LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP) , Dr Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: DSCC-1, Basic Physics-I , Sem - I

Planned					
Unit/Group/ Module/ Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks/ Comments**
(A) Mathematical Physics					
Preliminaries **(GP)**	a) Units & Dimension , Plotting functions	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk	
	b) Limits And continuity		1		
	c) Taylor and Binomial series		1		
	d) Calculus, maxima. Minima		1		
	e) Partial derivatives		1		
2. Ordinary Differential Equations **(SDG)**	a) First order	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk, Assignment	
	b) Second order		1		
3 Vectors **(SC)**	a) Vector products	Vector Analysis (Schaum's outline series) By Spiegel	2	Chalk & talk	
	b) Vector differentiations, gradient , curl,		3		
	c) Divergence and Stoke's theorem		2		
4. Curvilinear Coordinates **(SC)**	a) Plane polar, spherical, cylindrical coordinates, vectors, velocity and acceleration		5		
	b) Vector integrals		1		
	Total		**20**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP) , Dr Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: DSCC-1, Basic Physics-I , Sem - I

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
(B) Classical Mechanics					
1. Review of Newton's Laws (AS)	a) Inertial frames , Galilean transformation	Classical Mechanics By A.B. Gupta	1	Chalk & talk	
	b) Newton's laws conservation of linear momentum		1		
	c) Rotational motion		2		
	d) Problems		2		
2. Work Kinetic energy Theorem (AS)	a) Conservative and non conservative forces, potential		2		
	b) potential energy curves and Stability		1		
	c) Small oscillation		1		
3. Dynamics of a system of particles (GP)	a) COM and reduced mass	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Momentum and energy of a system of particles		2		
4. Central forces (GP)	a) Laws of Gravitation		1		
	b) Gravitational Potential and Intensity		2		
	c) Equation of motion in Central forces		3		
	d) Motion under inverse square law		2		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP) , Dr Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: DSCC-1, Basic Physics-I , Sem - I

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
5. Scattering (KB)	a) Two body collision and scattering	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
6 . Mechanics of Continuum (KB)	a) Kinematics of moving fluids, equation of continuity	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Streamline and turbulent flow		1		
	c) Stokes law, Euler equation,		1		
	d) Bernoulli's Theorem & application		2		
	Total		30		
TOTAL (A+B)			**20+30=50**		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Introduction to Graph Plotting (2D only, using GNUPLOT) **(SC)**	a) Plotting 2D graphs: both functions and data files. Changing plot range and plot styles: the options- with points (w p), with dots (w d), with lines (w l), with lines points (w lp), linetype (lt),linewidth (lw). Using the set command for samples, xrange, yrange, xlabel ,ylabel, title etc. Theusing option	1) Scientific Computing in Python by Abhijit Kar Gupta	2	Computer Practical	
	b) User defined functions [Including the use of ternary operator for piece-wise defined functions.]		3		
	c) Fitting data files using gnuplot.		3		
	d) Polar and parametric plots		3		
	e) Conditional Plotting of data from file using $, &&, || operators. (Graphs to be saved withoutusing GUI)		3		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
2. Introduction to programming in python (Version 3): **(SDG)**	a) Introduction Using the python interpreter as a calculator Variable and data types (int, float, complex, list, tuple, set, string, the type () function) Basic mathematical operations Compound statements in python Conditionals (if, elif, else) Loops (for, while)	1) Scientific Computing in Python by Abhijit Kar Gupta	3	Computer Practical, Study material	
	b) User defined functions def: (return statement, default values for arguments, keywordarguments), lambda function. Importing modules with math and cmath as examples, Using help and dir command to use the inbuilt manual, Basic idea of namespaces-local and global Python scripts, I/O operations (including opening and writing to files)		3		
	b) The python data types List: defining lists, reading and changing		4		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	elements from lists, slicing (with discussion on the difference between ll=mm and ll=mm[:], concatenation, list comprehension. built in functions involving lists: range(), len(), sum(), min(), max() – list methods: append(), extend(), count(), index(), sort(), insert(), pop(), remove(), reverse()				
	Tuples: Contrast and compare with lists, packing/unpacking using tuples (including a,b=b,a to swap variables) • Sets : set methods: update(), pop(), remove(), Set Theoretic operations: union, intersection, difference and symmetric difference of two sets.		4		
	Strings: defining strings, the use of single, double or triple quotes as string delimiters, len(),indexing, slicing, string concatenation, some string methods: strip(), split(), join(), find(), count(), replace(), string formatting in python (using the % operator	1) Scientific Computing in Python by Abhijit Kar Gupta	2	Computer Practical	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
3. Problems and Applications **(SDG)**	Finding factors of an integer Determining whether an integer is prime or not. Finding out prime number greater than or lesser than a given value. Finding out all prime numbers within a given range	1) Scientific Computing in Python by Abhijit Kar Gupta	10		
	Root finding for a single variable (basic theory and algorithm) using Newton-Raphson andBisection method Sorting of lists (algorithm, flowchart and code) using Bubble or Selection sort Sum of series correct up to given decimal places (Sine, Cosine, Exponential etc.)		8		
	Simulation of motion of a particle in 1D under a given force F(x, t, v) with given initial condition and plotting (x, t), (x, v), (t, v). (Output to be saved in data files and Gnuplot to be used to plot graphs), using		6	Computer Practical	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC), Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Euler's method only.				
	Matrix Addition, Multiplication and Transpose using List Comprehension.		6		
		Total	60		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: MN1 /CC1, Basic Physics-I , Sem - I

Planned					
Unit/Group/ Module/ Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks/ Comments**
(A) Mathematical Physics					
Preliminaries **(GP)**	a) Units & Dimension , Plotting functions	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk	
	b) Limits And continuity		1		
	c) Taylor and Binomial series		1		
	d) Calculus, maxima. Minima		1		
	e) Partial derivatives		1		
2. Ordinary Differential Equations **(SDG)**	a) First order	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk, Assignment	
	b) Second order		1		
3 Vectors **(SDG)**	a) Vector products	Vector Analysis (Schaum's outline series) By Spiegel	2	Chalk & talk. Assignment	
	b) Vector differentiations, gradient , curl,		3		
	c) Divergence and Stoke's theorem		2		
4. Curvilinear Coordinates **(SDG)**	a) Plane polar, spherical, cylindrical coordinates, vectors, velocity and acceleration		5		
	b) Vector integrals		1		
	Total		**20**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: MN1 /CC1, Basic Physics-I , Sem - I

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
(B) Classical Mechanics					
1. Review of Newton's Laws **(AS)**	a) Inertial frames , Galilean transformation	Classical Mechanics By A.B. Gupta	1	Chalk & talk	
	b) Newton's laws conservation of linear momentum		1		
	c) Rotational motion		2		
	d) Problems		2		
2. Work Kinetic energy Theorem **(AS)**	a) Conservative and non conservative forces, potential		2		
	b) potential energy curves and Stability		1		
	c) Small oscillation		1		
3. Dynamics of a system of particles **(GP)**	a) COM and reduced mass	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Momentum and energy of a system of particles		2		
4. Central forces **(GP)**	a) Laws of Gravitation		1		
	b) Gravitational Potential and Intensity		2		
	c) Equation of motion in Central forces		3		
	d) Motion under inverse square law		2		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Dr. Atri Sarkar (AS), Ms Kathakali Biswas (KB)

Paper Name & Code: MN1 /CC1, Basic Physics-I , Sem - I

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
5. Scattering (KB)	a) Two body collision and scattering	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
6. Mechanics of Continuum (KB)	a) Kinematics of moving fluids, equation of continuity	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Streamline and turbulent flow		1		
	c) Stokes law, Euler equation,		1		
	d) Bernoulli's Theorem & application		2		
	Total		30		
TOTAL (A+B)			**20+30=50**		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra(SC) and Dr. Atri Sarkar (AS)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Introduction to Graph Plotting (2D only, using GNUPLOT) **(SC)**	a) Plotting 2D graphs: both functions and data files. Changing plot range and plot styles: the options- with points (w p), with dots (w d), with lines (w l), with lines points (w lp), linetype (lt),linewidth (lw). Using the set command for samples, xrange, yrange, xlabel ,ylabel, title etc. Theusing option	1) Scientific Computing in Python by Abhijit Kar Gupta	2	Computer Practical	
	b) User defined functions [Including the use of ternary operator for piece-wise defined functions.]		3		
	c) Fitting data files using gnuplot.		3		
	d) Polar and parametric plots		3		
	e) Conditional Plotting of data from file using $, &&, || operators. (Graphs to be saved withoutusing GUI)		3		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra(SC) and Dr. Atri Sarkar (AS)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
2. Introduction to programming in python (Version 3): (**AS)**	a) Introduction Using the python interpreter as a calculator Variable and data types (int, float, complex, list, tuple, set, string, the type () function) Basic mathematical operations Compound statements in python Conditionals (if, elif, else) Loops (for, while)	1) Scientific Computing in Python by Abhijit Kar Gupta	3	Computer Practical, Study material	
	b) User defined functions def: (return statement, default values for arguments, keywordarguments), lambda function. Importing modules with math and cmath as examples, Using help and dir command to use the inbuilt manual, Basic idea of namespaces-local and global Python scripts, I/O operations (including opening and writing to files)		3		
	b) The python data types List: defining lists, reading and changing		4		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra(SC) and Dr. Atri Sarkar (AS)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	elements from lists, slicing (with discussion on the difference between ll=mm and ll=mm[:], concatenation, list comprehension. built in functions involving lists: range(), len(), sum(), min(), max() – list methods: append(), extend(), count(), index(), sort(), insert(), pop(), remove(), reverse()				
	Tuples: Contrast and compare with lists, packing/unpacking using tuples (including a,b=b,a to swap variables) • Sets : set methods: update(), pop(), remove(), Set Theoretic operations: union, intersection, difference and symmetric difference of two sets.		4		
	Strings: defining strings, the use of single, double or triple quotes as string delimiters, len(),indexing, slicing, string concatenation, some string methods: strip(), split(), join(), find(), count(), replace(), string formatting in python (using the % operator	1) Scientific Computing in Python by Abhijit Kar Gupta	2	Computer Practical	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra(SC) and Dr. Atri Sarkar (AS)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
3. Problems and Applications **(AS+KB)**	Finding factors of an integer Determining whether an integer is prime or not. Finding out prime number greater than or lesser than a given value. Finding out all prime numbers within a given range	1) Scientific Computing in Python by Abhijit Kar Gupta	10		
	Root finding for a single variable (basic theory and algorithm) using Newton-Raphson andBisection method Sorting of lists (algorithm, flowchart and code) using Bubble or Selection sort Sum of series correct up to given decimal places (Sine, Cosine, Exponential etc.)		8		
	Simulation of motion of a particle in 1D under a given force F(x, t, v) with given initial condition and plotting (x, t), (x, v), (t, v). (Output to be saved in data files and Gnuplot to be used to plot graphs), using		6	Computer Practical	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra(SC) and Dr. Atri Sarkar (AS)

Paper Name & Code: Introduction to Computer Programming and Graph Plotting (Pr) SEC1, Semester - I

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Euler's method only.				
	Matrix Addition, Multiplication and Transpose using List Comprehension.		6		
		Total	60		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Semester - I

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Nature of Science	Role of proper reasoning and experiments, with examples. Inductive and deductive logic.	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes – Steven Weinberg	2	Chalk and Talk	
	The character of physical laws, including universality.		2		
	Difference between science and pseudo science		1		
2. Universe	The Copernican revolution, Kepler's laws and the Solar system, Galileo and birth of Telescopic Astronomy,	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes – Steven Weinberg	4	Chalk and Talk	
	Modern observations: Stars and galaxies, Life cycle of stars. Birth of the Universe,		3		
	Big Bang and Hubble expansion, Dark matter and dark energy.		3		
3. Matter	Atoms and molecules: The physical basis of the Periodic Table	1. The character of physical laws –	2	Chalk and Talk	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Heat and Thermodynamics: Basic idea about the kinetic theory of gases; Distinction between ideal and real gases; The three laws of thermodynamics. Concept of Entropy.	Richard P. Feynman 2. Introduction to Astronomy: From Darkness to Blazing Glory – J. W Scott, JAS Educational Publications	6		
	Radioactivity: Alpha, beta & gamma decay; X-Rays – Properties		3		
	Structure of the atom: Electron, Nucleus: proton and neutron. Mention of the Standard Model of particles & interactions.		4	Chalk and Talk	
4. Forces	Laws of falling bodies, Inertia, Gravitation, Electricity and Magnetism, Light and its dual property.	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes	5	Chalk and Talk	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	The microscopic world of Quantum Mechanics.	– Steven Weinberg	5	Chalk and Talk	
	Special and General Theory of Relativity (brief and qualitative ideas only)		5		
	Total Lectures		**45**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Subhendu Chandra (SC), Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS)

Paper Name & Code: Waves and Optics, DSCC 3, Sem III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Oscillations **(SC)**	Differential equation of simple harmonic oscillation and its solution. Kinetic energy, potential energy, total energy and their time average values.	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit 3) A Treatsie on Oscillations, Waves And Acoustics by Dr. D. Chattopadhyay	2	Chalk & talk, Assignment	
	Damped and forced oscillations: Transient and steady states, resonance, sharpness of resonance; power dissipation and Quality Factor.		2		
2. Superposition of Harmonic Oscillations **(SC)**	Superposition of two collinear Harmonic oscillations having equal frequencies and different frequencies (beats).		1	Chalk & talk, Assignment	
	Superposition of two Perpendicular Harmonic Oscillations for phase difference $\delta = 0,\pi,2\pi$: Graphical and analytical methods, Lissajous' figures with equal and unequal frequency and their uses.		2		
3. Wave motion **(SC)**	Plane and spherical waves. Longitudinal and transverse waves. Plane progressive (travelling) waves. Wave equation for travelling waves. Particle and wave velocities.		2	Chalk & talk	

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Subhendu Chandra (SC), Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS)

Paper Name & Code: Waves and Optics, DSCC 3, Sem III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
4. Superposition of harmonic Waves (SC)	Velocity of transverse vibrations of stretched strings; standing (stationary) waves in a string: fixed and free ends (analytical treatment).	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit 3) A Treatsie on Oscillations, Waves And Acoustics by Dr. D. Chattopadhyay	2	Chalk & talk	
	Changes with respect to position and time. Energy of vibrating string. Transfer of energy.		2		
	Normal modes of stretched strings. Plucked and struck strings, Superposition of N harmonic waves. Phase and group velocities.		2		
	Numerical problems		1		
5. Fermat's Principle (AS)	Fermat's principle, laws of reflection and refraction at a plane and curved surface.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	2	Chalk & talk	
6. Interference (AS)	Huygens principle, division of amplitude and wavefront. Young's double slit experiment. Fresnel's Biprism.		2	Chalk & talk	
	Phase change on reflection: Stokes' treatment. Interference in thin films: parallel and wedge shaped films.		3		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Subhendu Chandra (SC), Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS)

Paper Name & Code: Waves and Optics, DSCC 3, Sem III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Fringes of equal inclination (Haidinger fringes); Fringes of equal thickness (Fizeau fringes). Newton's Rings: Measurement of wavelength and refractive index.		3		
	Michelson interferometer (no detailed theory required), Fabry Perot interferometer. temporal and spatial coherence.		3		
	Numerical problems.		1		
7. Diffraction **(AS)**	Fraunhofer diffraction: Single slit, double slit and diffraction grating. Resolving power of grating.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	4	Chalk & talk	
	Rayleigh criterion for resolution. Circular aperture (qualitative discussion only).		2		
	Fresnel diffraction: Fresnel's half-period zones for plane wave. Explanation of rectilinear propagation of light. Theory of a Zone Plate: Multiple foci of a Zone Plate.		3		
	Class test		1		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Subhendu Chandra (SC), Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS)

Paper Name & Code: Waves and Optics, DSCC 3, Sem III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
. Polarization (SDG)	Description of linear, circular and elliptical polarization.	**1) Optics by E. Hecht** **2) Optics by Ajoy Ghatak** **3) Introduction to Optics by E. L. Pedrotti**	2	Chalk & talk, PPT, Assignment	
	Propagation of electromagnetic waves in birefringent medium, polarization in uniaxial crystals. Double refraction. Polarization by double refraction. Nicol prism. Ordinary and extraordinary refractive indices.		2		
	Phase Retardation plates: Quarter-wave and Half-wave plates. Production and analysis of polarized light.		2		
	Rotatory polarization, Biot's laws for rotatory polarization. Fresnel's theory of optical rotation. Calculation of angle of rotation. Specific rotation.		2		
	Numerical problems and Quiz		1		
	Class test.		1		
		Total	**50**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Subhendu Chandra (SC), Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS)

Paper Name & Code: Waves and Optics, DSCC 3, Sem III

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: Mathematical Physics I , DSC-4, Semester - III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. **Convergence of infinite series** **(KB)**	Convergence of power series. Idea of interval convergence.	1) Mathematical Methods in the Physical Science by M. L. Boas 2) Mathematical Physics by H. K. Dass 3) Mathematical Methods for Physics and Engineering by K. F Riley, Michael Paul Hobson, and Stephen John Bence	1	Chalk & talk, PPT, Assignment	
	Different convergence tests of power series: D'Alembert's ratio test, Cauchy's root test, Integral test.		2		
	Alternating series test. Absolute and conditional convergence.		1		
2. **Fourier Series** **(KB)**	Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients.		2	Chalk & talk, PPT, Assignment	
	Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions.		2		
	Applications. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity.		1		
	Class test and quiz.		1		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: Mathematical Physics I , DSC-4, Semester - III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
3. **Fourier Transform** **(SDG)**	Fourier Integral theorem. Fourier Transform (FT) with examples. FT of trigonometric, Gaussian, finite wave train, and other functions.	1) Mathematical Methods in the Physical Science by M. L. Boas 2) Mathematical Physics by H. K. Dass 3) Mathematical Methods for Physics and Engineering by K. F Riley, Michael Paul Hobson, and Stephen John Bence	2	Chalk & talk, PPT, Assignment	
	Inverse Fourier transform, Properties of FT (translation, change of scale, complex conjugation etc.). Parseval's identity.		2		
	Applications of FT in single slit, double slit, rectangular aperture and N-slit grating.		1		
	Class Test		1		
4. **Partial Differential Equations** **(GP)**	Solution to partial differential equations using separation of variables: Solutions of Laplace's equation in problems with Cartesian and spherically symmetric cases only.	1) Mathematical Physics by H. K. Dass 2) Mathematical Methods by Potter and Goldberg	4	Chalk & talk	
	Wave equation and its solution for vibrational modes of a stretched string, Diffusion Equation in one dimension.		3		
	Numerical and quiz		1		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: Mathematical Physics I , DSC-4, Semester - III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
5. **Introduction to Probability** **(GP)**	Probability for discrete events, and combined probability for uncorrelated events. Mean and variance.	1) Mathematical Methods in the Physical Science by M. L. Boas 2) Mathematical Physics by H. K. Dass	3	Chalk & talk	
	Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples.		3		
	One dimensional Random walk.		1		
	Class Test		1		
6. **Dirac δ-function** **(GP)**	Definition of Dirac δ-function. Delta function as limit of different delta-sequence functions. Properties of δ-function: $\delta(-x)$, $\delta(f(x))$.	1) Mathematical Methods for Physics and Engineering by K. F Riley, Michael Paul Hobson, and Stephen John Bence	2	Chalk & talk	
	Derivative of the step function. Fourier transform of δ-function. Two-and three-dimensional δ-function. Fourier transform of three-dimensional Coulomb potential, evaluation of $\nabla^2 \left(\frac{1}{r}\right)$.		2		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: Mathematical Physics I , DSC-4, Semester - III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
7. **Some special integrals** **(GP)**	Beta and Gamma functions and relation between them. Expression of integrals in terms of Gamma functions.	1) Mathematical Physics by H. K. Dass	3	Chalk & talk	
	Error function (probability integral). Numerical problems.		1		
8. **Numerical Analysis I** **(KB)**	*Approximation in numerical computation*: Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors: errors in normal distribution as quadrature (uncorrelated).	1) Numerical Methods, Arun Kr Jalan, Utpal Sarkar, 2015, University Press	1	Chalk & talk, PPT	
	Numerical solution of Algebraic equation: Bisection method, Newton-Raphson method.		1		
	Interpolation: Finite difference operators, Newton (Gregory) forward and backward interpolation, Lagrange's Interpolation.		2		
	Numerical integration: Trapezoidal rule, Simpson's 1/3 rule.		1		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: Mathematical Physics I , DSC-4, Semester - III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	System of linear algebraic equations: Direct methods: Gaussian elimination; Iterative methods: Gauss-Jacobi method, Gauss-Seidel method. Some qualitative discussion on matrix inversion technique.		2		
	Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods (order two and four).		2		
	Curve fitting: Curve fitting by the method of least squares. Fitting of curves of the form y = ax +b, $y = ax^b$ and $y = ax^2 + bx + c$.		1		
		Total	**50**		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Arduino SEC3, Semester- III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. **Prerequisite**	1. Basic Electronics: Familiarity with fundamental electronic components like resistors, capacitors, diodes, and transistors is essential. Understanding concepts like voltage, current, resistance and Ohm's law is crucial for working with circuits.	1) Arduino Cookbook, Michael Margolis, 2011, O'Reilly Media 2) Getting Started with Arduino, Massimo Banzi, 2009, O'Reilly Media	1	Hands on training, PPT	
	2. Circuit Design: Knowing how to design and analyze simple circuits is important. This includes understanding circuit diagrams, bread-boarding and connecting components properly.		1		
	3. Programming Fundamentals: Basic programming knowledge is necessary since Arduino programming involves writing code in C/C++. Understanding variables, loops, conditional statements and functions is vital.		2		
	4. Understanding Sensors and Actuators: Arduino projects often involve interfacing with sensors (e.g., temperature, light, motion) and actuators (e.g., motors, LEDs). Understanding how these devices work and how to interface them with the Arduino is essential.		2		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Arduino SEC3, Semester- III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	5. Digital and Analog Signals: Understanding the difference between digital and analog signals, as well as concepts like analog-to-digital conversion (ADC) and pulse-width modulation (PWM), is crucial for working with Arduino.		2		
	6. Serial Communication: Knowing how to communicate between the Arduino and other devices (e.g, computers, sensors) via serial communication (e.g, UART, 12C, SPI) is important for more advanced projects.	1) Arduino Cookbook, Michael Margolis, 2011, O'Reilly Media 2) Getting Started with Arduino, Massimo Banzi, 2009, O'Reilly Media	1	Hands on training, PPT	
	7. Problem-Solving Skills: Being able to troubleshoot and debug circuits and code is essential. This involves logical thinking and the ability to break down problems into smaller, more manageable parts.		1		
Introduction of Microcontroller & Arduino	Basic Idea about Microcontroller; Introduction to Arduino: Brief history of the Arduino; Pin configurations of the board Arduino Uno. Brief idea about Arduino-nano/Arduino R4 WiFi/Arduino MRGA. Sources of constant voltages 5volt/3.3 volt		5	Hands on training, PPT	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Arduino SEC3, Semester- III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	and ground and corresponding pins of the respective boards. PWM and idea of duty cycle.				
Arduino Programming	1. Setting up the arduino board. Installation of IDE in PC/laptop for Arduino programming.	1) Arduino Cookbook, Michael Margolis, 2011, O'Reilly Media 2) Getting Started with Arduino, Massimo Banzi, 2009, O'Reilly Media	1	PPT, Practical	
	2. Programming structure : Data types, variables, constants, operators, control statements, loops, functions, string.		3		
	Conditional like if, elseif; for and while loop. Idea about global variable and local variable.		2		
	Use of serial monitor for input/output and serial plotter for observation of variation of data.		2		
	3. Some Basic Operations: i) Binary operation through HIGH/LOW status of digital pin. Operation on inbuilt LED/LED connected externally in series with a resistance e.g., blinking.		1		
	ii) Sending analog voltage. Use of analog pins. Changing brightness of an LED.		1		
	iii) Measurement of voltage through appropriate pins.		1		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta (SDG)

Paper Name & Code: Arduino SEC3, Semester- III

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Projects	10 Projects using Arduino	1) Arduino Cookbook, Michael Margolis, 2011, O'Reilly Media, 2) Physics Today 66, 11, 8 (2013) 3) The Physics Teachers 52, 157 (2014)	25	Hands on training using Arduino.	
		Total	**50**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms Kathakali Biswas (KB)

Paper Name & Code:PHS-Minor4/2-3-1, PHS-Minor3-3-1, Basic Physics-I , Sem - III

Planned					
Unit/Group/ Module/ Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks/ Comments**
(A) Mathematical Physics					
1. Preliminaries (SDG)	a) Units & Dimension , Plotting functions	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk	
	b) Limits And continuity		1		
	c) Taylor and Binomial series		1		
	d) Calculus, maxima. Minima		1		
	e) Partial derivatives		1		
2. Ordinary Differential Equations (SDG)	a) First order	Mathematical Methods in the Physical Sciences by M.L. Boas	1	Chalk & talk, Assignment	
	b) Second order		1		
3 Vectors (SDG)	a) Vector products	Vector Analysis (Schaum's outline series) By Spiegel	2	Chalk & talk. Assignment	
	b) Vector differentiations, gradient , curl,		3		
	c) Divergence and Stoke's theorem		2		
4. Curvilinear Coordinates (SDG)	a) Plane polar, spherical, cylindrical coordinates, vectors, velocity and acceleration		5		
	b) Vector integrals		1		
	Total		**20**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms Kathakali Biswas (KB)

Paper Name & Code:PHS-Minor4/2-3-1, PHS-Minor3-3-1, Basic Physics-I , Sem - III

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
(B) Classical Mechanics					
1. Review of Newton's Laws (GP)	a) Inertial frames , Galilean transformation	Classical Mechanics By A.B. Gupta	1	Chalk & talk	
	b) Newton's laws conservation of linear momentum		1		
	c) Rotational motion		2		
	d) Problems		2		
2. Work Kinetic energy Theorem (GP)	a) Conservative and non conservative forces, potential		2		
	b) potential energy curves and Stability		1		
	c) Small oscillation		1		
3. Dynamics of a system of particles (GP)	a) COM and reduced mass	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Momentum and energy of a system of particles		2		
4. Central forces (GP)	a) Laws of Gravitation		1		
	b) Gravitational Potential and Intensity		2		
	c) Equation of motion in Central forces		3		
	d) Motion under inverse square law		2		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms Kathakali Biswas (KB)

Paper Name & Code:PHS-Minor4/2-3-1, PHS-Minor3-3-1, Basic Physics-I , Sem - III

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
5. Scattering (KB)	a) Two body collision and scattering	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
6. Mechanics of Continuum (KB)	a) Kinematics of moving fluids, equation of continuity	Classical Mechanics By A.B. Gupta	2	Chalk & talk	
	b) Streamline and turbulent flow		1		
	c) Stokes law, Euler equation,		1		
	d) Bernoulli's Theorem & application		2		
	Total		30		
TOTAL (A+B)			**20+30=50**		

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Semester - III

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Nature of Science	Role of proper reasoning and experiments, with examples. Inductive and deductive logic.	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes – Steven Weinberg	2	Chalk and Talk	
	The character of physical laws, including universality.		2		
	Difference between science and pseudo science		1		
2. Universe	The Copernican revolution, Kepler's laws and the Solar system, Galileo and birth of Telescopic Astronomy,	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes – Steven Weinberg	4	Chalk and Talk	
	Modern observations: Stars and galaxies, Life cycle of stars. Birth of the Universe,		3		
	Big Bang and Hubble expansion, Dark matter and dark energy.		3		
3. Matter	Atoms and molecules: The physical basis of the Periodic Table	1. The character of physical laws –	2	Chalk and Talk	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Heat and Thermodynamics: Basic idea about the kinetic theory of gases; Distinction between ideal and real gases; The three laws of thermodynamics. Concept of Entropy.	Richard P. Feynman 2. Introduction to Astronomy: From Darkness to Blazing Glory – J. W Scott, JAS Educational Publications	6		
	Radioactivity: Alpha, beta & gamma decay; X-Rays – Properties		3		
	Structure of the atom: Electron, Nucleus: proton and neutron. Mention of the Standard Model of particles & interactions.		4	Chalk and Talk	
4. Forces	Laws of falling bodies, Inertia, Gravitation, Electricity and Magnetism, Light and its dual property.	1. Six Easy Pieces – Richard P. Feynman 2. The first three minutes	5	Chalk and Talk	

LESSON PLAN, AY 2025-26

Department Name: Physics

Name of Faculty: Dr. Atri Sarkar (AS)

Paper Name & Code: IDC (INTERDISCIPLINARY COURSE): FRONTIERS IN PHYSICS

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	The microscopic world of Quantum Mechanics.	– Steven Weinberg	5	Chalk and Talk	
	Special and General Theory of Relativity (brief and qualitative ideas only)		5		
	Total Lectures		**45**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Maitreyi Ray Kanjilal (MRK), Dr Subhendu Chandra (SC)

Paper Name & Code: DSCC-9, Analog Electronics, Sem - V

Planned					
Unit/Group/ Module/ Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks/ Comments**
1. Circuits and network (DC) **(SC)**	Discrete components, active and passive components, ideal constant voltage and constant current sources.	1) Circuit Theory by Chattopadhyay and Rakshit 2) Electricity and Magnetism by B. Ghosh	2	Chalk & talk	
	Network analysis: Kirchhoff's laws, Thevenin's and Norton's theorem, Superposition theorem. Maximum power transfer theorem.		2		
2. Semiconductor diodes and applications **(SC)**	P and N type semiconductors. Energy level diagram. Conductivity and mobility, concept of drift velocity. PN junction fabrication (simple idea only). Barrier formation in PN junction diode. Static and dynamic resistance. Current flow mechanism in forward and reverse biased diode. Drift velocity.	1) Basic Electronics by Chattopadhyay and Rakshit 2) Principles of Electronics by Malvino	4	Chalk & talk	
	Rectifier diode: Half-wave rectifiers. Centre-tapped and Bridge full-wave rectifiers, Calculation of Ripple Factor and Rectification Efficiency,		2		
	L and C filter. Circuit and operation of clipping and clamping circuit; principle and structure of LEDs, photodiode, solar cell.		3		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Maitreyi Ray Kanjilal (MRK), Dr Subhendu Chandra (SC)

Paper Name & Code: DSCC-9, Analog Electronics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
3.Bipolar junction transistors and biasing **(SC)**	n-p-n and p-n-p transistors. Characteristics of CB, CE and CC configurations. Physical mechanism of current flow. Relations between the current gains of the three modes. Active, cut-off and saturation regions. DC load line and Q-point;	1) Basic Electronics by Chattopadhyay and Rakshit 2) Principles of Electronics by Malvino 3) Circuits and Networks by Boyelsted and Nesalsky	4	Chalk & talk	
	Transistor biasing and stabilization circuits. Fixed bias, collector to base bias, emitter or self bias, voltage divider bias.		3		
	Transistor as 2-port network. h-parameter equivalent circuit. Analysis of a single-stage CE amplifier using hybrid model. Input and output impedance.		3		
4. Field Effect transistors **(SC)**	JFET and MOSFET (both depletion and enhancement type) as a part of MISFET. Basic structure and principle of operations and their characteristics. Pinch off, threshold voltage and short channel effect.	1) Basic Electronics by B. L. Theraja	3	Chalk & talk	
5. Regulated power supply **(SC)**	Load regulation and line regulation. Zener diode as a voltage regulator. Problem with the Zener regulator circuit. Requirement of feedback and error amplifier. Study of series regulated power supply using pass and error transistor assisted by Zener diode as a reference voltage supplier.	1) Basic Electronics by Chattopadhyay and Rakshit	3	Chalk & talk	

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Maitreyi Ray Kanjilal (MRK), Dr Subhendu Chandra (SC)

Paper Name & Code: DSCC-9, Analog Electronics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
6. Amplifiers **(SC)**	Transistor amplifier; CB, CE and emitter follower circuit and their uses. Load Line analysis of transistor amplifier.	1) Basic Electronics by B. L. Theraja 2) Circuits and Networks by Boyelsted and Nesalsky	2	Chalk & talk	
	Classification of class A, B and C amplifiers with respect to placement to Q point. Frequency response of a CE amplifier. Role of series and parallel capacitors for cut off frequencies.		3		
7. Feedback amplifiers and OPAMP **(MRK)**	Effects of positive and negative feedback. Voltage series, current series, voltage shunt and current shunt feedback and uses for specific amplifiers. Estimation of input impedance, output impedance, gain, stability;	1) Analog Electronics by Milman & Halkias 2) OP-AMPs and Linear Integrated Circuits by R. A. Gayakwad	3	Chalk & talk	
	Operational Amplifiers (black Box approach): Characteristics of ideal and practical OP-AMP (IC 741), Open-loop and closed-loop voltage gain. Frequency response. CMRR. Slew rate and concept of virtual ground.		2		
	Application of OP-AMP: DC application — inverting and non-inverting amplifiers, inverting and noninverting adder, differentiator as subtractor, error amplifier, comparator, Schmidt trigger. AC applications: differentiator, integrator.		3		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Maitreyi Ray Kanjilal (MRK), Dr Subhendu Chandra (SC)

Paper Name & Code: DSCC-9, Analog Electronics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
8. Multivibrator **(SC)**	Transistor as a switch, Explanation using CE output characteristics. Construction and operation using wave shapes of collector coupled Bistable, Monostable and astable multivibrator circuits, Expression for time period.	1) Basic Electronics by Chattopadhyay and Rakshit 2) Basic Electronics by B. Ghosh	**5**	Chalk & talk	
9. Oscillators **(SC)**	Sinusoidal oscillators: Barkhausen's criterion for self-sustained oscillations. RC phase shift oscillator, Wien bridge oscillator, determination of feedback factor and frequency of oscillation. Relaxation oscillator using OP-AMP	1) Basic Electronics by Chattopadhyay and Rakshit 2) Analog Electronics by Milman & Halkias	**3**	Chalk & talk	
TOTAL			**50**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Atri Sarkar (AS). Ms. Kathakali Biswas (KB)

Paper Name & Code: Nuclear and Particle Physics, DSC-10, Sem-V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Rutherford scattering(AS)	Calculation of differential cross-section.	1) Nuclear Physics by S.N. Ghosal 2) Nuclear Physics bySatadal Bhattacharya 3) Radiation detection and measurement by G.F. Knoll	2	Chalk and talk	
2. Nuclear properties and structure (AS)	Mass, charge, size, B.E, spin and magnetic moment of the nucleus; Impossibility of anelectron being in the nucleus as a consequence of the uncertainty principle		4	Chalk and talk	
	Isotopes, isobars, isotones. Bainbridge Mass Spectrograph. Nature of nuclear force between nucleons, Stability and binding, N -Z plot.		2	Chalk and talk	
	Nuclear models: Liquid Drop model. Bethe-Weizsäcker semi-empirical mass formula and binding energy.		3	Chalk and talk	
	Some applications: explanation of α decay by heavy nuclei, mass parabola, explanation of β decay by mirror nuclei. Nuclear shell model and magic numbers, ground state spin parity, Nordheim's Rule (qualitative discussion on phenomenology with examples).		6	Chalk and talk	

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Atri Sarkar (AS). Ms. Kathakali Biswas (KB)

Paper Name & Code: Nuclear and Particle Physics, DSC-10, Sem-V

3. Interaction with and within the nucleus (AS)	Radioactivity: α- decay — kinematics, range-energy relationship and Geiger-Nuttall Law; β-decay — energy released, spectrum and Pauli's prediction of neutrino; Energy levels and decay schemes, positron emission and electron capture, selection rules: Fermi and Gamow-Teller transitions.	1)Nuclear Physics by S.N. Ghosal 2)Nuclear Physics by Satadal Bhattacharya 3)Radiation detection and measurement by G.F. Knoll	6	Chalk and talk	
	γ-ray emission, nuclear isomerism, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.		4	Chalk and talk	
4. Nuclear Reactions (KB)	Types of reactions, conservation laws, kinematics of reactions, Q-value, reaction rate, reaction cross-section. Concept of compound and direct reaction, Ghoshal's experiment.	1)Nuclear Physics by S.N. Ghosal 2)Solid State and Nuclear Physics by Dr. J.P Agrawal 3)Introduction to Elementary Particles, D. Griffiths, 2008, John Wiley & Sons	3	Chalk and talk, PPT	
	Resonance reaction, fission and fusion: mass deficit and generation of energy. Reaction characteristics, explanation in terms of liquid drop model, fission products and energy release, spontaneous and induced fission, transuranic elements.		3	Chalk and talk, PPT	
	Chain reaction and basic principle of nuclear reactors. Nuclear fusion: energetics in terms of liquid drop model. Chain reaction and basic principle of nuclear reactors, slow neutrons interacting with U-235, Nuclear Fusion — energetics in terms of liquid drop model (brief qualitative discussions).	1)Nuclear Physics by S.N. Ghosal 2)Nuclear Physics by Satadal Bhattacharya	4	Chalk and talk, PPT	

5. Particle accelerators and detectors (KB)	Linear accelerator, cyclotron, betatron, gas detectors — GM Counters. Semiconductor detectors.		3	Chalk and talk, PPT	
6. Particle physics (AS)	Elementary particles and their families, interactions and basic features. Symmetry and conservation laws: energy and momentum, angular momentum, parity, baryon number, lepton number, isospin, hypercharge, and strangeness.	1)Nuclear Physics by S.N. Ghosal	3	Chalk and talk	
	Wu's experiment and basic idea of parity violation. Gell-Mann–Nishijima formula. The baryon and meson octet and baryon decuplet diagrams. Quark structure of hadrons. Concept of quark model, color quantum number and gluons (qualitative discussion only).		4	Chalk and talk	
7. Nuclear Astrophysics (AS)	Energy production in stars, p-p chain, CNO cycle. Production of heavier elements (qualitative discussion).	1)Nuclear Physics by S.N. Ghosal	3	Chalk and talk	
		Total	**50**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Quantum Mechanics, DSCC 11, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Formulation of Quantum Mechanics in vector space language (SDG)	State as a vector in a complex vector space, inner product, its properties using Dirac bra-ket notation.	**1) Quantum Mechanics Concepts and Applications by Nouredine Zettili** **2) Introduction to Quantum Mechanics by Krishnendu Sengupta and Palash B. Pal**	2	Chalk & talk, Assignment, PPT	
	Physical observables as Hamiltonian operators on state space; eigenvalues, eigenvectors and completeness property of the eigenvectors-matrix representation of Hermitian operators.		3		
	Unitary time evolution. Wavefunction as the probability amplitude distribution of a state for the observables with continuous eigenvalues.		2		
	Position representation and momentum representation of wave-function and operators. Interpretation of $\psi(r)=<r\|\psi>$.		2		
	One dimensional harmonic oscillator by raising and lowering operator method. Matrix representation of position and momentum operators.		3		
	Numerical Problems		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Quantum Mechanics, DSCC 11, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
2. Two and three dimensional problems **(SDG)**	Two and three dimensional problems in Cartesian coordinates: separation of variables. Application for free particle, Particle in 2-d and 3-d box. Degeneracy of energy levels. Concept of symmetry and accidental degeneracy in 2-d box. Isotropic and anisotropic harmonic oscillator. Degeneracy for isotropic harmonic oscillator in 2-d and 3-d.	**1) Quantum Mechanics Concepts and Applications by Nouredine Zettili** **2) Introduction to Quantum Mechanics by Krishnendu Sengupta and Palash B. Pal** **3) Quantum Mechanics by Walter Greiner**	3	Chalk & talk, PPT, Assignment	
	Class test		1		
3. Angular momentum algebra using Ladder operators **(SDG)**	Construction of matrix representation of L_x, L_y, L_z for $l=1$. Algebra with Ladder operators.		2	Chalk & talk, PPT, Assignment	
	Addition of angular momenta $l_1 + l_2$, and their projections. Spin as an intrinsic angular momentum and its relation with the Pauli matrices for spin-1/2.		2		
	Numerical Problems		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Quantum Mechanics, DSCC 11, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
4. Quantum theory of hydrogen-like atoms **(SDG)**	Reduction of a two-body problem to a one body problem. The time independent Schrödinger equation for a particle moving under central force; the Schrödinger equation in spherical polar coordinates.	**1) Quantum Mechanics Concepts and Applications by Nouredine Zettili** **2) Introduction to Quantum Mechanics by Krishnendu Sengupta and Palash B. Pal** **3) Quantum Mechanics by Walter Greiner**	2		
	Separation of variables. Angular equation and orbital angular momentum. Spherical Harmonics (solution to Legendre differential equation may be assumed).		3		
	Radial equation for attractive Coulomb interaction- Hydrogen atom. Solution for the radial wavefunctions (solution to Laguerre differential equation may be assumed). Sketch of probability densities. Orbital angular momentum number *l* and *m, s,p,d* shells.		3		
	Peer teaching		1		
	Numerical problems		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Quantum Mechanics, DSCC 11, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Quantum Statistical Mechanics **5. System of identical particles** **(GP)**	Collection of non-interacting identical particles. Classical approach and quantum approach: distinguishability and indistinguisability.	**1) Statistical Mechanics: Theory, Problems, and Solutions by** **Dr. Upendranath Nandi** **2) Statistical Mechanics** **R.K.Patharia**	**1**	Chalk & talk, assignment	
	Composite system postulate and symmetry postulate of quantum mechanics (for a pair particles only). Bosons and Fermions. Symmetric and antisymmetirc wave functions.		**2**		
	Pauli Exclusion principle for Fermions. Derivation of Bose-Einstein and Fermi-Dirac distribution function using grand canonical ensemble.		**4**		
	Numericals		**1**		
6. Bose-Einstein statistics **(GP)**	Thermodynamic functions of a strongly degenerate Bose gas. Bose derivation of Planck's law.		**3**	Chalk & talk, Assignment	
	Radiation as a photon gas. Bose-Einstein condensation and properties of liquid He-4 (qualitative description only).		**2**		
	Numericals		**1**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Quantum Mechanics, DSCC 11, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
7. Fermi-Dirac statistics (GP)	Thermodynamic functions of a strongly degenerate Fermi gas	**1) Statistical Mechanics: Theory, Problems, and Solutions by Dr. Upendranath Nandi** **2) Statistical Mechanics R.K.Patharia**	**3**	Chalk & talk, Assignment	
	Fermi energy, electron gas in a metal, Specific heat of metals due to electrons (qualitative discussions).		**2**		
	Numericals		**1**		
		Total	**50**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: DSCC-12, Thermal Physics and Statistical Mechanics, Sem - V

Planned					
Unit/Group/ Module/ Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks/ Comments**
Kinetic Theory of Gases **1. Transport phenomenon in ideal gas (SDG)**	Viscosity, thermal conductivity and diffusion.	**1) Thermal Physics by Roy and Gupta**	**2**	Chalk & talk, PPT, Assignment	
	Brownian motion and its significance (Langevin approach)		**2**		
	Quiz and peer teaching		**1**		
2. Conduction of heat	Thermal conductivity and diffusivity. Variable and steady state; Fourier's equation for heat conduction and its solution for rectilinear flow of heat.	**2) Thermal Physics by Garg, Bansal and Ghosh**	**2**	Chalk & talk, PPT, Assignment	
	Numericals		**1**		
3. Real Gas	Behavior of real gases: Deviations from the ideal gas Equation. Andrew's experiments on CO_2. Critical constants. Continuity of liquid and gaseous state. Vapour and gas. Boyle temperature. Van der Waals' equation of state. Critical const. Law of corresponding states. Comparison with expt. P-V		**4**	Chalk & talk, PPT, Assignment	

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: DSCC-12, Thermal Physics and Statistical Mechanics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
Thermodynamics **1.Thermodynamic Potentials (KB)**	Generic conditions of stable equilibrium for (V,T) and (P,T) systems. Internal energy, enthalpy, Helmholtz free energy, Gibbs free energy	**1)Thermal physics by A.B. Gupta and H.P. Roy** **2) Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill**	**4**	Chalk & talk	
	Use of Legendre transform in these cases. Properties and applications.		**2**		
2. Maxwell's thermodynamic relations (KB)	Derivation and applications: (i) T dS equations, (ii) Difference of specific heats, (iii) Variation of specific heats, (iv) Ratios of volume expansivity, pressure coefficients, compressibility.		**3**	Chalk & talk	
	Change of temperature during Adiabatic process; Joule-Thomson effect. Porous plug experiment: Throttling process. Joule-Thomson effect for ideal and real gases. Temperature of inversion. Joule-Thomson cooling.		**4**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: DSCC-12, Thermal Physics and Statistical Mechanics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
3 . Phase transition (KB)	Classification of phase transitions; First order phase transitions: Clausius-Clapeyron equation, Second latent heat equation; Continuous phase transitions: Ehrenfest's equation.	**1)Thermal physics by A.B. Gupta and H.P. Roy**	**3**	Chalk & talk	
4. Radiation (KB)	Classical and quantum aspects: Properties of thermal radiation. Black-body radiation. Temperature dependence. Kirchhoff's law. Stefan-Boltzmann law: thermodynamic proof.	**2)Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill**	**3**	Chalk & talk	
	Calculation of energy density and pressure of radiation from thermodynamics. Spectral distribution of black-body radiation.		**2**		
	Rayleigh-Jeans law and the ultraviolet catastrophe, Planck's quantum postulates. Planck's law of black-body radiation. Deduction of Rayleigh-Jeans law, Stefan-Boltzmann law, Wien's displacement law from Planck's law.		**2**		

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: DSCC-12, Thermal Physics and Statistical Mechanics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
Classical Statistical Mechanics **1. Macrostate and Microstate (GP)**	Elementary Concept of Ensemble and Ergodic Hypothesis (statement only).	**1) Statistical Mechanics: Theory, Problems, and Solutions by Dr. Upendranath Nandi** **2) Statistical Mechanics by R.K. Patharia**	**1**	Chalk & talk	
	Phase space. Microcanonical ensemble, Postulate of equal a priori probability. Boltzmann hypothesis: Entropy and thermodynamic probability.		**2**	Chalk & talk	
	Numericals		**1**	Chalk & talk	
2. Canonical ensemble **(GP)**	Partition function,		**1**	Chalk & talk	
	Thermodynamic properties of an ideal gas. Thermodynamic properties of classical and quantum harmonic oscillator in one dimension using canonical ensemble.		**3**		
	Classical entropy expression, Gibbs paradox. Equivalence of microcanonical and canonical ensembles. Sackur-Tetrode equation, Law of equipartition of energy (with proof) and its applications.		**3**	Chalk & talk	

LESSON PLAN

Department Name: Physics, AY 2025-26

Name of Faculty: Dr. Gayatri Pal (GP), Dr Shinjinee Das Gupta (SDG), Ms. Kathakali Biswas (KB)

Paper Name & Code: DSCC-12, Thermal Physics and Statistical Mechanics, Sem - V

Unit/Group/ Module/ Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks/ Comments
2. Canonical ensemble **(GP)**	Thermodynamic functions of a two-energy level system. Negative temperature.	**1) Statistical Mechanics: Theory, Problems, and Solutions by Dr. Upendranath Nandi** **2) Statistical Mechanics by R.K. Patharia**	**1**	Chalk & talk	
	Idea of chemical potential and grand canonical ensemble. Application of ideal gas using grand canonical ensemble.		**2**	Chalk & talk	
	Numericals		**1**	Chalk & talk	
TOTAL			**50**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor4/1-5-1/ PHS-Minor4/2-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Oscillations (KB)	Differential equation of simple harmonic oscillation and its solution. Kinetic energy, potential energy, total energy and their time average values.	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit	3	Chalk & talk, Assignment	
	Damped and forced oscillations: Transient and steady states, resonance, sharpness of resonance; power dissipation and Quality Factor.		3		
2. Superposition of Harmonic Oscillations (KB)	Superposition of two collinear Harmonic oscillations having equal frequencies and different frequencies (beats).		1	Chalk & talk, Assignment	
	Superposition of two Perpendicular Harmonic Oscillations for phase difference $\delta = 0, \pi, 2\pi$:		2		
3. Wave motion (KB)	Plane progressive (travelling) waves. Wave equation for travelling waves. Particle and wave velocities.		2	Chalk & talk	

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor4/1-5-1/ PHS-Minor4/2-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Velocity of transverse vibrations of stretched strings; standing (stationary) waves in a string.	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit	3	Chalk & talk	
	Phase and group velocities, Doppler effect.		2		
	Numerical problems		1		
4. Geometrical Optics (SDG)	Fermat's principle. Laws of reflection and refraction at a plane surface, refraction at a spherical surface, lens formula.	1) Optics by Ajoy Ghatak 2) Optics by B. Ghosh	2	Chalk & talk, PPT	
	Combination of thin lenses-equivalent focal length. Dispersion and dispersive power.		2		
	Numerical problems		1		
5. Interference (SDG)	Huygens principle: explanation of the laws of reflection and refraction.	1) Optics by Ajoy Ghatak 2) Optics by B. Ghosh	2	Chalk & talk	
	Division of amplitude and wavefront. Young's double slit experiment. intensity distribution, conditions of interference.		3		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor4/1-5-1/ PHS-Minor4/2-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Interference in thin films: parallel and wedge shaped films: parallel and wedge shaped films.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	3		
	Fringes of equal inclination (Haidinger fringes); Fringes of equal thickness (Fizeau fringes). Newton's Rings: Measurement of wavelength and refractive index.		3		
	Numerical problems.		1		
6. Diffraction (SDG)	Fraunhofer diffraction: Single slit, double slit and diffraction grating. Resolving power of grating.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	3	Chalk & talk	
	Rayleigh criterion for resolution. Circular aperture (qualitative discussion only).		2		
	Fresnel diffraction: Fresnel's half-period zones for plane wave. Theory of a Zone Plate: Multiple foci of a Zone Plate.		2		
	Class test		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP), Dr. Shinjinee Das Gupta (SDG) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor4/1-5-1/ PHS-Minor4/2-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
7. Polarization **(SDG)**	Description of linear, circular and elliptical polarization.	**1) Optics by E. Hecht** **2) Optics by Ajoy Ghatak** **3) Introduction to Optics by E. L. Pedrotti**	1	Chalk & talk, PPT, Assignment	
	Propagation of electromagnetic waves in birefringent medium, polarization in uniaxial crystals. Double refraction. Polarization by double refraction. Ordinary and extraordinary refractive indices.		2		
	Phase Retardation plates: Quarter-wave and Half-wave plates.		1		
	Rotatory polarization, Biot's laws for rotatory polarization. Specific rotation.		2		
	Numerical problems		1		
	Class test.		1		
		Total	**50**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Modern Physics, PHS-Minor, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Special Theory of Relativity (AS)	Postulates of STR, Lorentz Transformation (Derivation not required). Derivation of i) length contraction, ii) time dilation, iii) velocity addition for velocities in same direction.	**1) Special Theory of Relativity by Robert Resnick**	5	Chalk & talk, Assignment	
	Energy-momentum dispersion relation. Mass-energy equivalence.		3		
2. Quantum theory of Radiation (GP)	Planck's concept, radiation formula (statement only).	**1) Modern Physics by R. Murugeshan**	1	Chalk & talk, Assignment	
	Photoelectric effect. Bohr's theory. Effect of finite nuclear mass. Compton effect.		6		
	Numerical		1		
3. Basic Quantum Mechanics (GP) 15	Wave nature of material particle, wave-particle duality, wavelength of de-Broglie waves, Heisenberg Uncertainty principle.	**1) Modern Physics by R. Murugeshan**	7	Chalk & talk	

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Modern Physics, PHS-Minor, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Schrodinger equation, time-dependent and time-independent Schrodinger wave-function and its probabilistic interpretation. Normalization.	**1) Modern Physics by R. Murugeshan**	2	Chalk & talk	
	Introduction to linear operators. Calculation of various commutation relations.		1		
	Particle in a one dimensional infinite potential well: energy eigen values. Schrodinger equation for one dimesional harmonic oscillator. Energy eigenvalues and energy eigenfunctions. (only first three wavefunctions, no need to introduce Hermite polynomial).		5		
4. Crystal Structure (AS)	Crystalline structure of solid, Miller indices, lattice planes, simple cubic, FCC and BCC lattices.	**1) Solid State Physics by Puri and Babbar**	3	Chalk & talk, PPT	
	Diffraction of X-ray, Bragg's law, Moseley's Law: explanation from Bohr's theory. Continuous and characteristic X-ray.		3		
	Numerical problems		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Ms. Kathakali Biswas (KB)

Paper Name & Code: Modern Physics, PHS-Minor, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
5. Structure of Solids (AS)	Different types of bonding: ionic, covalent, metallic, Van der Waals and hydrogen.	**1) Solid State Physics by Puri and Babbar**	3	Chalk & talk	
	Elementary ideas about band structure in conductors, direct and indirect semiconductors and insulators (qualitative discussions) .		3		
6. Magnetic properties of material (AS)	Dia, para and ferro-magnetic properties of solids. Origin of dia-magnetism.	**1) Solid State Physics by Puri and Babbar**	2	Chalk & talk	
	Langevin theory of paramagnetism and Curie's law.		2		
	Domain structure of ferromagnetic materials. B-H loop and hysteresis.		2		
		Total	**50**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS), Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor3-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Oscillations **(KB)**	Differential equation of simple harmonic oscillation and its solution. Kinetic energy, potential energy, total energy and their time average values.	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit	3	Chalk & talk, Assignment	
	Damped and forced oscillations: Transient and steady states, resonance, sharpness of resonance; power dissipation and Quality Factor.		3		
2. Superposition of Harmonic Oscillations **(KB)**	Superposition of two collinear Harmonic oscillations having equal frequencies and different frequencies (beats).		1	Chalk & talk, Assignment	
	Superposition of two Perpendicular Harmonic Oscillations for phase difference $\delta = 0, \pi, 2\pi$:		2		
3. Wave motion **(KB)**	Plane progressive (travelling) waves. Wave equation for travelling waves. Particle and wave velocities.		2	Chalk & talk	

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS), Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor3-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Velocity of transverse vibrations of stretched strings; standing (stationary) waves in a string.	1) Waves and Oscillations, Brij Lal & N Subrahmanyam Vikas Publishing 2) Vibrations, Waves and Acoustics by Dr. D. Chattopadhyay & Dr. P. C. Rakshit	3	Chalk & talk	
	Phase and group velocities, Doppler effect.		2		
	Numerical problems		1		
4. Geometrical optics **(SDG)**	Fermat's principle. Laws of reflection and refraction at a plane surface, refraction at a spherical surface, lens formula.	**1) Optics by Ajoy Ghatak** **2) Optics by B. Ghosh**	2	Chalk & talk, PPT	
	Combination of thin lenses-equivalent focal length. Dispersion and dispersive power.		2		
	Numerical problems		1		
5. Interference **(AS)**	Huygens principle: explanation of the laws of reflection and refraction.		2	Chalk & talk	
	Division of amplitude and wavefront. Young's double slit experiment. intensity distribution, conditions of interference.		3		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS), Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor3-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	Interference in thin films: parallel and wedge shaped films: parallel and wedge shaped films.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	3		
	Fringes of equal inclination (Haidinger fringes); Fringes of equal thickness (Fizeau fringes). Newton's Rings: Measurement of wavelength and refractive index.		3		
	Numerical problems.		1		
6. Diffraction **(AS)**	Fraunhofer diffraction: Single slit, double slit and diffraction grating. Resolving power of grating.	**1) Wave and Optics by A. B. Gupta** **2) Optics by Ajoy Ghatak** **3) Optics by B. Ghosh**	3	Chalk & talk	
	Rayleigh criterion for resolution. Circular aperture (qualitative discussion only).		2		
	Fresnel diffraction: Fresnel's half-period zones for plane wave. Theory of a Zone Plate: Multiple foci of a Zone Plate.		2		
	Class test		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Shinjinee Das Gupta (SDG) , Dr. Atri Sarkar (AS), Ms. Kathakali Biswas (KB)

Paper Name & Code: Waves and Optics, PHS-Minor3-5-1, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
7. Polarization **(SDG)**	Description of linear, circular and elliptical polarization.	**1) Optics by E. Hecht** **2) Optics by Ajoy Ghatak** **3) Introduction to Optics by E. L. Pedrotti**	1	Chalk & talk, PPT, Assignment	
	Propagation of electromagnetic waves in birefringent medium, polarization in uniaxial crystals. Double refraction. Polarization by double refraction. Ordinary and extraordinary refractive indices.		2		
	Phase Retardation plates: Quarter-wave and Half-wave plates.		1		
	Rotatory polarization, Biot's laws for rotatory polarization. Specific rotation.		2		
	Numerical problems		1		
	Class test.		1		
		Total	**50**		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Electronics I, PHS-Minor3-5-2, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Basic Analog Electronics **1. Circuits and network** **(GP)**	Discrete components, active and passive components, ideal constant voltage and constant current sources.	**1) Fundamental principles of Electronics by Basudev Ghosh** **2) Electronics Theory and Applications by D. Chattapadhyay and P. C. Rakshit**	3	Chalk & talk, Assignment	
	Network analysis: Kirchhoff's laws, Thevenin's and Norton's theorems, Reciprocity theorem, Superposition theorem. Maximum power transfer theorem.		3		
2. Semiconductor diodes and applications **(GP)**	(a) Semiconductor diodes: P and N type semiconductors. Barrier formation in PN junction diode. Qualitative idea of current flow mechanism in forward and reverse biased diodes. PN junction and its characteristics. Static and dynamic resistance. Principle and structure of LED, photodiode, Solar Cell.		5	Chalk & talk, Assignment	
	(b) Application of diodes: Half-wave rectifies. Centre-tapped and bridge full-wave rectifiers, Ripple factor and Rectification efficiency. Basic idea about capacitor filter. Zener diode and voltage regulation.		5		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Electronics I, PHS-Minor3-5-2, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	(c) Bipolar junction transistors: n-p-n and p-n-p transistors. Characteristics of CB, CE and CC configurations. Active, cut-off and saturation regions. Current gains α and β, relations between them. Load line analysis of transistors. DC load line and Q-point. Concept of biasing.	**1) Fundamental principles of Electronics by Basudev Ghosh** **2) Electronics Theory and Applications by D. Chattapadhyay and P. C. Rakshit**	5	Chalk & talk, assignment	
3. Power Supply **(GP)**	Difference between regulated and unregulated power supplies. Load regulation and line regulation. Zener as voltage regulator.		3		
	Numerical problems		1		
Basic Digital Electronics **1. Number system (SDG)**	Binary numbers, decimal to binary and reverse conversions. Binary addition and subtraction (1's complement and 2's complement), signed and unsigned number. negative numbers.	**1) Digital Electronics by Malvino and Leech**	6	Chalk & talk, assignment	
	Logic gates, Universal gates, XOR, XNOR gates. De Morgan's theorem. Realization of OR and NOT gates using diode and transistors.		5		
	Numerical problems		1		

LESSON PLAN, AY 2025-2026

Department Name: Physics

Name of Faculty: Dr. Gayatri Pal (GP) , Dr. Shinjinee Das Gupta (SDG)

Paper Name & Code: Electronics I, PHS-Minor3-5-2, Semester - V

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
2. Digital Circuits (SDG)	Difference between analog and digital circuits. XOR and XNOR gates as parity checkers. SOP and POS expressions. Minterms and Maxterms.	**1) Digital Electronics by Malvino and Leech**	5	Chalk & talk, Assignment	
	Conversion between truth table and logical expressions, Simplification of logical expressions. K-maps up to four variables.		5		
	Numerical problems.		2		
	Class test		1		
		Total	**50**		