Even Semester, 2023-24

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr Gayatri Pal

Paper Name & Code: Digital Systems & Applications CC13 (Th)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Integrated Circuits	Principle and design of monolithic IC	Digital circuits Part I & II by D. Roychoudhury Digital Principles & applications by A.P. Malvino, D.P. Leach	1	PPT	
	Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI		2		
2. Number System	Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers		2	Chalk and Talk	
	Singed & unsigned numbers, 1's & 2's complement, subtraction using 2's complement		1	Chalk and Talk	
3.Digital Circuits	Difference between Analog and Digital Circuits. Switching algebra, Huntington postulates, combinational logic		2	Chalk and Talk	
	AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers.		4	Chalk and Talk	
	Different logic families DTL , TTL ,CMOS		2	PPT	

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Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
3 (contd)	MOS & CMOS inverter NAND/NOR using MOS logic		2	PPT	
	De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.		4	Chalk and Talk	
4. Implementation of different circuits	Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. IC 7483		2	Chalk and Talk	
	Combinational logic circuits using PLA/PAL		2	PPT	
5. Data processing circuits	Basic idea of Multiplexers, De-multiplexers,		2	Chalk and Talk	
	Decoders, Encoders.		1	Chalk and Talk	
6. Sequential circuits	SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations.	Digital circuits Part I & II by D. Roychoudhury	3	Chalk and Talk	

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Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
		Digital Principles & applications by A.P. Malvino, D.P. Leach			
	Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. D –FF, T -FF	Digital circuits Part I & II by D. Roychoudhury Digital Principles & applications by A.P. Malvino, D.P. Leach	2	Chalk and Talk	
7. Registers & Counters	Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).		3	Chalk and Talk	
	Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter		3	Chalk and Talk	
8. Computer organisation	I/O devices, Data Storage (RAM, ROM,EPROM)		2	PPT	
	Memory organisation& addressing, interfacing , Memory Map		3	PPT	
9. Data Conversion	Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion		2	PPT	
	D/A conversion		2	PPT	
		Total	60		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Solid State Physics , CC14

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Crystal Structure **(AS)**	Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis; Central and Non-Central Elements.	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	**2**	Chalk and Talk, Assignment	
	Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones.		**2**		
	Diffraction of X-rays by Crystals. Laue and Bragg's Law and their equivalence.		**2**		
	Atomic and Geometrical Structure Factor.		**2**		
	Basic idea of crystal indexing: examples with SC, BCC, FCC structure.		**3**		
	Problems		**1**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Solid State Physics , CC14

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
2. Elementary Lattice Dynamics **(AS)**	Lattice Vibrations and Phonons: Linear Monatomic and Diatomic Chains.	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	**3**	Chalk and Talk	
	Acoustical and Optical Phonons.		**1**		
	Qualitative Description of the Phonon Spectrum in Solids.		**1**		
	Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law.		**4**		
	Problems		**1**		
3. Magnetic Properties of Matter (AS)	Dia, Para, Ferri and Ferromagnetic Materials.	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	**1**	Chalk and Talk	
	Classical Langevin Theory of Dia and Paramagnetic Domains.		**2**		
	Quantum Mechanical Treatment of Paramagnetism (using parition function).		**2**		
	Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.		**3**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Solid State Physics , CC14

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Dielectric Properties of Materials **(AS)**	Polarization. Local Electric Field at an Atom. Depolarization Field	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	**1**	Chalk and Talk, Assignment	
	Electric Susceptibility. Polarizability. Clausius Mosotti Equation.		**2**		
	Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion		**2**		
	Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant.		**2**		
	Problems		**1**		
5. Drude's theory **(AS)**	Free electron gas in metals, effective mass, drift current, mobility and conductivity, Hall effect in metals.	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	3	Chalk and Talk, Assignment	
	Thermal conductivity. Lorentz number, limitation of Drude's theory		1		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Solid State Physics , CC14

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
6. Elementary band theory **(SDG)**	Kronig Penny model. Band Gap. effective mass and effective mass tensor	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by Harald Ibach and Hans Lüth	**3**	Chalk and Talk, Assignment	
	Conductor, Semiconductor (P and N type) and insulator.		**1**		
	Conductivity of Semiconductor, mobility		**2**		
	Hall Effect. Measurement of conductivity (4 probe method) & Hall coefficient.		**3**		
	Problems and quiz		**1**		
	Peer teaching		**1**		
	Class Test		**1**		
7. Superconductivity **(AS)**	Experimental Results. Critical Temperature. Critical magnetic field.	1) Introduction to Solid State Physics by C. Kittel, 2) Solid State Physics by R K Puri and V K Babbar	**1**	Chalk and Talk	
	Meissner effect. Type I and type II Superconductors,		**2**		
	London's Equation and Penetration Depth. Isotope effect.		**2**		
	Class test		**1**		
		Total	**60**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Nanomaterials and Applications , DSEA2(a)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Nanoscale Systems (SDG)	Length scales in physics, Nanostructures:1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods)	1) Nanomaterials: Theory, Problem and Solutions by U. N. Nandi and D. Jana 2) Introduction to Nanoscience and Nanotechnology by Kuno. M	2	Chalk and Talk, PPT, Quiz, Assignment	
	Band structure and density of states of materials at nanoscale		2		
	Size Effects in nano systems,		1		
	Quantum confinement: Applications of Schrodinger equation: Infinite potential well, potential step, potential box		**3**		
	quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences.		**2**		
2. Synthesis of Nanostructure Materials	Top down and Bottom up approach, Photolithography.		2	Chalk and Talk, PPT, Assignment	

(KB)	Ball milling. Gas phase condensation. Vacuum deposition Physical vapor deposition (PVD) Thermal evaporation – Electron beam evaporation – Pulsed Laser deposition Chemical vapor deposition (CVD) MBE growth of quantum dots Chemical Synthesis, Chemical bath deposition Electro deposition Spray pyrolysis Hydrothermal synthesis Sol-Gel synthesis	1) Nanomaterials: Theory, Problem and Solutions by U. N. Nandi and D. Jana 2) Introduction to Nanoscience and Nanotechnology by Kuno. M	12		

	Tutorial		1		
3.Characterization (KB)	X-Ray Diffraction.	1) Nanomaterials: Theory, Problem and Solutions by U. N. Nandi and D. Jana 2) Introduction to Nanoscience and Nanotechnology by Kuno. M	**2**	Chalk and Talk, PPT, Assignment	
	Optical Microscopy. Scanning Electron Microscopy (SEM). Transmission Electron Microscopy (TEM).		**3**		
	Atomic Force Microscopy (AFM). Scanning Tunneling Microscopy (STM).		**4**		
	Tutorial		**1**		
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
4. Optical Properties (SDG)	Coulomb interaction in nanostructures	1) Nanomaterials: Theory, Problem and Solutions by U. N. Nandi	1	Chalk and Talk, PPT, Assignment, Quiz	
	Concept of dielectric constant for nanostructures and charging of nanostructure.		2		

	Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals.	and D. Jana 2) Introduction to Nanoscience and Nanotechnology by Kuno. M	2		
	Quantitative treatment of quasi-particles and excitons, charging effects..		3		
	Radiative processes: General formalization, absorption, emission and luminescence		2		
	Optical properties of heterostructures and nanostructures.		2		
	Tutorial Problems + Class Test		2+1=3		
5. Electron Transport (SDG)	Carrier transport in nanostrucutures. Coulomb blockade effect	1) Nanomaterials: Theory, Problem and Solutions by U. N. Nandi and D. Jana	2	Chalk and Talk	
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
5. Electron Transport (SDG)	thermionic emission, tunneling and hoping conductivity	2) Introduction to Nanoelectronics by Vladimir Mitin et. al.	**3**	Chalk and Talk, Quiz, PPT, Assignment	
	Defects and impurities: Deep level and surface defects.		**2**		

	Peer teaching		**1**		
	Tutorial Problems and Quiz		**1 +1=2**		
6. Applications (KB)	Applications of nanoparticles,quantumdots, nanowires andthinfilmsfor photonicdevices (LED,solar cells).Single electrontransferdevices(noderivation). CNT basedtransistors.Nanomaterial Devices:Quantum dot sheterostructurelasers,opticalswitchingandopticaldatastorage.Magneticquantumwell;magneticdots magneticdatastorage.MicroElectromechanicalSystems(MEMS),NanoElectromechanicalSystems(NEMS).		**15**		
		Total	**75**		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC)

Paper Name & Code: Communication Electronics , DSEB2(a)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Electronic communication	Introduction to communication means and modes. Need for modulation.	1. Introduction to communication Electronics-B. P. Lathi 2. Communication Electronics-Kenedy	2	Chalk and Talk, Assignment	
	Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI).		2		
	Electro- magnetic communication spectrum, band designations and usage.		2		
	Channels and base-band signals.		2		
	Concept of Noise, signal-to-noise (S/N) ratio		2		
2. Analog Modulation	Amplitude Modulation, mathematical analysis for modulation index, frequency spectrum and power in AM Generation of AM (Emitter Modulation)	3. Electronic Communication Systems: Fundamentals Through Advanced Author: Tomasi 4. Communication Systems-Simon S. Haykin	4	Chalk and Talk, Assignment	
	Diode/square law modulator, Amplitude Demodulation (diode detector) Balanced modulator for DSB, Concept of Single sideband generation and detection, concept of vestigial sideband.		4		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC)

Paper Name & Code: Communication Electronics , DSEB2(a)

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
2. Analog Modulation	Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, Transistor/FET reactance modulator, equivalence between FM and PM, Generation of FM using VCO		4	Chalk and Talk, Assignment	
	FM detector : slope detector ,Balanced slope detector, Idea of Phase discriminator and ratio detector, Qualitative idea of IF and Super heterodyne receiver		**3**		
3. Analog Pulse Modulation	Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM	5. Digital Communications: Fundamentals And Applications- Bernard Sklar	**4**	Chalk and Talk, Assignment	
	modulation and detection technique for PAM only, Multiplexing – FDM and TDM and its application in communication		**4**		
	Problem solving class		**2**		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC)

Paper Name & Code: Communication Electronics , DSEB2(a)

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Digital Pulse Modulation	Need for digital transmission, Sampling and Shanon's criteria, Quantization and Encoding, Quantisation error,	6. Pulse Code Modulation Techniques: With Applications in Communications and Data Recording-**William M. Waggener (Author)**	3	Chalk and Talk, PPT, Assignment, Quiz	
	non-uniform quantisation, Impulse sampling, Natural sampling and flat top sampling,		3		
	Pulse Code Modulation (PCM), Differential PCM , Digital Carrier Modulation Techniques, Concept of		3		
	Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK).		2		
	Idea of 8-PSK, QPSK, BPSK, use of Constellation diagram (idea only), Delta modulation. Concept of companding-		2		
	A law and μ law. Line Coder: Unipolar and bipolar RZ& NRZ, Manchester format.		2		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC)

Paper Name & Code: Communication Electronics , DSEB2(a)

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Introduction to communication and Navigation systems:	Satellite Communication: Introduction, need, Geo synchronous satellite orbits geostationary satellite advantages of geostationary satellites.	7. Satellite Communications- Varsha Agrawal Anil K. Maini 8. Wireless and Mobile Communication- Rishabh Anand	5	Chalk and Talk, PPT, Assignment, Quiz	
	Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.		5		
	Mobile Telephony System: Basic concept of mobile communication, frequency bands used in mobile communication,		3		
	concept of cell sectoring and cell splitting, SIM number, IMEI number,		3		
	need for data encryption, architecture (block diagram) of mobile communication network,		3		
	idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset,		4		
	2G, 3G and 4G concepts (qualitative only).GPS navigation system (qualitative idea only).		2		
		Total	**75**		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Subhendu Chandra (SC)

Paper Name & Code: Communication Electronics , DSEB2(a)

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Mathematical Physics III , CC8

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Complex Analysis: (KB)	Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, Roots of Complex Numbers. Functions of Complex Variables.	Complex Variables and Applications, J.W. Brown and R.V. Churchill, 7th Ed. 2003, Tata McGraw-Hill	3	Chalk and talk	
	Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable.		5		
	Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region.		5		
	Laurent and Taylor's expansion.		3		
	Residues and Residue Theorem. Application in solving Definite Integrals. only single valued integrals; simple poles on and off the real axis.		4		
Variational calculus in Physics (KB)	Functionals. Basic ideas of functionals. Extremization of action as a basic principle in mechanics.	Classical Mechanics , N.C. Rana and P. Joag, McGraw Hill Education	4	Chalk and talk	
	Lagrangian formulation. Euler's equations of motion for simple systems: harmonic oscillators, simple pendulum, spherical pendulum, coupled oscillators.		6		
	Cyclic coordinates. Symmetries and conservation laws.		4		
	Legendre transformations and the Hamiltonian formulation of		6		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Mathematical Physics III , CC8

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	mechanics. Canonical equations of motion. Applications to simple systems.	Classical Mechanics H.V. Sharma, S.I.. Gupta,V. kumar			
Special theory of Relativity (AS)	Michelson-Morley Experiment and its outcome.		1		
	Postulates of Special Theory of Relativity.Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation.		2	Chalk and talk	
	Relativistic transformation of velocity.Relativistic Dynamics.Variation of mass with velocity.Massless Particles.Mass-energy Equivalence. Transformation of Energy and Momentum.		4		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Mathematical Physics III , CC8

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	A short introduction to tensors Covariant and contravariant vectors.Contraction.Covariant, contravariant, and mixed tensors of rank-2, transformation properties.The metric tensor (flat space-time only).Raising and lowering of indices with metrictensors.(Consistent use of convention → diag(1,-1,-1,-1).)	. Introduction to Special Relativity, R. Resnick, 2010, John Wiley and Sons	4		
	RelativityinFourVectorNotation:Four-vectors,LorentzTransformationandInvariantinterval,Space-time diagrams.PropertimeandPropervelocity.Relativisticenergyandmomentum-Fourmomentum.Conservation of four momentum and applications to collisions.Minkowski Force.		6		
	Problem set		2		
	Class test		1		
		Total	60		

LESSON PLAN

Department Name: Physics

Name of Faculty: Principal Madam Dr Maitreyi Ray Kanjilal (MRK) , Dr Gayatri Pal (GP)

Paper Name & Code: Analog Systems & Applications CC9 (Th)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1.Circuits and Network **(GP)**	Components & sources	Fundamental Principles of Electronics by B.GHOSH Electronics Fundermentals and Applications by D. Chattopadhyay & P.C. Rakshit	1	Chalk and Talk	
	Thevenin & Norton Theorem		2		
	Superposition & Maximum Power Transfer Theorem		2	Chalk and Talk	
	Numericals		1		
2. Semiconductor Diodes & Applications **(GP)**	P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity.		2	Chalk and Talk	
	PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Re- verse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction.		3	Chalk and Talk	
	Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, L & C-filter. Clipping and clamping circuits		3	Chalk and Talk	
3.Bipolar Junction transistors and biasing **(GP)**	n-p-n and p-n-p **Transistors**. Characteristics of CB, CE and CC Configurations. Current gains α and β Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cut-off and Saturation Regions.		3	Chalk and Talk	

LESSON PLAN

Department Name: Physics

Name of Faculty: Principal Madam Dr Maitreyi Ray Kanjilal (MRK) , Dr Gayatri Pal (GP)

Paper Name & Code: Analog Systems & Applications CC9 (Th)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
3 (Contd)	Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance.	Fundamental Principles of Electronics by B.GHOSH Electronics Fundermentals and Applications by D. Chattopadhyay & P.C. Rakshit	4	Chalk and Talk	
	Numericals		2		
4. Field effect transistors **(GP)**	JFET & MOSFET basic structure , principle of operation		1	PPT	
	Pinch off , Characteristics , threshold voltage, short channel effect		2	Chalk and Talk	
5. Regulated Power Supply **(GP)**	Zener Diode , Load and Line regulation ,numericals		2 +1	Chalk and Talk	
	Series regulated power supply with Zener and Transistor		1	PPT	
6. Amplifiers**(GP)**	Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers		2	Chalk and Talk	
	Frequency response of a CE amplifier. Role of		2	Chalk and Talk	

LESSON PLAN

Department Name: Physics

Name of Faculty: Principal Madam Dr Maitreyi Ray Kanjilal (MRK) , Dr Gayatri Pal (GP)

Paper Name & Code: Analog Systems & Applications CC9 (Th)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
	capacitors in cut off frequencies				
	Numericals	Fundamental Principles of Electronics by B.GHOSH Electronics Fundermentals and Applications by D. Chattopadhyay & P.C. Rakshit	2		
7. Feedback in amplifiers & OPAMP **(MRK)**	Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise		2	Chalk and Talk	
	Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground.		3	Chalk and Talk	
	Applications of Op-Amps: Linear - (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Comparator (9) Schmidt Trigger		6	Chalk and Talk	
	Numericals		4		

LESSON PLAN

Department Name: Physics

Name of Faculty: Principal Madam Dr Maitreyi Ray Kanjilal (MRK) , Dr Gayatri Pal (GP)

Paper Name & Code: Analog Systems & Applications CC9 (Th)

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
8. Multivibrator **(GP)**	Transistor as a Switch, Explanation using Characteristics ,Calculation of switching time	Fundamental Principles of Electronics by B.GHOSH Electronics Fundermentals and Applications by D. Chattopadhyay & P.C. Rakshit	1		
	Bistable, Monostable , Astable Multivibrators Construction, wave forms		3		
9. Oscillators **(GP)**	Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. LC oscillators , Tank Circuit, Hartley & Colpitts oscillators.		2		
	RC Phase shift oscillator, determination of Frequency. Lead Lag circuit, Wien Bridge Oscillator		3		
		Total	60		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Quantum Mechanics , CC10

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Wave packet description (SC)	Description of a particle using wave packets. Spread of the Gaussian wave-packet for a free particle in one dimension.	1) Introduction to Quantum Mechanics by S. N. Ghoshal, 2) Quantum Mechanics: Concepts and Application by N. Zittili 3) Quantum Mechanics by G. Aruldhas	**3**	Chalk and Talk, Quiz, Assignment	
	Fourier transforms and momentum space wave function. Position-Momentum uncertainty.		**2**		
2. General discussion of bound states in an arbitrary potential (SC)	Continuity of wave function, boundary condition and emergence of discrete energy levels.		**3**		
	Application to one dimensional square well potential of finite depth.		**3**		
	Problems		**2**		
3. Quantum mechanics of simple harmonic oscillator (SC)	Setting up the eigen-value equation for the Hamiltonian.		**2**		
	Energy levels and energy eigen functions in terms of Hermite polynomials (Solution to Hermite differential equation may be assumed).		**2**		
	Ground state, zero point energy & uncertainty principle.		**2**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Quantum Mechanics , CC10

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 Schrodinger equation for a particle moving under a central force, the Schrodinger equation in spherical polar coordinates..	1) Introduction to Quantum Mechanics by S. N. Ghoshal, 2) Quantum Mechanics: Concepts and Application by N. Zittili 3) Quantum Mechanics by G. Aruldhas	**1**	Chalk and Talk, PPT, Assignment	
	Separation of variables, Angular equation and orbital angular momentum. Spherical Harmonics (Solution to Legendre differential equation may be assumed)		**2**		
	Radial equation for attractive coulomb interaction - Hydrogen atom. Solution for the radial wave-functions (Solution to Laguerre differential equation may be assumed).		**2**		
	Shapes of the probability densities for ground & first excited states. Orbital angular momentum quantum numbers l and m; s, p, d shells.		**2**		
	Problems		**1**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Quantum Mechanics , CC10

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Generalized Angular Momenta and Spin (SDG)	Generalized angular momentum. Electron's magnetic Moment and Spin Angular Momentum . J =L+S.	1) Atomic and Molecular Spectra: Laser by Raj Kumar 2) Physics of Atoms and Molecules by Bransden, Joachain	**1**	Chalk and Talk, PPT, Assignment	
	Gyromagnetic Ratio and Bohr Magneton and the *g* factor.		**2**		
	Energy associated with a magnetic dipole placed in magnetic field. Larmor's Theorem		**2**		
	Stern-Gerlach Experiment.		**1**		
	Addition of angular momenta-statement only. Allowed values of angular momentum		**2**		
	Problems + Class Test		**1+1=2**		
6. Spectra of Hydrogen atom and its fine structure (SDG)	(a) Formula for first order non-degenerate perturbative correction to the eigen value statement only.		**1**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Quantum Mechanics , CC10

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
6. Spectra of Hydrogen atom and its fine structure (SDG)	Spin-orbit interaction and relativistic correction to the kinetic energy and Darwin term.	1) Atomic and Molecular Spectra: Laser by Raj Kumar 2) Physics of Atoms and Molecules by Bransden, Joachain	**2**	Chalk and Talk, Quiz, Assignment	
	Fine structure of the hydrogen atom spectrum(No rigorous derivation is required).		**1**		
	Peer teaching		**1**		
7. Atoms in Electric & Magnetic Fields (SDG)	ZeemanEffect: Normal and Anomalous Zeeman Effect (Formula for first order perturbative correction to the eigenvalue to be assumed).		**3**	Chalk and Talk, Quiz, PPT	
	PaschenBack effect & Stark effects (Qualitative Discussion only).		**3**		
	Problem solving + Peer teaching		**1+1=2**		
8. Many electron atoms (SDG)	Identical particles. Symmetric & Antisymmetric Wave Functions. Pauli's Exclusion Principle.		**2**	Chalk and Talk, Quiz, PPT, Assignment	
	Hund'sRule. Periodic table. Fine structure splitting. L-S and J-J coupling scheme		**3**		
	Spectral Notations for Atomic States and Term symbols. Spectra of Alkali Atoms (Na etc.).		**2**		
	Problems and Class test		**2 +1=3**		
		Total	**60**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Arduino , SECB1

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Introduction to Arduino (SC)	Brief history of the Arduino; open-source electronics prototyping	1) Arduino Cookbook, Michael Margolis, O'Reilly Media (2011) 2) https://www.arduino.cc/en/Guide/HomePage	**2**	Chalk and Talk, Arduino	
2 Basic ideas (SC)	Basic ideas of Arduino, Familiarize the Arduino board, Setting up the arduino board. Installation of IDE in PC/laptop for Arduino programming (Sketch)		**3**		
3. Arduino Programming: (SDG)	Program structure: Data types, variables and constants, operators, control statements, loops, functions, string.		**5**		
	Interfacing: serial communication, digital and analog input/output, getting input from sensors (e.g. temperature sensor, ultrasonic sensor etc)		**5**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Arduino , SECB1

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
Projects (SC+SDG)	LED Blinking and fading.	1) Arduino Cookbook, Michael Margolis, O'Reilly Media (2011) 2) https://www.arduino.cc/en/Guide/HomePage	**2**	Projects using Arduino	
	Measurement of voltages (Below 5V and above).		**2**		
	Interfacing 7 Segment display.		**3**		
	Construction of thermometer using LM35 or Others.		**2**		
	Construct the experimental set up for studying simple pendulum and hence determine the acceleration's due to gravity.		**3**		
	Construct data logger for studying charging and discharging of RC circuit.		**3**		
		Total	**30**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Wave and Optics , GE4

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
1. Accoustics **(SC)**	Review of SHM, damped & forced vibrations: amplitude and velocity resonance.	1) Accoustics by D. P. Roychaudhuri 2) Sound by B. Ghosh	**2**	Chalk and Talk, Assignment	
	Fourier's Theorem and its application for some waveforms e.g., Saw tooth wave, triangular wave, square wave.		**3**		
	Intensity and loudness of sound. Intensity levels, Decibels.		**3**		
	Problems and Quiz		**2**		
2. Superposition of vibrations (SC)	Superposition of Two Collinear Harmonic oscillations having equal frequencies and different frequencies (Beats).		**2**		
	Superposition of Two Perpendicular Harmonic Oscillation for phase difference $\delta = 0, \frac{\pi}{}, \pi$: Graphical and Analytical Methods, Lissajous Figures with equal and unequal frequency and their uses.		**3**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Wave and Optics , GE4

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
3. Vibrations in String **(SC)**	Wave equation in stretched string and its solutions. Boundary conditions for plucked and struck strings. Expression of amplitude for both the cases (no derivation).	1) Accoustics by D. P. Roychaudhuri 2) Sound by B. Ghosh	**3**	Chalk and Talk, Assignment	
	Young's law, Ideal of harmonics.		**2**		
	Musical scales and notes		**1**		
	Problems + Class test		**1+1=2**		
4. Introduction to wave Optics **(GP)**	Definition and Properties of wavefront. Huygens Principle, Electromagnetic nature of light.	1) A Text Book on Light by B. Ghosh and K. G. Majumdar	**2**	Chalk and Talk, Assignment	
5. Interference **(GP)**	Superposition of two waves with phase difference, distribution of energy,		**1**		
	formation of fringes, visibility of fringes.		**1**		
	Division of amplitude and division of wavefront. Young's Double Slit experiment.		**2**		
	Lloyd's Mirror and Fresnel's Biprism.		**1**		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Wave and Optics , GE4

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
5. Interference (GP)	Phase change on reflection: Stoke's treatment.	1) A Text Book on Light by B. Ghosh and K. G. Majumdar	**1**	Chalk and Talk, Assignment	
	Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes).		**3**		
	Newton's Rings: measurement of wavelength and refractive index.		**2**		
	Michelson's Interferometer (a) Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index.		**2**		
	Problems + Class test		**1+1=2**		
4. Diffraction (SDG)	Fraunhofer diffraction Single slit; Double Slit.	1) A Text Book on Light by B. Ghosh and K. G. Majumdar	3	Chalk and Talk, Assignment	
	Multiple slits and Diffraction grating.		2		

LESSON PLAN

Department Name: Physics

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

Paper Name & Code: Wave and Optics , GE4

Unit / Group / Module / Article	Topics	Reference Books	No of Lecture Planned	Content Delivery Technique	Remarks / Comments
4. Diffraction (SDG)	Fresnel Diffraction: Half-period zones	1) A Text Book on Light by B. Ghosh and K. G. Majumdar	**2**	Chalk and Talk, Assignment	
	Zone plate.		**2**		
	Problems		**1**		
5. Polarization (SDG)	Transverse nature of light waves. Plane polarized light production and analysis	1) A Text Book on Light by B. Ghosh and K. G. Majumdar 2) Optics by L. Mathur	**3**		
	Circular and elliptical polarization		**3**		
	Optical activity.		**2**		
	Problems + Quiz		**1**		
	Class Test		**1**		
		Total	**60**		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Gayetri Pal (GP). Ms. Kathakali Biswas (KB), Dr. Subhendu Chandra (SC)

Paper Name & Code: DSC-2, Basic Physics-II

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Basic Electricity and Magnetism (KB)	Electrostatics: Coulomb's law, Electric field, Electric field lines. Superposition Principle. Electric flux. Idea of charge density (linear, surface, volume) and continuous charge distributions. Gauss' Law (in integral form) with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field.	Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings	3	Chalk and talk	
	Introduction to electrostatic potential, Equipotential surfaces. Calculation of potential for linear, surface and volume charge distributions: simple cases (e.g.: uniform line charge, disc, spherical shell, sphere etc.). Potential and field due to a physical dipole; Torque, force and Potential Energy of an electric dipole in a uniform electric field	Electricity and Magnetism, D.Chattopadhyay and P.C.Rakshit, New Central Book Agency, 2011	4		

	Electrostatic energy of system of charges, a charged sphere. Conductors in an electrostatic Field. Mechanical force on the surface of a charged conductor. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Capacitance for parallel-plate, cylindrical, spherical capacitors (without dielectrics). Energy stored in Electrostatic field.	Foundations of Electricity & Magnetism by Dr. Basudev Ghosh	4		
Basic Electricity and Magnetism (GP)	Lorentz force: Force on a moving charge in simultaneous electric and magnetic fields, force on a current carrying conductor in a magnetic field. Trajectory of charged particles in uniform electric field, crossed uniform electric and magnetic fields. Basic principle of cyclotron.	Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings	3	Chalk and talk	

	Magnetostatics: Concept of current density (linear, surface, volume). Equation of continuity. Biot and Savart's law, magnetic field due to a straight conductor, circular coil, Helmholtz coil, solenoid. Ampere's circuital law with applications (Infinite long wire, infinite solenoid, infinite current sheet). Magnetic field due to a small current loop - concept of magnetic dipole. Torque and force on magnetic dipole in a uniform magnetic field.	Electricity and Magnetism, D.Chattopadhyay and P.C.Rakshit, New Central Book Agency, 2011 Foundations of Electricity & Magnetism by Dr. Basudev Ghosh	8		
Introduction to Thermodynamics **(SC)**	Kinetic theory: Macroscopic and microscopic description of matter, Postulates of molecular kinetic theory of an ideal gas, Relation between microscopic and macroscopic state variables, Maxwell's velocity distribution, Concept of pressure and temperature.	Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill	3	Chalk and talk	
	Zeroth and First Law of Thermodynamics: Extensive and intensive thermodynamic variables.		9		

	Thermodynamic equilibrium, zeroth law of Thermodynamics & concept of temperature. Concept of work & heat, State Functions, internal energy and first law of Thermodynamics, its differential form, first law & various processes. Applications of first law: General relation between CP and CV, work done during isothermal and adiabatic processes, compressibility and expansion coefficient.	Thermal Physics by Dr. A. B. Gupta & Dr. H. P. Roy			
	Second Law of Thermodynamics: Reversible and irreversible process with examples. Interconversion of work and heat. Heat engines. Carnot's cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, Kelvin-Planck and Clausius statements for the second law and their equivalence. Carnot's Theorem. Applications of second law of Thermodynamics: Thermodynamic scale of temperature and its equivalence to perfect gas scale.		10		

	Entropy: Concept of Entropy, Clausius theorem. Clausius inequality, Second law of Thermodynamics in terms of Entropy. 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. Temperature-Entropy diagrams for different cycles. Third law of Thermodynamics. Unattainability of absolute zero.		6		
		Total	50		

LESSON PLAN

Department Name: Physics

Name of Faculty: Dr. Gayetri Pal (GP). Ms. Kathakali Biswas (KB), Dr. Atri Sarkar (AS)

Paper Name & Code: Minor-2, Basic Physics-II

Planned					
Unit / Group / Module / Article	**Topics**	**Reference Books**	**No of Lecture Planned**	**Content Delivery Technique**	**Remarks / Comments**
Basic Electricity and Magnetism (KB)	Electrostatics: Coulomb's law, Electric field, Electric field lines. Superposition Principle. Electric flux. Idea of charge density (linear, surface, volume) and continuous charge distributions. Gauss' Law (in integral form) with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field.	Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings	3	Chalk and talk	
	Introduction to electrostatic potential, Equipotential surfaces. Calculation of potential for linear, surface and volume charge distributions: simple cases (e.g.: uniform line charge, disc, spherical shell, sphere etc.). Potential and field due to a physical dipole; Torque, force and Potential Energy of an electric dipole in a uniform electric field	Electricity and Magnetism, D.Chattopadhyay and P.C.Rakshit, New Central Book Agency, 2011	4		

	Electrostatic energy of system of charges, a charged sphere. Conductors in an electrostatic Field. Mechanical force on the surface of a charged conductor. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Capacitance for parallel-plate, cylindrical, spherical capacitors (without dielectrics). Energy stored in Electrostatic field.	Foundations of Electricity & Magnetism by Dr. Basudev Ghosh	4		
Basic Electricity and Magnetism (GP)	Lorentz force: Force on a moving charge in simultaneous electric and magnetic fields, force on a current carrying conductor in a magnetic field. Trajectory of charged particles in uniform electric field, crossed uniform electric and magnetic fields. Basic principle of cyclotron.	Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings	3	Chalk and talk	

	Magnetostatics: Concept of current density (linear, surface, volume). Equation of continuity. Biot and Savart's law, magnetic field due to a straight conductor, circular coil, Helmholtz coil, solenoid. Ampere's circuital law with applications (Infinite long wire, infinite solenoid, infinite current sheet). Magnetic field due to a small current loop - concept of magnetic dipole. Torque and force on magnetic dipole in a uniform magnetic field.	Electricity and Magnetism, D.Chattopadhyay and P.C.Rakshit, New Central Book Agency, 2011 Foundations of Electricity & Magnetism by Dr. Basudev Ghosh	8		
Introduction to Thermodynamics **(AS)**	Kinetic theory: Macroscopic and microscopic description of matter, Postulates of molecular kinetic theory of an ideal gas, Relation between microscopic and macroscopic state variables, Maxwell's velocity distribution, Concept of pressure and temperature.	Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill	3	Chalk and talk	
	Zeroth and First Law of Thermodynamics: Extensive and intensive thermodynamic variables.		9		

	Thermodynamic equilibrium, zeroth law of Thermodynamics & concept of temperature. Concept of work & heat, State Functions, internal energy and first law of Thermodynamics, its differential form, first law & various processes. Applications of first law: General relation between CP and CV, work done during isothermal and adiabatic processes, compressibility and expansion coefficient.	Thermal Physics by Dr. A. B. Gupta & Dr. H. P. Roy			
	Second Law of Thermodynamics: Reversible and irreversible process with examples. Interconversion of work and heat. Heat engines. Carnot's cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, Kelvin-Planck and Clausius statements for the second law and their equivalence. Carnot's Theorem. Applications of second law of Thermodynamics: Thermodynamic scale of temperature and its equivalence to perfect gas scale.		10		

	Entropy: Concept of Entropy, Clausius theorem. Clausius inequality, Second law of Thermodynamics in terms of Entropy. 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. Temperature-Entropy diagrams for different cycles. Third law of Thermodynamics. Unattainability of absolute zero.		6		
		Total	50		

LESSON PLAN

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**
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

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

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**		