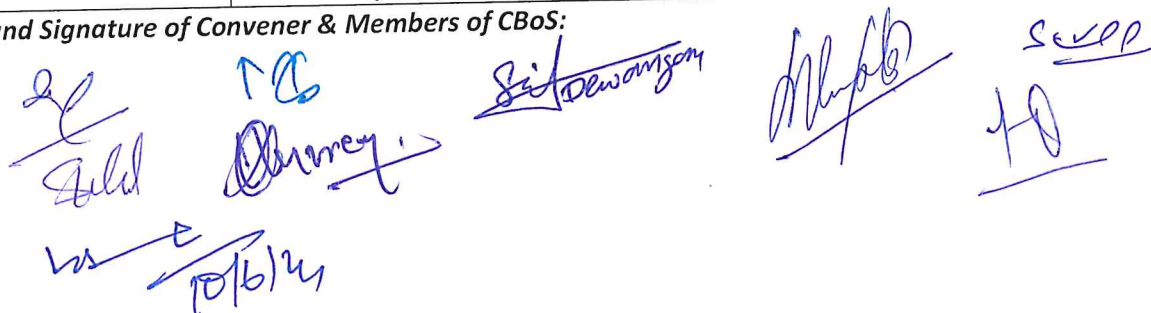
Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance – 05 Total Marks - 15	Better marks out of the two Test / Quiz +Marks obtained in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory Performance: On spot Assessment Performed the Task based on lab. work - 20 Marks Spotting based on tools & technology (written) – 10 Marks Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

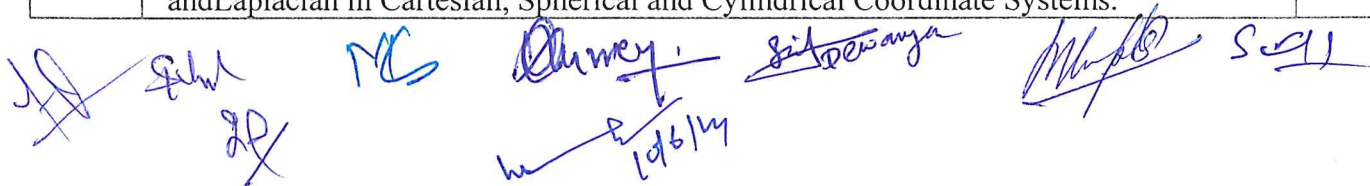


FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART-A: INTRODUCTION			
Program: Bachelor in Science <i>(Diploma /Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	PHSE-02	
2	Course Title	Mathematical Physics-I	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Revise and apply the knowledge of calculus, vectors, vector calculus, probability and probability distributions in various cases. ➤ Illustrate proficiency in writing and solving Differential equation and solving them for a given physical system. ➤ Apply and interpret the curvilinear coordinates in problems with spherical and cylindrical symmetries. ➤ Use Dirac Delta function for various physical situation, especially in quantum mechanical approaches. 	
6	Credit Value	4 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods(01 Hr. per period) – 60 Periods (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	<p>Calculus:</p> <p>Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions, Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only).</p> <p>Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.</p> <p>Origin and Evolution of Mathematical concepts in Ancient India: Bhaskaracharya, the Inventor of Calculus: some examples on calculus</p>	16
II	<p>First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.</p> <p>Orthogonal Curvilinear Coordinates:</p> <p>Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.</p>	16



III	Introduction to probability: Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing.	15
IV	Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. Problems based on dirac-delta function and its application	13
Keywords	Calculus, Lagrange Multipliers, Homogeneous Equations, Particular Integral, Probability distribution, Dependent events, Dirac delta function	

Signature of Convener & Members (CBoS):

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PART-C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended –

1. Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
2. Mathematical Physics, Goswami, 1st edition, Cengage Learning
3. Engineering Mathematics, S. Pal and S.C. Bhunia, 2015, Oxford University Press
4. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
5. Essential Mathematical Methods, K. F. Riley & M.P.Hobson, 2011, Cambridge Univ. Press.
6. Mathematical Physics, H.K. Dass and R. Verma, S. Chand & Company

Reference Books Recommended–

1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
2. An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
3. Differential Equations, George F. Simmons, 2007, McGraw Hill.
4. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.

Online Resources–e-Resources / e-books and e-learning portals

1. NPTEL online Courses: <https://archive.nptel.ac.in/courses/115/105/115105097/>
2. NPTEL online Courses: <https://nptel.ac.in/courses/115103036>
3. e-gyankosh- <https://egyankosh.ac.in/handle/123456789/97951>
4. Origin and Evolution of Calculus in India: <http://mathematical-forum.org/wp-content/uploads/2021/01/Paper-1.pdf>
5. <https://iks.iitgn.ac.in/wp-content/uploads/2016/02/Development-of-Calculus-in-India-K-Ramasubramanian-MD-Srinivas-2010.pdf>
6. Indian Mathematics: NPTEL Course : <https://nptel.ac.in/courses/111101080>

PART-D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment(CIA):
(By Course Teacher)

Internal Test / Quiz-(2): 20 & 20
Assignment/Seminar- 10
Total Marks - 30

Better marks out of the two Test / Quiz
+ obtained marks in Assignment shall be
considered against 30 Marks

End Semester Exam (ESE):

Two section – A & B

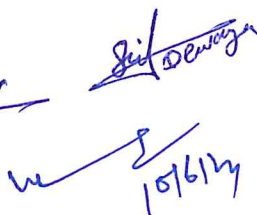
Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks

Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40Marks

Name and Signature of Convener & Members of CBoS:


S. S. S.


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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	CHSC-04T	
2	Course Title	ORGANIC AND PHYSICAL CHEMISTRY-I	
3	Course Type	DSC	
4	Pre-requisite(if,any)	-	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Master the synthesis, properties, and reactivity of various functional groups and apply this knowledge to understand their significance in organic chemistry. ➤ Employ the principles of chemical/ionic equilibria, their influencing factors and applications ➤ Interpret phase diagrams for one and two-component systems, determine degrees of freedom, and identify the triple point. ➤ Master the principles and applications of liquid-liquid mixtures using Raoult's law, Henry's law, and Nernst distribution law. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics(Course contents)		No.of Period
I	<p>A. Halides (5 hrs)</p> <p>(i) Alkyl Halides: Preparation: from alkenes and alcohols. Reactions: Nucleophilic substitution reactions of alkyl halides (alcohol, ester, nitrile & isonitrile formation, Williamson's ether synthesis), mechanism and stereochemistry of nucleophilic substitution reactions (SN1 and SN2), factors affecting SN1 and SN2 reactions.</p> <p>(ii) Aryl Halides: Chlorobenzene: Preparation by aromatic halogenation and Sandmeyer reaction. Aromatic nucleophilic substitution involving Benzyne Mechanism: KNH₂/NH₃ (or NaNH₂/NH₃). Reactivity and Relative strength of C-Halogen bond in alkyl and aryl/Vinyl halides.</p> <p>B. Alcohols & Phenols (7hrs)</p> <p>(i)Alcohols</p> <p>(a)Monohydric-nomenclature, methods of formation, Properties & chemical reactions distinction between primary, secondary & tertiary alcohols.</p> <p>(b)Dihydric alcohols: Nomenclature, methods of formation of ethylene glycol (from ethylene, epoxide, ethylene dibromide and ethylene diamine). Chemical reactions of vicinal glycols: with carbonyl compounds, dehydration, oxidative cleavage with Pb(OAc)₄ and HIO₄ and Pinacol-Pinacolone rearrangement (with mechanism).</p> <p>(c) Trihydric alcohols: Nomenclature and methods of formation (from hydrolysis of fats and oils, propene and acrolein), chemical reactions of glycerol (with PCI₅, HI, oxidation, and dehydration) and uses/applications.</p> <p>(ii)Phenols</p> <p>Nomenclature and methods of formation, physical properties, and acidic character. Resonance stabilization of phenoxide ion. Comparative acidic strength of alcohols and phenols. Electrophilic aromatic substitution, acetylation, and carboxylation. Mechanism of Fries rearrangement, Claisen rearrangement, and Reimer-Tiemann reaction.</p>		12

II	<p>Aldehydes/Ketones and acid/its derivatives</p> <p>A. Aldehydes and Ketones (6 hrs) Nomenclature and structure of the carbonyl group, synthesis of aldehydes and ketones. Acidity of alpha hydrogens and formation of enolate, Concept of reactive methylene group, Keto-enol tautomerism in Acetoacetic ester. Oxidation of aldehydes by KMnO_4, and Tollen's reagent, Reduction of aldehydes by LiAlH_4 and NaBH_4.</p> <p>Mechanism of nucleophilic additions to carbonyl group with particular emphasis on aldol, Perkin, and Knoevenagel reactions. Wittig and Mannich reaction (without mechanism), Baeyer-Villiger oxidation of Ketones (without mechanism), Cannizzaro reaction (with mechanism), MPV, Clemmensen, and Wolf-Kishner reaction.</p> <p>B. Acid & its derivatives (5 hrs)</p> <p>(i) Carboxylic Acids Nomenclature, structure, physical properties, acidity of carboxylic acids, effect of substituent on acid strength, method of preparation and chemical reaction. Hell-Volhard-Zeilinsky (HVZ) reaction, Reduction of carboxylic acids, Mechanism of decarboxylation. Di carboxylic acids: - Methods of formation and chemical reactions, effect of heat and Dehydrating agents.</p> <p>(ii) Carboxylic Acid Derivatives Structure, method of preparation & physical properties of acid chlorides, esters, amides (Urea) and acid anhydrides. Relative stability of acyl derivatives.</p>	11
III	<p>Equilibrium</p> <p>A. Chemical equilibria (3 hrs) Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constants and their quantitative dependence on temperature, pressure, and concentration, factors affecting equilibrium – Le Chatelier's principle.</p> <p>B. Ionic Equilibria (5 Hrs) Ionization of acids and bases, Strong and weak electrolytes, degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect and solubility product (with illustrative examples), Salt hydrolysis - calculation of hydrolysis constant and degree of hydrolysis for salt of strong acid and weak base, Buffer solutions – Introduction, Henderson-Hasselbalch equations for acidic and basic buffer.</p> <p>(C). Phase Equilibrium (3 hrs) (A)Gibbs phase (no derivation), phase, component and degree of freedom, Application of phase rule to one component system (water system and Sulphur systems), Reduced phase rule. Application of phase rule to two component systems: Pb-Ag system. Congruent-Ferric chloride system.</p>	11
IV	<p>Photochemistry and liquid-liquid mixtures</p> <p>A) Photochemistry (8 hrs) Interaction of radiation with matter, difference between thermal and photochemical reactions, Laws governing absorption of light, laws of photochemistry, Jablonski diagram depicting various processes, quantum yield, determination of quantum yield of reactions, reasons for low and high quantum yields. Some examples of photochemical reactions (e.g. Photochemical decomposition of Hydrogen iodide, Photosynthesis of HBr from H_2 and Br_2 and photosynthesis of HCl from H_2 and Cl_2). Photosensitization and Quenching, Photosensitized reactions.</p> <p>B)Liquid-Liquid mixtures(3 hrs) Ideal liquid mixtures, Raoult's law of ideal solutions, Henry's law and its applications, Nernst distribution law, limitations, and applications (association and dissociation - No derivation).</p>	11
Keywords	<p><i>Halides (alkyl & aryl halides), Alcohols, Phenols, Aldehydes & Ketones, Carboxylic acids & their derivatives, Equilibrium (Chemical, Ionic, and Phase equilibria), Photochemistry, Liquid-liquid mixtures.</i></p>	

Indira
Rahul
D.K. Sh
Anurag
Sujana
Anurag

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bahl, A. (2010). *Advanced organic chemistry*. S. Chand publishing.
2. Singh, J & Yadav, L. D. S. (2016) *Advanced organic chemistry*. Pragati Prakashan Meerut.
3. Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). *Principles of physical chemistry*. Vishal Publishing Co.
4. Kapoor, K. L. (2019). *A Textbook of Physical Chemistry, Thermodynamics and Chemical Equilibrium (SI Units) - Vol. 2, 6th Edition*.

Reference Books recommended-

1. Boyd, R. N., & Morrison, R. T. (1983). *Organic Chemistry: (uden title)*. Allyn and Bacon.
2. *Physical Chemistry*
3. Atkins, P. W., De Paula, J., & Keeler, J. (2023). *Atkins' physical chemistry*. Oxford university press.
4. McQuarrie, D. A., & Simon, J. D. (2004). *Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi*.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://ncert.nic.in/ncerts/l/lech202.pdf>
- <https://unacademy.com/content/wp-content/uploads/sites/2/2022/10/30.-Aldehydes-Ketones-and-Carboxylic-Acid.pdf>
- <https://egyankosh.ac.in/bitstream/123456789/68232/3/Unit-3.pdf>
- [https://magadhmahilacollege.org/wp-content/uploads/2020/04/photochemistry and jablonski diagram M.sc II Sem.pdf](https://magadhmahilacollege.org/wp-content/uploads/2020/04/photochemistry%20and%20jablonski%20diagram%20M.sc%20II%20Sem.pdf)

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

End Semester Exam(ESE): 70 Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20/20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science <i>(Diploma / Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	CHSC-04P	
2	Course Title	CHEMISTRY LAB. COURSE-IV	
3	Course Type	DSC	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>Understand the fundamentals of organic compounds analysis including preparation of sodium extract and detection of elements.</i> ➤ <i>Identify functional groups and prepare derivatives.</i> ➤ <i>Determine the pH of various samples like water/acid/base/soil etc.</i> ➤ <i>Apply the concepts of phase equilibria to determine critical solution temperature and study concepts of Nernst distribution law and determine equilibrium constant of various reactions.</i> 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No. of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Periods
Lab./Field Training/ Experiment Contents of Course	Organic Analysis Systematic identification of organic compounds: a. Test for aliphatic and aromatic nature of substances. b. Test for saturation and unsaturation. c. Detection of elements (N, S, and halogens) in organic compounds. d. Identification of functional groups: i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones, v) Esters vi) Carbohydrates vii) Amines viii) Amides, ix) Halogen compounds e. Determination of melting and boiling points. f. Preparation of solid derivatives. pH determination Determination of pH of soil, water. To measure the pH of various solutions using pH indicators and pH meter. To determine the value of K_a for an unknown acid. To prepare and study the properties of buffer solutions. Phase Equilibrium: 1) To determine the critical solution temperature of two partially miscible liquids (phenol-water systems). 2) To study the effect of solute such as (i) sodium chloride (NaCl), (ii) succinic acid ($\text{HOOC-CH}_2\text{-CH}_2\text{-COOH}$) on the critical solution temperature of two partially miscible liquids (e.g. phenol – water system). 3) To construct the phase diagram of two components (e. g. diphenylamine-benzophenone system) by cooling curve method. Nernst Distribution Law 1) To determine the partition coefficient of Iodine between water and carbon tetrachloride/Kerosene. 2) To determine the partition coefficient of benzoic acid between water and benzene.		30

	3) To determine the equilibrium constant of the reaction, $KI + I_2 = KI_3$ by distribution method.
Keywords	Organic analysis, Aromatic/Aliphatic compounds, Saturated/unsaturated compounds, Element detection, Functional groups, Derivatives for functional groups, pH, Phase equilibria, Nernst distribution law.

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Sahu, D. P. & Bapat, K. N. (2022) Unified Practical Chemistry, Navbodh Prakashan.
2. Yadav, J. B. (2006). Advanced Practical Physical Chemistry. Krishna Prakashan Media.
3. Pandey, O. P., Bajpai, D. N., Giri, S. (2010). Practical Chemistry. S. Chand Publisher.

Reference Books Recommended:

1. Moudgil, H. K. (2010). Textbook of Physical Chemistry. PHI Learning Pvt. Ltd.
2. Adamson, A. (2012). A Textbook Of Physical Chemistry. Elsevier.
3. Findlay, A. (1923). Practical Physical Chemistry. Longmans, Green.
4. Leonard, J, Lygo, B & Procter, G. (2013). Advanced Organic Practical Chemistry, CRC Press.

Online Resources–

- e-Resources / e-books and e-learning portals
- [https://faculty.ksu.edu.sa/sites/default/files/vogel - practical organic chemistry 5th edition.pdf](https://faculty.ksu.edu.sa/sites/default/files/vogel_practical_organic_chemistry_5th_edition.pdf)
- <https://tech.chemistrydocs.com/Books/Physical/Advanced-Physical-Chemistry-Experiments-by-J-N-Gurtu-&-Amit-Gurtu.pdf>
- <https://byjus.com/chemistry/conductometric-titration/>
- [https://chem.libretexts.org/Courses/University of California Davis/Chem 4B Lab%3A General Chemistry for Majors II/1%3A Thermochemistry \(Experiment\)](https://chem.libretexts.org/Courses/University_of_California_Davis/Chem_4B_Lab%3A_General_Chemistry_for_Majors_II/1%3A_Thermochemistry_(Experiment))
- https://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment_10.pdf
- <https://www.masterjeeclases.com/wp-content/uploads/2019/02/11.Practical-Organic-ChemistryTheory.pdf>

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA): 15 Marks

End Semester Exam(ESE): 35 Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	J. Performed the Task based on lab. work - 20 Marks	
	K. Spotting based on tools & technology (written) – 10 Marks	
	L. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelors in Science (Diploma /Degree/Honors)		Semester-IV	
		Session: 2024-2025	
1	Course Code	CHSE-02T	
2	Course Title	ENVIRONMENTAL CHEMISTRY	
3	Course Type	DSE	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>To explore the environment through the lens of chemistry, examining interactions between the biosphere, lithosphere, hydrosphere, and atmosphere.</i> ➤ <i>To delve into ecological principles, biogeochemical cycles, and the challenges of thermal and noise pollution.</i> ➤ <i>To develop concept of water quality, water management, and the multifaceted issue of water pollution take center stage.</i> ➤ <i>To investigate air pollution, soil composition, radiation chemistry, and potential solutions for environmental challenges.</i> 	
6	Credit Value	03 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max.Marks:100	Min. PassingMarks:40
PART-B: Content of the Course			
Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Module /Unit	Topics(Course contents)		No.of Period
I	Introduction to Environmental Chemistry Biosphere, Lithosphere, Hydrosphere and Atmosphere, Ecological principles- aspects of ecology, classification, types of ecosystems. Biogeochemical cycles- carbon, nitrogen, phosphorous, oxygen, hydrogen. Thermal pollution: sources, harmful effects, and prevention of thermal pollution. Noise pollution: sources, effects, and control of noise pollution.		12
II	Water Origin, physico-chemical properties of water, sources of water, hydrological cycle, criteria of water quality, Water management- water shed management, rainwater harvesting, water pollution- sources, consequences and harmful effects of water pollution, strategies for water pollution control.		11
III	Air Major regions of the atmosphere, composition of the atmosphere, temperature inversion and air pollution episodes, photochemistry of the atmosphere, depletion of the stratospheric ozone, greenhouse effect, greenhouse gases, remedial measures for reversion of greenhouse effect, acid rain, photochemical smog, particulate matter.		11
IV	Soil and radiation pollution Chemical and mineralogical composition of soil, classification of soil, types of soil-saline and alkaline, physical properties – texture, bulk density, permeability, chemical properties—Ion exchange capacity, soil pH and micro and macro nutrient availability. Introduction to radiation chemistry, sources of radioactive pollution, effects of radioactive pollution, protection from radiation, control of radiation.		11
Keywords	<i>Environment, Chemistry, Atmosphere, Hydrosphere/Biosphere/lithosphere, Biogeochemical cycles, water, water management, Air, Acid rain, Photochemical smog, Greenhouse gases,</i>		

Signature of Convener & Members (CBoS) :

PART-C

Learning Resources: Text books, Reference Books and Others

Textbooks Recommended-

1. Dara, S. S. (2002). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
2. De, A. K. (2003). *Environmental chemistry*. New Delhi: New Age International.
3. Mahajan, (2010). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
4. Kudesia, V. P. (1985). *Water pollution*. Pragati Prakashan.

Reference Books Recommended-

1. Chiras, D. D. (1994). *Environmental science (4th ed.)*. Jones & Bartlett Learning.
2. Bockris, J. O. M. (1977). *Environmental chemistry*. Academic Press.
3. Lodge, J. P. (1994). *Methods of air sampling and analysis*. Publications, Jaipur.
4. Moore, W., & Moore, J. (2010). *Environmental chemistry*. CRC Press.

Online Resources-e-Resources/e-books and e-learning portals

- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- <https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water.>
- [https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry - The Central Science \(Brown et al.\)/18%3A_Chemistry of the Environment](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment)
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis>

Part-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA): 30 Marks

End Semester Exam(ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam(ESE):	Two section - A & B Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4=20Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks.	

Name and Signature of Convener and Members of CBoS

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	CHSE-02P	
2	Course Title	ENVIRONMENTAL CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite (if, any)	-	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ To know the basic idea on techniques of water analysis and acidity alkalinity ➤ To get experience with the calculations of BOD and COD ➤ To understand the basics of soil analysis viz. pH, Conductivity. ➤ To have an experience on the determination of heavy metals in soil and Colorimetric estimation of iron and manganese. ➤ To familiarize with interpretation of data 	
6	Credit Value	01Credit	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max.Marks:50	Min. Passing Marks:20

PART-B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics(Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course.	Water Analysis a. Alkalinity b. Acidity c. Temporary, Permanent and total hardness d. Sulphate e. Phosphorus	30
	Water analysis e. Nitrites f. Chlorides g. D.O, BOD and COD h. Insecticides i. Pesticides Analysis of chemicals used in water and waste water treatment-Alum, bleaching powder, activated carbon. Determination and comparison of chlorine content in tap water, storage tank and swimming pool.	
	Soil Analysis Determination of: a. pH b. Conductivity c. Ca d. Mg e. Heavy metals like Cr, Pb, Cd, Zn.	
	Miscellaneous Analysis of nutrients – Nitrogen (total, ammonia,nitrite, and nitrate), Phosphate Determination of N,P,K of soil	

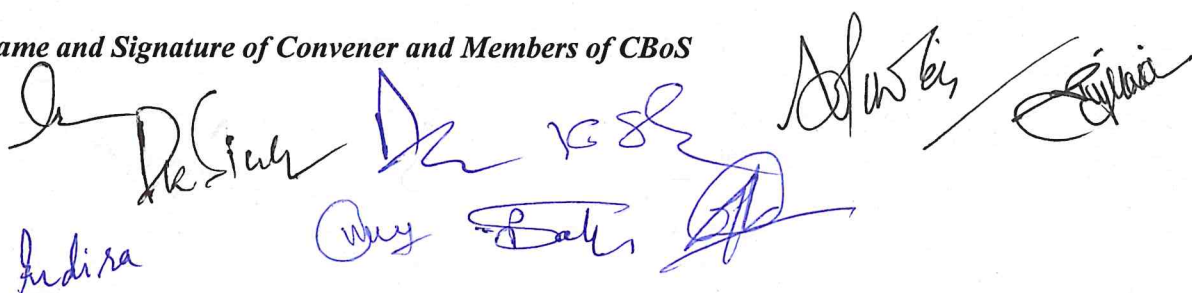
	<p>Determination of macro and micro nutrients in soil. Sampling of water- tap water, well water, overhead storage tank water pond water and lake water. Physicochemical and organoleptic characteristics of the above water samples. Statistical evaluation of the data obtained for optimization of results. Determination of Total solids, Total dissolved solids and total suspended solids and its significance. Determination of noise pollution in a particular area with noise dosimeter. Study of particulate matter. Study of atmospheric chemistry. Air Monitoring Gas detection.</p>
Keywords	Sampling, Water, soil, N/P/K, pH, Conductivity, acidity & alkalinity, Heavy metals.

Signature of Convener & Members (CBoS) :

PART-C
Learning Resources: Text Books, Reference Books and Others
<p>Textbooks Recommended-</p> <ol style="list-style-type: none"> 1. Dara, S. S., & Asole, B. G. (2017). <i>Environmental chemistry: Practical approach (2nd ed.)</i>. New Age International (India) Publishers. 2. Trivedi, R. K., Goyal, P., & Trisal, B. S. (2018). <i>Manual of water and wastewater analysis (2nd ed.)</i>. ABD Publishers & Distributors. 3. Sehgal, H. S. (2010). <i>A textbook of soil chemical analysis (2nd ed.)</i>. Kalyani <p>Reference Books Recommended-</p> <ol style="list-style-type: none"> 1. Vogel, A. I. (1955). <i>A text-book of quantitative inorganic analysis: theory and practice</i>. Longmans, Green and Company. 2. Sandell, E. B. (1945). <i>Colorimetric determination of traces of metals (Vol. 59, No. 6, p. 481)</i>. LWW. 3. Boubel, R. W., Vallerio, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). <i>Fundamentals of air pollution</i>. Elsevier. 4. Clesceri, L. S. (1998). <i>Standard methods for examination of water and wastewater</i>. American public health association, 9. 5. Rump, H. H. (1999). <i>Laboratory manual for the examination of water, waste water and soil (No. Ed. 3)</i>. Wiley-VCH Verlag GmbH. <p>Online Resources- e-Resources/e-books and e-learning portals</p> <ul style="list-style-type: none"> • https://ncert.nic.in/textbook/pdf/kech207.pdf • https://archive.nptel.ac.in/courses/122/106/122106030/ • https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/ • https://www.ncbi.nlm.nih.gov/books/NBK83730/ • https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water. • https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment • https://byjus.com/chemistry/environmental-chemistry/ • https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis • https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799

PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 50 Marks		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 35 Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment D. Performed the Task based on lab. work - 20 Marks E. Spotting based on tools & technology (written) – 10 Marks F. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener and Members of CBoS



 Indira

FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION			
Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)		Semester: II/ IV/V/ VI	
		Session: 2024-25	
1	Course Code	PHSEC- 01	
2	Course Title	Basic Electrical Skill	
3	Course Type	Skill Enhancement Course	
4	Pre-requisite (if any)	As per Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, student is expected to enhance his electrical skill through: ➤ Understanding importance of accuracy in measuring physical quantities. ➤ Using basic mechanical tools. ➤ Using various measuring instruments. ➤ Fault finding and repairing simple domestic appliances	
6	Credit Value	02 Credits (1C+1C)	1 Credit= 15 Hours for Theoretical Learning & = 30 Hours Laboratory or Field learning/ Training
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20
PART – B: CONTENT OF THE COURSE			
Total No. of Teaching–learning Periods: Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)			
Module	Topic (Course Contents)		No. of Period
I	Measurement: Idea about accuracy in measurement, measuring devices for commonly used physical quantities (Length, Mass, Density, Temperature, Power, Current, Voltage, Resistance, capacitance, inductance, frequency etc). D.C. Circuit: Ohms law, Series and parallel resistance circuit, Kirchoff's law & their application, Primary and secondary cells, maintenance of secondary cells. A.C. Circuits: Generation of AC voltage, wave shape, frequency, peak, average, instantaneous & RMS values, idea about R, L, C circuits Heating & Lighting effects of current: Joule's law of electric heating and its domestic applications, idea of commonly used lighting bulb, tube, CFL, LED. Working: Working principle of Domestic appliances like electric fan, Cooler, Inverters, Mixer, Electric heater etc Safety measurements- Safety measurements in working with mechanical and electrical tools, testing and repair of electrical appliances.		15
II	Laboratory Work: (i) Use of basic tools: Screwdriver, Pliers, Wrench, Hacksaw, Spanner, Hand and electric drill, Soldering iron etc. (ii) Use of Voltmeter, Current meter, electronic balance. (iii) Use of Multimeter, CRO. (iv) Design & Construction of extension board (v) Fan repairing and its study (vi) Mixer repairing and its study (vii) Electric kettle repairing and its study (viii) Electric press repairing and its study (ix) Cooler repairing and its study (x) Geezer repairing and its study (xi) Invertor repairing and its study		30

Signature of Convener & Members (CBOS) :

PART – C: LEARNING RESOURCES**Text Books, Reference Books and Others****Text Books Recommended-**

1. A text book in Electrical Technology - B L Theraja - S Chand and Co.
2. Electrical circuits, - M Nahvi and J Edminister, Schaum's outline series, Tata McGraw 2005
3. Circuit Theory, A Chakraborti, Dhanpat Rai & Co.
4. A Text book of electrical technology, - Vol.1, B L Thereja, S. Chand & Co, Delhi
5. A text book of electrical technology- J B Gupta, SK Kalaria & Sons,
6. Principle of electrical engineering- V K Mehta, Rohit Mehta, S. Chand & Co, Delhi
Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Reference Books Recommended

1. Electrical and Electronic Measurements and Instrumentation by R.K. Rajput
2. Electrical Workshop: Safety, Commissioning, Maintenance & Testing of Electrical Equipment by R.P. Singh
3. Electricity and Magnetism by D.N. Vasudeva

Online Resources (e-books/ learning portals/ other e-resources)

1. National Digital Library- <https://ndl.iitkgp.ac.in/>
2. https://nptel.ac.in/courses/108/108/108_108076/
3. [Basic Instrumentation Skills – Selfstudy Institute](#)
4. physics.iisuniv.ac.in
5. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/note_1469078786.PDF

PART – D: ASSESSMENT AND EVALUATION**Suggested Continuous Evaluation Methods:**

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

Continuous Internal Assessment (CIA): (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks- 15	

End Semester Examination (ESE)	Laboratory /Skill Performance: On spot Assessment	Evaluation by Coordinator
	A. Performed the Task based on learned skill - 20 Marks	
	B. Spotting based on tools (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	

Signature of Convener & Members (CBoS):

	<ul style="list-style-type: none"> At the Railway Station/ Bus Station enquiry: (Arrival and departure of buses/ trains) Hotel: Booking a room, asking tariff rate Travel agency: (Asking to book tickets fares, finding vacancies in hotels) <p>C) Greetings and Common Etiquettes: Introducing oneself; Invitation; Making Requests; Expressing Gratitude; Complimenting and Congratulating; Expressing Sympathy; Apologizing; Complaining and Expressing Regret</p>	
IV	<p>Presentation skills (Performance Based):</p> <p>Effective oral presentation, Characteristics of good oral presentation. Use of quotations and anecdotes. Ways of Oral Presentation (Seminar, Viva -voce, Interview, Power Point etc.) Gestures/ Mannerism during oral presentation. Media methods used for effective oral presentation, Body Language, Attire.</p>	08
Key words	Communication, Vocabulary, Conversation, Reading, Presentation.	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources
Text Books, Reference Books and Others
<p>Text Books Recommended - Suggested Reading:</p> <ul style="list-style-type: none"> ➤ Fluency in English - Part II, Oxford University Press, 2006. ➤ Enrich Your English, OUP, SR Inthira and V. Saraswathi, CIEFL, 1997 ➤ Oxford A-Z of English Usage, ed. Jeremy Butterfield, OUP, 2007. ➤ Longman Dictionary of Common Errors, N.D. Turton and J.B. Heaton, Longman, 1998 ➤ Contemporary Communicative English, S Chand ➤ Malhotra Perna, Deb Dulal Halder, (2019) Communication Skills: Theory and Practice, Eighth Edition, BookAge Publications, New Delhi.
<p>Online Resources-</p> <ul style="list-style-type: none"> ➤ Applying Communication Theory for Professional Life: A Practical Introduction. Dainton and Zolley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25f ➤ https://web.sol.du.ac.in/my_modules/type/cbcs-41-2/data/root/B.Com/Semester%202/ABILITY-ENHANCEMENT%20COMPULSORY%20COURSE-AECC/English%20Communication%20A-B-C/Unit%201-5.pdf ➤ https://archive.org/details/personality-development-book/mode/1up ➤ https://www.coursera.org/articles/presentation-skills ➤ https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/ ➤ https://benjaminball.com/blog/good-body-language-best-visual-aid-talks/ ➤ https://blog.moderngov.com/importance-of-body-language-in-presentations-good-bad-examples
PART -D: Assessment and Evaluation
<p>Suggested Continuous Evaluation Methods:</p> <p>Maximum Marks: 50 Marks</p> <p>Continuous Internal Assessment (CIA): 15 Marks</p> <p>End Semester Exam (ESE): 35 Marks</p>

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Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Q1. Objective/ MCQs to be asked only from Unit I (1 x5= 05 Mark) Q2. I Vocabulary: (5Marks) II Unseen Passage (5 Marks) Q3. Particles from Unit 3 & 4 consisting of 20 marks.	

Name and Signature of Convener & Members of CBoS:

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