

# LESSON PLAN

Department Name: Physics

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

Ms Kathakali Biswas ( KB)

Paper Name & Code: Mathematical Physics II ( Th) CC5

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Fourier Series ( SC)	a) Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only).	1) Mathematical Methods by Rajput 2) Principles of Mathematical Physics by Kuila 3) Engineering Mathematics by B. S. Grewal	2	Chalk and Talk	
	Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients.		2		
	Complex representation of Fourier series. Expansion of functions with arbitrary period.		2		
	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.		2		
2. Frobenius method and	Singular Points of Second Order	1. Mathematical	4	Chalk and Talk	

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**Paper Name & Code: Mathematical Physics II ( Th) CC5**

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
Special functions ( KB)	Linear Differential Equations and their importance. Power series solution of 2nd order differential equation.	Methods in the Physical Sciences, M. L. Boas, 2005, Wiley 2. Mathematical Physics, H K Dass, S. Chand		Chalk and Talk	
	Frobenius method and its applications to differential equations.		3		
	Legendre Differential Equations		3		
	Bessel Differential Equations		3		
	Hermite Differential Equations		3		
	Problem Discussion		4		
3. Some Special Integrals ( KB)	Gamma Functions	1. Mathematical Methods in the Physical Sciences, M. L. Boas, 2005, Wiley 2. Mathematical Physics, H K Dass, S. Chand	1	Chalk and Talk	
	Beta functions		2		
	Error function		1		

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Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Integral transforms ( SC)	Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples.	1) Mathematical Methods by Gupta, Kumar, Sharma 2) Mathematical Physics by Arfken 3) Engineering Mathematics by B. S. Grewal	2		
	Fourier transform of trigonometric, Gaussian, finite wave train & other functions.		2		
	Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.).		2		
	Three dimensional Fourier transforms with examples. Application of Fourier Transforms		3		

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Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations.				
	Class Test		1		
5. Introduction to probability (SC)	Independent random variables: Sample space and Probability distribution functions.	1) General Properties of Matter by Sengupta, Chatterjee  2) Introduction to Mechanics by Biswanath Mukherjee	2		
	Binomial, Gaussian, and Poisson distribution with examples. Mean and variance.		2		
	Problem Discussion		2		
6. Partial Differential	Solutions to partial differential equations using separation of	1) Mathematical Methods for Physics	1	Chalk and Talk, PPT,	

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Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
equations  ( SDG)	variables:	and Engineers, K.F Riley, M.P. Hobson and S. J. Bence  2) Mathematical Methods by Potter  3) Mathematical Physics by H K Dass		Assignment	
	Solutions of Laplace's equation in problems with cylindrically and spherically symmetric boundary conditions.		2		
	Examples from Electrostatics.		1		
	Advance Problem Solving		1	Chalk and Talk, PPT, Assignment	
	Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes.		3		
	Diffusion Equation.		1		
	Class Test		1		
		Total	60		

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**Subject Name/Code:**

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Introduction to thermodynamics ( SC)	a) Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics & Concept of Temperature.	1) Thermal Physics by Roy, Gupta 2) Heat and Thermodynamics by P. K. Chakraborty 3) Treatise of Heat by Saha and Srivastava	2	Chalk and Talk	
	Concept of Work & Heat, State Functions, Internal Energy and First Law of Thermodynamics. Its differential form, First Law & various processes.		3		
	Applications of First Law: General Relation between $C_P$ and $C_V$ , Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient.		2		
	Problem Solving		2		
	b) Second Law of Thermodynamics:		3		

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Department Name: Physics

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Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency.				
	Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence.		2	Chalk and Talk	
	Problem Solving		1		
	c) Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.		2		
	d) Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy.		2		

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Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Entropy of a perfect gas.				
	Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Principle of Increase of Entropy.		2	Chalk and Talk	
	Temperature- Entropy diagrams for Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero.		2		
	Problem Solving		2		
2. Thermodynamic Potentials  (SC)	a) Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy, Their Definitions, Properties and Applications.	1) Thermal Physics by Roy, Gupta  2) Heat and Thermodynamics by P. K. Chakraborty	2		
	Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization,	3) Treatise of Heat by	2		

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Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations.	Saha and Srivastava	2	Chalk and Talk	
	Problem Solving		1		
	b) Maxwell's Thermodynamic Relations. Derivations and applications of Maxwell's Relations: (1) Clausius Clapeyron equation, (2) Values of $C_P - C_V$	1) Thermal Physics by Roy, Gupta	2		
	3) TdS Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations	2) Heat and Thermodynamics by P. K. Chakraborty	2		
	(6) Change of Temperature during Adiabatic Process. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas.	3) Treatise of Heat by Saha and Srivastava	2		

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Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	c) Joule-Thomson Porous Plug Experiment: Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule Thomson Cooling.		2	Chalk and Talk	
3. Kinetic Theory of gases  ( SDG)	a) Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification.	1) Thermal Physics by Garg, Bansal, Ghosh 2) A Treatise on Heat, Meghnad Saha, and B.N. Srivastava	2		
	Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds.	1) Thermal Physics by Roy and Gupta 2) A Treatise on Heat, Meghnad Saha, and B.N. Srivastava	1		

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Department Name: Physics

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Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases.	1) Thermal Physics by Garg, Bansal, Ghosh	1	Chalk and Talk, PPT	
	b) Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path.	1) Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell	1		
	Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance.	1) Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell 2) Thermal Physics by Roy and Gupta	3		

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Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Problem Solving		1		
	c) Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO <sub>2</sub> Gas.	1) Thermal Physics by Garg, Bansal, Ghosh 2) Thermal Physics by Roy and Gupta	2	Chalk and Talk, Peer Teaching	
	Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature.		1		
	Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. P-V Diagrams.		2		
	Class Test and Quiz		1		
4. Conduction of	Thermal conductivity, diffusivity.	1) Thermal Physics by	1	Chalk and Talk,	

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Paper Name & Code: Thermal Physics ( Th) CC6

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
Heat ( SDG)	Fourier's equation for heat conduction its solution for rectilinear flow of heat.	Roy and Gupta	2	PPT, Quiz	
	Problem Solving		1		
	Class Test		1		
		Total	60		

# LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Gayatri Pal**

**Paper Name & Code: Modern Physics CC7 ( Th)**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Radiation and its nature	Blackbody radiation , Planck's hypothesis Photons	<b>Modern Physics by R. Murugesan</b>	1	Chalk and Talk	
	Photo electric effect and Compton effect,		3	PPT	
	de Broglie hypothesis, matter waves and their properties		4	Chalk and Talk	
	Heisenberg's Uncertainty Principle and experiments on matter waves		4	PPT	
	Numericals		2		
2. Basics of Quantum Mechanics	Postulates, operators and their properties	<b>Basic Quantum mechanics by A.K. Ghatak</b>	3	Chalk and Talk	
	Quantum mechanical operators, Commutability of operators.	<b>Nuclear Physics by S.N. Ghoshal</b>	3	Chalk and Talk	
	Wave function, Normalisation Eigen functions and Eigen values		3	Chalk and Talk	
2. Basics of Quantum Mechanics	Schrodinger Equation Application of Sch Eqn : boundary conditions, particle in		4	Chalk and Talk	

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# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal

Paper Name & Code: Modern Physics CC7 ( Th)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
( Contd)	a box, Step potential				
	Tunnelling , alpha decay as example		2	Chalk and Talk	
	Numericals		3		
3 . Nuclear Structure	Size and structure of the atomic nucleus		1	PPT	
	Nature of Nuclear Forces, NZ graph		3	Chalk and Talk	
	Nuclear Models: Liquid drop, Shell Model		4	Chalk and Talk	
	Numericals		1		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal

Paper Name & Code: Modern Physics CC7 ( Th)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Interaction with and within the nucleus	Beta decay Gamma Decay		4	Chalk and Talk	
	Fission		2	PPT	
	Fusion & Thermonuclear Reaction		3	PPT	
	Numericals		2		
5. Laser	Spontaneous & Stimulated emission Einstein's coefficients		2	Chalk and Talk	
	Optical pumping , population inversion, basic lasing action		2	Chalk and Talk	
	Three level & four level lasers		2		
	Numericals		2		
		Total	60		

# LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Gayatri Pal**

**Paper Name & Code: Modern Physics CC7 ( Th)**

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**Subject Name/Code:**

# LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Shinjinee Das Guta ( SDG),**

**Paper Name & Code: Scientific Writing, SEC A1**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Introduction to L <sup>A</sup> T <sub>E</sub> X	The difference between WYSIWYG and WYSIWYM. Preparing a basic L <sup>A</sup> T <sub>E</sub> X file. Compiling L <sup>A</sup> T <sub>E</sub> X file.	1. L <sup>A</sup> T <sub>E</sub> X Tutorials A PRIMER, Indian T <sub>E</sub> X user group, E. Krishnan 2. Official L <sup>A</sup> T <sub>E</sub> X site : <a href="https://www.latex-project.org/">https://www.latex-project.org/</a>	2	PPT and Usage of L <sup>A</sup> T <sub>E</sub> X software	
2. Document classes :	Different type of document classes, e.g., article, report, book etc.		1		
3. Page Layout	Titles, Abstract, Chapters, Sections, subsections, paragraph, verbatim, References, Equation references, citation.		2		
4. List structures	Itemize, enumerate, description etc.		1		
5. Representation of mathematical equations	Inline math, Equations, Fractions, Matrices, trigonometric, logarithmic, exponential functions		3		
	line-surface- volume integrals with and without limits, closed line		2		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Shininee Das Guta ( SDG),

Paper Name & Code: Scientific Writing, SEC A1

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	integral, surface integrals, Scaling of Parentheses, brackets etc.				
6. Customization of fonts	Bold fonts, emphasise, mathbf, mathcal etc. Changing sizes Large, Larger, Huge, tiny etc	3. L <sup>A</sup> T <sub>E</sub> X Tutorials A PRIMER, Indian T <sub>E</sub> X user group, E. Krishnan 4. Official L <sup>A</sup> T <sub>E</sub> X site : <a href="https://www.latex-project.org/">https://www.latex-project.org/</a>	1	PPT and Usage of L <sup>A</sup> T <sub>E</sub> X software	
7. Writing tables	Creating tables with different alignments, placement of horizontal, vertical lines.		2		
8. Figures	Changing and placing the figures, alignments.		1		
	Project Work		15	L <sup>A</sup> T <sub>E</sub> X	
		Total	30		

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1.Laws of Thermodynamics ( GP)	a) Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between $C_p$ and $C_v$ ,	Thermal Physics, A. B. Gupta, H. P. Roy	2		
	b) b) Work Done during Isothermal and Adiabatic Processes. Compressibility and Expansion Coefficients, Reversible and irreversible processes.		3		

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Department Name: Physics

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Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	c) Second law and Entropy, Carnot's cycle & Carnot's theorem, Entropy changes in reversible & irreversible processes, Entropy temperature diagrams.  d) Third law of thermodynamics, unattainability of absolute zero.				
2. Thermodynamic Potentials  (SDG)	Enthalpy, Gibbs, Helmholtz and Internal Energy functions	1) A Handbook of Degree PHYSICS (Vol III), C. R. Dasgupta, Ashok Kumar Das	2	Chalk and Talk, Assignment	
	Maxwell's relations and applications: Joule-Thompson		2		

Subject Name/Code:

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Effect	2) Thermal Physics, A. B. Gupta, H. P. Roy			
	Clausius- Clapeyron Equation, Expression for ( $C_P$ and $C_V$ ).		2		
	TdS equations		1		
	Problem Solving		2		
3. Kinetic Theory of gases <b>( SDG)</b>	Derivation of Maxwell's law of distribution of velocities and its experimental verification	1) A Handbook of Degree PHYSICS (Vol III), C. R. Dasgupta, Ashok Kumar Das	4	Chalk and Talk, Assignment	
	Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case)		4		
	Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-	2) Thermal Physics, A. B. Gupta, H. P. Roy	1		

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Department Name: Physics

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

Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	atomic and diatomic gases.				
	Problem Solving		1		
4. Theory of Radiation ( SDG)	Blackbody radiation, Spectral distribution, Concept of Energy Density		2		
	Derivation of Planck's law		1		
	Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.		3		
	Problem Solving		1		
	Class Test		1		

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Department Name: Physics

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

Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Statistical Mechanics <b>(GP)</b>	a) Phase space, Macrostate and Microstate. Ensemble, Ergodic hypothesis. Entropy and Thermodynamic probability, Boltzmann hypothesis.		3	Chalk and Talk, Assignment	
	b) Maxwell-Boltzmann law of distribution of velocity.		2		
	c) Quantum statistics (qualitative discussion only). Fermi-Dirac distribution law (statement only), electron gas as an example of Fermi gas. Bose- Einstein distribution law (statement only), photon gas as an example of Bose gas.		4		

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Paper Name & Code: Thermal Physics and Statistical Mechanics ( Th) GE3

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Comparison of three statistics. Problem solving		2		
		Total	60		

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Electromagnetic Theory (Th) CC11

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Maxwell Equations ( MRK)	Review of Maxwell's equations. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media.	1. Electricity and Magnetism by Chattapadhaya and Rakshit. 2. Electricity and Magnetism by Griffith 3. Electromagnetic Theory by Satya Prakash	3	Chalk-and-Talk	
	Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector.		3	Chalk-and-Talk	
	Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density		3	Chalk-and-Talk	
	Problem Solving		3	Chalk-and-Talk	

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Department Name: Physics

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

Paper Name & Code: Electromagnetic Theory (Th) CC11

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
2. EM Wave Propagation in Unbounded Media (MRK)	Plane EM waves through vacuum and isotropic dielectric medium,	1. Electricity and Magnetism by Chattapadhaya and Rakshit.	2	Chalk-and-Talk	
	Transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance.	2. Electricity and Magnetism by Griffith	3	Chalk-and-Talk	
	Propagation through conducting media, relaxation time, skin depth.	3. Electromagnetic Theory by Satya Prakash	3	Chalk-and-Talk	
	Problem Solving		2	Chalk-and-Talk	
3. EM Wave in Bounded Media (SC)	Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media.	1. Electromagnetic Theory by Satya Prakash	3	Chalk-and-Talk	
	Laws of Reflection & Refraction. Fresnel's formulae for perpendicular	2. Electromagnetic Theory and	4	Chalk-and-Talk	

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# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Electromagnetic Theory (Th) CC11

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	& parallel polarization cases, Reflection & Transmission coefficients, Brewster's law.	Transmission Line by G. S. N. Raju			
	Total internal reflection, evanescent waves. Metallic reflection (normal Incidence).	3. Classical Electricity and Magnetism by W. K. H. Panofsky and M. Phillips	1	Chalk-and-Talk	
	Problem Solving	4. Electricity and Magnetism by Benjamin Crowell	2	Chalk-and-Talk	
4. Polarization (SC)	Description of Linear, Circular and Elliptical Polarization.	1) B. Sc. Physics by C. L. Arora	4	Chalk-and-Talk	
	Propagation of E.M. Waves in birefringent medium.	2) Light by Ajoy kumar Ghatak	3	Chalk-and-Talk	

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Department Name: Physics

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

Paper Name & Code: Electromagnetic Theory (Th) CC11

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Polarization in uniaxial crystals (SC)	Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction.	1. Electricity and Magnetism by Griffith 2. Electromagnetic Theory by Satya Prakash 3. Light by Ajoy kumar Ghatak	4	Chalk-and-Talk	
	Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices.		4	Chalk-and-Talk	
	Phase Retardation Plates: Quarter Wave and Half-Wave Plates.		4	Chalk-and-Talk	
	Production & analysis of polarized light. Babinet Compensator and its Uses.		3	Chalk-and-Talk	
6. Rotatory polarization ( SC)	Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation.	1. B. Sc. Physics by C. L. Arora	2	Chalk-and-Talk	

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Department Name: Physics

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

Paper Name & Code: Electromagnetic Theory (Th) CC11

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Calculation of angle of rotation. Experimental verification of Fresnel's theory.	2. Electromagnetic Theory by Satya Prakash	2	Chalk-and-Talk	
	Specific rotation. Laurent's half-shade and biquartz polarimeters.	3. Light by Ajoy kumar Ghatak	2	Chalk-and-Talk	
		Total	60		

# LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Gayatri Pal**

**Paper Name & Code: Statistical Physics CC12 ( Th)**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Classical Statistical Mechanics	a) Microstate, Macrostate, phase space, concept of ensemble	<b>Statistical Mechanics by U. Nandi</b>  <b>Statistical Mechanics by R.K. Pathria</b>  <b>Statistical Physics by F. Reif</b>	4	Chalk and Talk	
	b) Microcanonical ensemble its properties, thermodynamic probability,		3	PPT	
	c) Canonical ensemble , Partition function, thermodynamic functions of ideal gas		6	Chalk and Talk	
	d) Sackur Tetrode equation, Two level system, specific heat negative temperature		3	PPT	
	e) Grand Canonical ensemble, thermodynamic functions of ideal gas, Chemical potential		4	Chalk and Talk	
	f) Numerical problems		4		
	g)				
2. System of Identical Particles	a) Classical and Quantum approach		1	Chalk and Talk	
	b) MB distribution		3	Chalk and Talk	
	c) Fermions and Bosons		1	Chalk and Talk	

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal

Paper Name & Code: Statistical Physics CC12 ( Th)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	d) Numerical problems		1		
2. BE Statistics	a) BE distribution Law		3	Chalk and Talk	
	b) Strongly degenerate Bose gas		3	Chalk and Talk	
	c) BE condensation, Helium IV		3	PPT	
	d) Numerical problems		3		
3. Radiation	a) Classical laws of Radiation		3	PPT	
	b) Planck's Theory , Photon gas		3	Chalk and Talk	
	c) Numerical problems		1		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal

Paper Name & Code: Statistical Physics CC12 ( Th)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5.. F.D. Statistics	a) FD distribution Law		3	Chalk and Talk	
	b) Strongly degenerate Fermi gas		2	PPT	
	c) Electron gas in metals		2	PPT	
	d) Specific heat of metals		1	Chalk and Talk	
	e) Numerical problems		2		
		Total	60		

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Laser and Fibre optics ( Th) DSE A1(b)**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Einstein's Coefficients and Rate equation  ( GP)	a) Stimulated light amplification and Einstein's Coefficients	<b>Lasers : Theory &amp; application by A. Ghatak &amp; K. Thyagrajan</b>	4	Chalk and Talk	
	b) Population inversion , threshold conditions , pumping power		3	PPT	
	c) Rate equations for 2, 3, and 4 level lasers		6	Chalk and Talk	
	d) Numerical problems		2		
2. Basic laser properties ( SDG)	a) Coherence , directionality	<b>Lasers : Theory &amp; application by A. Ghatak &amp; K. Thyagrajan</b>	2	Chalk and Talk	
	b) Monochromaticity , brightness		2	Chalk and Talk	
3. Resonators  ( SDG)	a) Optical resonators and their different configurations		3	Chalk and Talk, PPT, study material from NPTEL course	
	b) Stability condition and stability diagram		2		
	c) Cavity lifetime , quality factor		2		
	d) Numerical problems		2		

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Laser and Fibre optics ( Th) DSE A1(b)**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Transient effects ( SDG)	a) Transverse and longitudinal modes		3		
	b) Different methods of Q-switching, mode		2		
	c) Mode locking , pockels cell		2		
	d) Numerical problems		1		
5. Basic Laser systems ( KB)	a) Gas lasers , He –Ne and CO <sub>2</sub>	1. Lasers: Theory and Applications , A. Ghatak & K. Thyagarajan	2	Chalk and Talk	
	b) Solid state lasers, Ruby, Nd: YAG and semiconductor		3	PPT	
	c) Liquid laser , Dye laser		1	PPT	
	d) Numerical problems		1		
6. Practical properties and	a) Line shape function and line broadening		3		

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Laser and Fibre optics ( Th) DSE A1(b)**

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
uses of laser  ( KB)	mechanisms				
	b) Laser trapping and cooling	. Lasers: Theory and Applications , A. Ghatak & K. Thyagarajan	2		
	c) Numerical problems		1		
7. Fibre optics  ( KB)	Optical fiber, coherent bundle, Numerical aperture. Attenuation of optical fibers. Ray paths , Ray paths in a homogeneous medium, in square law media. . Pulse dispersion in parabolic index medium and in planar step index waveguide	Introduction to Fiber Optics, A. Ghatak, 1998, Cambridge University Press	4		
	Modes of a planar waveguide: TE and TM modes. Physical understanding of modes, Optical fibers: Guided modes of step-index and graded index fibers.		7		

**Subject Name/Code:**

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Laser and Fibre optics ( Th) DSE A1(b)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	Applications of optical fibers in Communication and Sensing.		1		
8. Holography ( KB)	Principle of Holography. Recording and Reconstruction Method. Theory of Holography between two plane waves. Point source holograms.	1. Optics, E. Hecht & A. Ganesan, 2009, Pearson Prentice Hall	4		
9. Introductory Nonlinear optics ( KB)	Origin of nonlinearity, susceptibility tensor, Nonlinear susceptibility of a classical anharmonic oscillator in case of noncentrosymmetric medium	1. Nonlinear Optics, R. Boyd, 2008, Academic	3		
	Sum frequency generation, Difference frequency generation, Sum and Difference Frequency generation, for second-order nonlinear optical medium.		3		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Laser and Fibre optics ( Th) DSE A1(b)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	phase matching		3		
	Problem solving		1		
		Total	75		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Nuclear and Particle Physics ( Th) DSE B1(b)

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Introduction ( SDG)	Recapitulation of general properties of nuclei, nuclear models and radioactivity.	1) Nuclear Physics by S. N. Ghoshal 2) Nuclear Physics by Satadal Bhattacharya 3) Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde	4	Chalk and Talk	
	Problem Solving		1		
2. Nuclear Reactions ( SDG)	Types of Reactions, Conservation Laws,		1	Chalk and Talk, Study Material, Assignment	
	kinematics of reactions, Q value, reaction rate, reaction cross section,		3		
	Concept of compound and direct Reaction,		2		
	resonance reaction, Coulomb scattering (Rutherford scattering).		2		
	Problem Solving and quiz		1		
Class Test		1			

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Nuclear and Particle Physics ( Th) DSE B1(b)

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
3. Interaction of Nuclear Radiation with matter ( SDG)	Energy loss due to ionization (Bethe- Block formula), energy loss of electrons,	1) Nuclear Physics by S. N. Ghoshal 2) Nuclear Physics by Satadal Bhattacharya	3	Chalk and Talk, Study Material, Assignment	
	Cerenkov radiation		1		
	Gammaray interaction through matter, photoelectric effect, Compton scattering, pair production	3) Radiation detection and measurement, G.F. Knoll	4		
	neutron's interaction with matter.	4) Techniques for Nuclear and Particle Physics Experiments by W. R. Leo	4		
	Problem Solving		2		
	Class Test		2		

## LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Shinjinee Das Gupta ( SDG),**

**Ms Kathakali Biswas ( KB)**

**Paper Name & Code: Nuclear and Particle Physics ( Th) DSE B1(b)**

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Detector for Nuclear Radiations  ( SDG)	Gas detectors: estimation of electric field, mobility of particle, ionization chamber and GM Counter.	1) Nuclear Physics by S. N. Ghoshal 2) Nuclear Physics by Satadal Bhattacharya	4	Chalk and Talk, PPT, Tutorial Assignment	
	Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT).	3) Radiation detection and measurement, G.F. Knoll	2		
	Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility),	4) Techniques for Nuclear and Particle Physics Experiments by W. R. Leo	3		
	neutron detector.		1		
	Peer Teaching		2		
	Problem Solving		2		
	Class Test		1		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Shinjinee Das Gupta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Nuclear and Particle Physics ( Th) DSE B1(b)

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Particle Accelerators (SDG )	Accelerator facility available in India, Different type of accelerators	1) Nuclear Physics by S. N. Ghoshal 2) Nuclear Physics by Satadal Bhattacharya	2	Chalk and Talk, PPT, Study Material	
	Van-de Graaf generator (Tandem accelerator)		2		
	Linear accelerator		2		
	Cyclotron		3		
	Betatron Synchrotrons				
	Peer Teaching		2		
	Tutorial		3		
	Class Test and quiz		1		

Subject Name/Code:

## LESSON PLAN

**Department Name: Physics**

**Name of Faculty: Dr Shinjinee Das Gupta ( SDG),**

**Ms Kathakali Biswas ( KB)**

**Paper Name & Code: Nuclear and Particle Physics ( Th) DSE B1(b)**

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
6. Particle Physics ( KB)	Fundamental particles and their families. Fundamental particle-interactions and their basic features. Gellmann Nishijima formula	1) Nuclear Physics by S. N. Ghoshal	2	Chalk and Talk, PPT, Study Material	
	Quark structure of hadrons and mesons		3		
	Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm.		3		
	concept of quark model, color quantum number and gluons		2		
	Tutorial		2		
	Class Test and quiz		3		
		Total	60		

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Basic Physics I DSCC 1( Major)

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
<b>( a ) Mathematical Physics</b>					
1. Preliminaries  ( SDG)	a) Units & Dimension , Plotting functions	Mathematical Methods in the Physical Sciences by M.L. Boas	1		
	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		1		
	b) Second order		1		
3 Vectors  ( SC)	a) Vector products	Vector Analysis ( Schaum's outline series)	2		
	b) Vector differentiations, gradient , curl, divergence	By Spiegel	3		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Basic Physics I DSCC 1( Major)

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	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		
	<b>Total</b>		<b>20</b>		
<b>( B ) Classical Mechanics</b>					
1. Review of Newton's Laws (GP)	a) Inertial frames , Galilean transformation	Classical Mechanics By A.B. Gupta	1		
	b) Newton's laws conservation of linear momentum		1		

Subject Name/Code:

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Basic Physics I DSCC 1( Major)**

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	c) Rotational motion	Classical Mechanics  By A.B. Gupta	2		
	d) Problems		2		
2. Work Kinetic energy Theorem (GP)	a) Conservative and non conservative forces, potential		2		
	c) potential energy curves and Stability		1		
	d) Small oscillation		1		
3. Dynamics of a system of particles(GP)	a) COM and reduced mass		2		
	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		

**Subject Name/Code:**

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Basic Physics I DSCC 1( Major)

Planned					
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		
6 . Mechanics of Continuum (KB)	a) Kinematics of moving fluids, equation of continuity		2		
	b) Streamline and turbulent flow		1		
	c) Stokes law, Euler equation,		1		
	d) Bernoulli's Theorem & application		2		
	<b>TOTAL</b>		<b>30</b>		

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal ( GP) , Dr Subhendu Chandra ( SC), Dr Shinjinee Das Guta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Basic Physics I DSC 1( Major)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
<b>( a ) Mathematical Physics</b>					
1. Preliminaries  (KB)	a) Units & Dimension , Plotting functions	Mathematical Methods in the Physical Sciences by M.L. Boas	1		
	b) Limits And continuity		1		
	c) Taylor and Binomial series		1		
	d) Calculus, maxima. Minima		1		
	e) Partial derivatives		1		
2. Ordinary Differential equations  ( KB )	a) First order		1		
	b) Second order		1		
3 Vectors  ( SDG)	a) Vector products	Vector Analysis ( Schaum's outline series)	2		
	b) Vector differentiations, gradient , curl, divergence	By Spiegel	3		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal ( GP) , Dr Subhendu Chandra ( SC), Dr Shinjinee Das Guta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Basic Physics I DSC 1( Major)

Planned				After implementation	
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	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		
	<b>Total</b>		<b>20</b>		
<b>( B ) Classical Mechanics</b>					
1. Review of Newton's Laws (GP)	a) Inertial frames , Galilean transformation	Classical Mechanics By A.B. Gupta	1		
	b) Newton's laws conservation of linear momentum		1		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal ( GP) , Dr Subhendu Chandra ( SC), Dr Shinjinee Das Guta ( SDG),  
Ms Kathakali Biswas ( KB)

Paper Name & Code: Basic Physics I DSC 1( Major)

Planned			After implementation		
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	c) Rotational motion	Classical Mechanics By A.B. Gupta	2		
	d) Problems		2		
2. Work Kinetic energy Theorem (GP)	a) Conservative and non conservative forces, potential		2		
	c) potential energy curves and Stability		1		
	d) Small oscillation		1		
3. Dynamics of a system of particles (GP)	a) COM and reduced mass		2		
	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		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal ( GP) , Dr Subhendu Chandra ( SC), Dr Shinjinee Das Guta ( SDG),

Ms Kathakali Biswas ( KB)

Paper Name & Code: Basic Physics I DSC 1( Major)

Planned				After implementation	
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		2		
6 . Mechanics of Continuum (KB)	a) Kinematics of moving fluids, equation of continuity		2		
	b) Streamline and turbulent flow		1		
	c) Stokes law, Euler equation,		1		
	d) Bernoulli's Theorem & application		2		
	<b>TOTAL</b>		<b>30</b>		

# LESSON PLAN

**Department Name: Physics**

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

**Paper Name & Code: Introduction to Computer Programming and Graph Plotting ( Pr) SEC 1**

Planned				Content Delivery Technique	Remarks / Comments
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned		
1. Introduction to Graph Plotting (2D only, using GNUPLOT) (KB)	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 linespoints (w lp), linetype (lt), linewidth (lw). Using the set command for samples, xrange, yrange, xlabel ,ylabel, title etc. Theusing option	1) Gnuplot 5, Lee Phillips, Alogus Publishing, edition 2012	2	Computer Practical	
	b) User defined functions [Including the use of ternary operator for piece-wise defined functions.]	2) Gnuplot in Action understanding data and Graphs, Phillipp K. Janert	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		

**Subject Name/Code:**

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Introduction to Computer Programming and Graph Plotting ( Pr) SEC 1

Planned				Content Delivery Technique	Remarks / Comments
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned		
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		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Introduction to Computer Programming and Graph Plotting ( Pr) SEC 1

Planned				Content Delivery Technique	Remarks / Comments
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned		
	b) The python data types List: defining lists, reading and changing 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()		4		
	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		

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Introduction to Computer Programming and Graph Plotting ( Pr) SEC 1

Planned				Content Delivery Technique	Remarks / Comments
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned		
	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	
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 and Bisection method Sorting of lists (algorithm, flowchart and code) using Bubble or Selection sort Sum of series correct up to given decimal		8		

Subject Name/Code:

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Introduction to Computer Programming and Graph Plotting ( Pr) SEC 1

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
	places (Sine, Cosine, Exponential etc.)				
	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 Euler's method only.		6	Computer Practical	
	Matrix Addition, Multiplication and Transpose using List Comprehension.		6		
		Total	60		

# LESSON PLAN

**Department Name: Physics**

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

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

Planned					
Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
1. Nature of Science (SDG)	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 (SDG)	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 (SC)	Atoms and molecules: The physical basis of the Periodic Table	1. The character of physical laws –	2	Chalk and Talk	

# LESSON PLAN

Department Name: Physics

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

Paper Name & Code: IDC (INTERDISCIPLINARY): 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	Chalk and Talk	
	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		
4. Forces (GP)	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

Department Name: Physics

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

Paper Name & Code: IDC (INTERDISCIPLINARY): 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		
	<b>Total Lectures</b>		<b>45</b>		