DEPARTMENT OF PHYSICS (Hons)
JULY 2023-JUNE 2024

Honours	Month	No of lectures		Topic	
		Theory Credit: 3	Practical Credit: 2	Theory	Practical
SEM 1 (NEP) Mathematical Methods-I (Theory) (DS-1) & Mathematical Methods-I (Lab) (DS-1) (Lab)	July	5	5	Calculus: Recapitulation, First Order and Second Order Differential equations	Basics of scientific computing Introduction to plotting graphs with QtiPlot (or equivalent)
	August	5	5	Homogeneous and Inhomogeneous second order differential equations	Introduction to programming in python & Programs as applications
	September	8	5	Calculus of functions of more than one variable	File handling in Python & Least square fitting
	October	9	5	Vector Calculus: Recapitulation of vector	User defined functions in Python, synthetic data generation and plotting
	November	9	5	Vector Differentiation, Vector Integration	Solution of Algebraic and Transcendental equations by Bisection Method
	December	9	5	Gauss' divergence theorem, Green's and Stokes Theorems and their applications	Solution of Algebraic and Transcendental equations by Newton -Raphson Method
SEM 2 (NEP) Mechanics-1 (Theory) (DS-2) & Mechanics-1 (Lab) (DS-2) (Lab)	July	5	5	Fundamentals of Dynamics	1.To determine the Moment of Inertia of a regular body using another auxiliary body and a cradle suspended by a metallic wire.
	August	7	5	Work and Energy, Collisions	2. To determine g and velocity for a freely falling body using Digital Timing Technique
	September	8	5	Rotational Dynamics	3. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
	October	10	5	Elasticity, Fluid Motion	4. To determine the Young's Modulus by flexure method.
	November	8	5	Gravitation and Central Force Motion	5. To determine the Modulus of Rigidity of a wire by a torsional pendulum.
	December	7	5	Oscillations	6.To determine the value of g using Bar Pendulum. 7. To determine the value of g using Kater's Pendulum.

Honours	Month	No of lectures		Topic	
		Theory Credit: 8	Practical Credit: 4	Theory	Practical
SEM 3 Mathematical Physics-II (PHSACOR05T) & Mathematical Physics-II Lab (PHSACOR05P)	July	10	10	Fourier Series	Sorting and Statistical Calculations
	August	10	10	Frobenius Method and Special Functions: Legendre, Bessel, Hermite and Laguerre Differential Equations.	Interpolation
	September	15	10	Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Multipole expansion. Hermite and Laguerre polynomials Bessel Functions of the First Kind.	Numerical differentiation
	October	9	10	Some Special Integrals and Variational calculus in physics	Numerical Integration
	November	10	10	Analytical Dynamics	Integration by stochastic method
	December	6	10	Partial Differential Equations	Solution of ODE First order Differential equation
SEM 3 Thermal Physics (PHSACOR06T) & Thermal Physics Lab (PHSACOR06P)	July	12	10	Introduction to Thermodynamics: First Law and second Law of Thermodynamics	1. Verification of Stefan's law using a torch bulb. 2. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
	August	13	10	Carnot's Theorem, Entropy	3. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT) using constant current source

					4. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions to find 'a' and 'b' coefficients by null method.
	September	8	10	Thermodynamic Potentials	5. To calibrate a thermocouple to measure temperature in a specified Range by Null Method using a potentiometer. 6. To calibrate a thermocouple to measure temperature in a specified Range by direct measurement using Op-Amp differential amplifier and to determine Neutral Temperature
	October	7	10	Derivations and applications of Maxwell's Relations	7. Mesuring unknown temperature using a diode sensor. 8. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
	November	10	10	Kinetic Theory of Gases: Maxwell-Boltzmann Law, Molecular Collisions: Mean Free Path.	9. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
	December	10	10	Real Gases: Behavior of Real Gases	10. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
SEM 3 Digital Systems and Applications (PHSACOR07T) & Digital Systems and Applications Lab (PHSACOR07P)	July	9	10	Electronic Components and Measuring devices, Integrated Circuits	1. a) To measure (i) Voltage, and (ii) Time period of a periodic waveform using CRO. b) To test a Diode and Transistor using a Multimeter. 2. a) To design a switch (NOT gate) using a transistor. b) To verify and design AND, OR, NOT and XOR gates using NAND gates.
	August	16	10	Digital Circuits	3. For a given truth table find logic equation, minimize and design the circuit using logic gate ICs. 4. Half Adder, Full Adder and 4-bit binary Adder.

	September	10	10	Arithmetic circuits, Data processing circuits	5. To build Flip-Flop (RS, D-type and JK) circuits using NAND gates. 6. To design an astable multivibrator of given specifications using 555 Timer.
	October	10	10	Sequential circuits and Timers	7. To design a monostable multivibrator of given specifications using 555 Timer. 8. Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C.
	November	8	12	Registers and Counters (4 bits)	9. To build JK Master-slave flip-flop using Flip-Flop ICs 10. To build a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram.
	December	7	8	Computer Organization	11. To make a 4-bit Shift Register (serial and parallel) using D-type/JK Flip-Flop ICs.
SEM 4 Mathematical Physics III (PHSACOR08T) & Mathematical Physics III Lab (PHSACOR08P)	January	10	10	Complex Analysis: Euler's formula. De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions.	1. ODE initial value problems by RK2 & RK4 2. Solution of Linear system of equations by Gauss elimination method, determinant by Gauss Jordan method.
	February	10	10	Complex Analysis: Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals.	3. Inverse of a matrix by Gauss-Seidal iterative method. 4. Gram-Schmidt orthogonalisation method with 3 vectors.
	March	8	10	Integrals Transforms: Fourier Transforms	5. Explicit calculation of largest eigenvalue calculation by power iterative method for real symmetric matrix and corresponding eigenvector 6. Eigen vectors, eigen values problems (by numpy.linalg)
	April	7	10	Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations	7. Boudary value problems (by finite difference method with fixed grid size): a. Laplace eqn in 1D with Dirichlet boundary condition b. 1D Fourier heat equation with Dirichlet boundary condition c. Poisson equations

					d. Wave equation 8. Find square roots, cube roots of a complex number using two dimensional Newton-Raphson method.
	May	10	10	Boundary Value Problems	9. Integral transform: FT of $\exp(-kx^2)$ 10. Dirac Delta Function: Evaluate, for σ=1, 0.1, 0.01 and show it tends to 5
	June	15	10	Matrices, Eigen-values and Eigenvectors	Octave: Introduction of Octave with its basic features. Few examples of solving (a) differential equations and (b) matrix eigenvalue problems - are to be performed using Octave
SEM 4 Elements of Modern Physics (PHSACOR09T) & Elements of Modern Physics Lab (PHSACOR09P)	January	12	12	Relativistic Dynamics	1. To determine the wavelength of H-alpha emission line of Hydrogen atom. 2. To determine the absorption lines in the rotational spectrum of Iodine vapour. 3. To determine the value of e/m by Bar magnet.
	February	10	8	Collection of Identical Entities – Classical Approach. Emergence of Quantum Theory: Planck's quantum postulate, blackbody Radiation. Photo-electric effect and Compton scattering.	4. To determine the wavelength of laser source using diffraction of double slits. 5. To determine wavelength using He-Ne/ solid state laser using plane diffraction grating
	March	10	10	Emergence of Quantum Theory: Heisenberg uncertainty principle	6. To determine angular spread of He-Ne/ solid state laser using plane diffraction grating 7. To determine work function of material of filament of directly heated vacuum diode.
	April	10	10	Emergence of Quantum Theory: Two-Slit interference experiment.Wave-particle duality, Bohr's complementarity principle. Matter waves. Lasers.	8. To show the tunneling effect in tunnel diode using I-V characteristics. 9. Measurement of Planck's constant using black body radiation and photo-detector
	May	9	8	Nuclear Physics: Size and structure of atomic nucleus, Nuclear Models.	10. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light

					11. To determine the Planck's constant using LEDs of at least 4 different colours.
	June	9	12	Nuclear Physics: Radioactivity, Fission and fusion.	12. To determine the ionization potential of mercury. 13. To setup the Millikan oil drop apparatus and determine the charge of an electron. 14. To determine the wavelength of laser source using diffraction of single slit.
SEM 4 Analog Systems and Applications (PHSACOR10T) & Analog Systems and Applications Lab (PHSACOR10P)	January	10	10	History of the development of electronics, Semiconductor Diodes	1. To study V-I characteristics of PN junction diode and Light emitting diode (LED) (using both current and voltage source). 2. To study the V-I characteristics of a Zener diode and its use as voltage regulator. 3. Study of V-I & power curves of Solar Cells and find maximum power point and efficiency. 4. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
	February	15	10	Two-terminal Devices and their Applications, Bipolar Junction transistors	5. To study the frequency response of voltage gain of a RC – coupled transistor amplifier. 6. To design inverting, non- inverting and buffer amplifiers using Op-amp (741/351) for dc voltage. 7. To design a Wien bridge oscillator for given frequency using a Op-Amp. 8. To add dc voltages using Op-amp in inverting and non-inverting mode.
	March	11	10	Field Effect transistors, Amplifiers	9. a) To investigate the use of an op-amp as an Integrator. b) To investigate the use of an op-amp as a Differentiator. 10. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias. 11. To study the various biasing configurations of BJT for normal class A

					operation. 12. To design a Phase Shift Oscillator of given specification using Op-Amp.
	April	7	10	Coupled Amplifier, Feedback in Amplifiers	13. To study the Colpitt's Oscillator. 14. To design a digital to analog converter (DAC) of given specifications. 15. To study the analog to digital converter (ADC) IC.
	May	8	10	Sinusoidal Oscillators, Operational Amplifiers (Black Box approach)	16. To design a precision Differential amplifier of given I/O specification using Op-Amp. 17. To design a circuit to simulate the solution of a 1st/2nd order differential equation. 18. To design inverting amplifier using Op-amp (741/351) and study its frequency response
	June	9	10	Applications of Op-Amps, Conversion	19. To design non-inverting amplifier using Op-amp (741/351) & study its frequency response 20. To study the zero – crossing detector and comparator. 21. Using Schmitt trigger and associated circuit (with OPAMP) generate different wave forms.

Honours	Month	No of lectures		Topic	
		Theory	Practical	Theory	Practical
SEM 5 Quantum Mechanics and Applications (PHSACOR11T) & Quantum Mechanics and Applications Lab (PHSACOR11P)	July	12	10	Basic Formalism of Quantum Mechanics	Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom
	August	12	10	Schrodinger Equation	Solve the s-wave radial Schrodinger equation for an atom
	September	8	12	Bound states in an arbitrary potential	Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction.
	October	10	8	Quantum theory of hydrogen-like atoms	Solve the s-wave radial Schrodinger

					equation for a particle of mass m
	November	9	12	Applications of Quantization Rules in Atomic Physics: Electron angular momentum quantization rules. Space quantization. Magnetic Moment, Gyromagnetic Ratio and Bohr magneton. Electron Spin Spin Angular Momentum. Spin Magnetic Moment. Stern-Gerlach Experiment. Larmor Precession.Pauli's Exclusion Principle Aufbau principle, Periodic table.	Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule
	December	9	8	Applications of Quantization Rules in Atomic Physics: Spin orbit interaction. spin-orbit interaction. Fine structure splitting. Normal and Anomalous Zeeman Effect, Paschen Back effect. Stark Effect. Spin-orbit coupling. Hund's Rule. Spectra of Hydrogen and Alkali Atoms.	Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits.
SEM 5 Solid State Physics (PHSACOR12T) & Solid State Physics Lab (PHSACOR12P)	July	12	10	Crystal Structure	1. To determine the Coupling Coefficient of a Piezoelectric crystal. 2. To measure the Dielectric Constant of a dielectric Materials with frequency
	August	10	10	Elementary Lattice Dynamics	3. To study the characteristics of a Ferroelectric Crystal. 4. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
	September	8	10	Magnetic Properties of Matter	5. To measure the resistivity of a semiconductor (Ge) with temperature by reverse bias characteristics of Ge diode (room temperature to 80 oC) and to determine its band gap. 6. To determine the Hall coefficient of a semiconductor sample.
	October	8	10	Dielectric Properties of Materials	7. To study temperature coefficient of a semiconductor (NTC thermistor) 8. Measurement of susceptibility of paramagnetic solution (Quinck`s Tube Method)
	November	12	12	Ferroelectric Properties of Materials, Drude's theory	9. To measure the Magnetic susceptibility of Solids.

					10. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR)
	December	16	8	Elementary band theory, Superconductivity	11. To determine the refractive index of a dielectric layer using SPR
SEM 5 Discipline Specific Elective Papers (DSE) Advanced Mathematical Physics – I (PHSADSE01T) & Advanced Mathematical Physics – I Lab (PHSADSE01P)	July	10		Laplace Transform	1. Linear algebra: a. Multiplication of two 3 x 3 matrices. b. Eigenvalue and eigenvectors
	August	10	8	Application of Laplace Transforms. Linear Vector Spaces: Abstract Systems. Binary Operations and Relations. Introduction to Groups and Fields. Vector Spaces and Subspaces.	2. Orthogonal polynomials as eigen functions of Hermitian differential operators.
	September	10	8	Linear Vector Spaces: Change of basis. Linear Transformations. Inner products. Gram-Schmidt orthogonalization.	3. Determination of the principal axes of moment of inertia through diagonalization.
	October	10	12	Cartesian Tensors: Transformation of Co-ordinates. Einstein's Summation Convention. Tensors. Algebra of Tensors. Sum, Difference and Product of Two Tensors. Contraction. Quotient Law of Tensors. Symmetric and Anti- symmetric Tensors. Invariant Tensors: Kronecker and Alternating Tensors. Association of Antisymmetric Tensor of Order Two and Vectors.	4. Vector space of wave functions in Quantum Mechanics: Position and momentum differential operators and their commutator, wave functions for stationary states as eigenfunctions of Hermitian differential operator.
	November	10	12	Cartesian Tensors: Vector Algebra and Calculus Differentiation. Gradient, Divergence and Curl of Tensor Fields. Vector Identities. Tensorial Formulation of Analytical Solid Geometry. Rotation Tensor. Isotropic Tensors.Tensorial Character of Physical Quantities. Moment of Inertia Tensor. Stress and Strain Tensors. Generalized Hooke's Law. Maxwell's stress tensor.	5. Lagrangian formulation in Classical Mechanics with constraints. 6. Study of geodesics in Euclidean and other spaces (surface of a sphere, etc).
	December	10	10	General Tensors.	7. Estimation of ground state energy and wave function of a quantum system.
SEM 5	July	15		Lagrangian & Hamiltonian Dynamics	

Discipline Specific Elective Papers (DSE) Advanced Dynamics (PHSADSE02T)	August	10		Rigid Body Mechanics	
	September	10		Small Amplitude Oscillations	
	October	12		Dynamical Systems: continuous dynamical system. The idea of phase space, flows and trajectories. Autonomous and non-autonomous systems, dimensionality. Linear stability analysis to study the behaviour of an 1-dimensional autonomous system. Extension of the method for simple mechanical systems as 2-dimensional dynamical systems, categorisation of equilibrium/fixed points : illustrations for the free particle, particle under uniform gravity, simple and damped harmonic oscillator (both under-damped and over-damped).	
	November	13		Dynamical Systems: Sketching flows and trajectories in phase space; Discrete time dynamical systems, examples.	
	December	15		Fluid Dynamics	
SEM 5 Discipline Specific Elective Papers (DSE) Nuclear and Particle Physics (PHSADSE03T)	January	10		General Properties of Nuclei	
	February	12		Nuclear Models	
	March	16		Radioactivity decay, Nuclear Reactions	
	April	8		Interaction of Nuclear Radiation with matter	
	May	13		Detector for Nuclear Radiations, Particle Accelerators	
	June	14		Particle physics	
SEM 6 Discipline Specific Elective Papers (DSE) Electromagnetic Theory (PHSACOR13T) & Electromagnetic Theory Lab	January	12	10	Maxwell Equations	1. To verify the law of Malus for plane polarized light. 2. To determine the specific rotation of sugar solution using Polarimeter.
	February	10	10	EM Wave Propagation in Unbounded Media	3. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating. 4. To study the polarization of light by reflection and determine the polarizing angle for air-glass

(PHSACOR13P)					interface.
	March	10	10	EM Wave in Bounded Media	5. To verify Fresnel's formula for reflection of polarized light incident on a dielectric interface 6. To determine the Boltzmann constant using V-I characteristics of PN junction diode.
	April	10	10	Polarization of Electromagnetic Waves: Linear, Circular and Elliptical Polarization	7. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eyepiece. 8. To determine the refractive index of liquid by total internal reflection using Wollaston's air- film.
	May	7	10	Polarization of Electromagnetic Waves: Rotatory Polarization.	9. To study the reflection, refraction of microwaves 10. To study Polarization and double slit interference in microwaves. 11. To analyze elliptically polarized Light by using a Babinet's compensator.
	June	11	10	Wave guides, Optical Fibres	12. To study dependence of radiation on angle for a simple Dipole antenna. 13. To verify the Stefan`s law of radiation and to determine Stefan's constant.
SEM 6 Statistical Mechanics (PHSACOR14T) & Statistical Mechanics Lab (PHSACOR14P)	January	10		Classical Statistical Mechanics: Macrostate & Microstate. Elementary Concept of Ensemble, Liouville's theorem. Phase Space, postulate of equal a priori probability, Entropy and Thermodynamic Probability, Canonical ensemble, Partition Function, Density of states: for ideal gas, for standing waves in a cavity.	1. Computational analysis of the behaviour of a collection of particles in a box that satisfy Newtonian mechanics and interact via the Lennard-Jones potential, varying the total number of particles N and the initial conditions: a) Study of local number density in the equilibrium state (i) average; (ii) fluctuations b) Study of transient behaviour of the system (approach to equilibrium) c) Relationship of large N and the arrow of time

	February	10		Classical Statistical Mechanics: Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy.	d) Computation of the velocity distribution of particles for the system and comparison with the Maxwell velocity distribution e) Computation and study of mean molecular speed and its dependence on particle mass f) Computation of fraction of molecules in an ideal gas having speed near the most probable speed
	March	11		Chemical Equilibrium, Theory of Blackbody Radiation	2. Computation of the partition function Z(β) for examples of systems with a finite number of single particle levels (e.g., 2 level, 3 level, etc.) and a finite number of non-interacting particles N under Maxwell-Boltzmann, Fermi-Dirac and Bose- Einstein statistics: a) Study of how Z(β), average energy <E>, energy fluctuation ΔE, specific heat at constant volume CV, depend upon the temperature, total number of particles N and the spectrum of single particle states. b) Ratios of occupation numbers of various states for the systems considered above c) Computation of physical quantities at large and small temperature T and comparison of various statistics at large and small temperature T.
	April	6		System of identical particles	3. Plot Planck's law for Black Body

					radiation and compare it with Raleigh-Jeans Law at high temperature and low temperature.
	May	12		Bose-Einstein Statistics	4. Plot Specific Heat of Solids (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature and low temperature and compare them for these two cases.
	June	11		Fermi-Dirac Statistics	5. Plot the following functions with energy at different temperatures a) Maxwell-Boltzmann distribution b) Fermi-Dirac distribution c) Bose-Einstein distribution
SEM 6 Discipline Specific Elective Papers (DSE) Advanced Mathematical Physics II (PHSADSE04T)	January	10		Partial Differential Equations: Existence and uniqueness theorem for soutions of partial differential equations (PDE). Categorisation of PDE's. Solution method for one homogeneous example of each type.	
	February	10		Partial Differential Equations: Inhomogeneous PDE. Green's function. General solution in terms of Green's function. Solution of Poisson's equation by Green's function method.	
	March	15		Group Theory: Review of sets, Mapping and Binary Operations, Relation, Types of Relations. Groups: Elementary properties of groups, uniqueness of solution, Subgroup, Centre of a group, Co-sets of a subgroup, cyclic group, Permutation/Transformation. Homomorphism and Isomorphism of group. Normal and conjugate subgroups, Completeness and Kernel.	
	April	15		Group Theory: special groups, Matrix Representations. Character tables and their uses. Application to small vibrations. Continuous groups.	
	May	13		Advanced Probability Theory: Fundamental	

				Probability Theorems. Conditional Probability, Bayes' Theorem, Repeated Trials, Binomial and Multinomial expansions. Random Variables and probability distributions. Expectation and Variance.	
	June	12		Special Probability distributions: The binomial distribution, The Poisson distribution, Continuous distribution: The Gaussian (or normal) distribution, The principle of least squares.	
SEM 6 Discipline Specific Elective Papers (DSE) Astronomy and Astrophysics (PHSADSE05T)	January	12		Astronomical Scales: Astronomical Distance, Mass and Time, Scales, Brightness, Radiant Flux and Luminosity, Measurement of Astronomical Quantities Astronomical Distances, Stellar Radii, Masses of Stars, Stellar Temperature. Basic concepts of positional astronomy: Celestial Sphere, Geometry of a Sphere, Spherical Triangle, Astronomical Coordinate Systems, Geographical Coordinate Systems, Horizon System, Equatorial System, Diurnal Motion of the Stars, Conversion of Coordinates.	
	February	12		Astronomical Scales: Measurement of Time, Sidereal Time, Apparent Solar Time, Mean Solar Time, Equation of Time, Calendar. Basic Parameters of Stars: Determination of Distance by Parallax Method; Brightness, Radiant Flux and Luminosity, Apparent and Absolute magnitude scale, Distance Modulus; Determination of Temperature and Radius of a star; Determination of Masses from Binary orbits; Stellar Spectral Classification, Hertzsprung-Russell Diagram.	
	March	9		Astronomical techniques, Physical principles	
	April	11		The sun and solar family	
	May	14		The milky way	
	June	17		Galaxies and Large scale structure & expanding universe	
SEM 6	January	8	8	Electronic communication	1. To design an Amplitude Modulator

Discipline Specific Elective Papers (DSE) Communication Electronics (PHSADSE06T) & Communication Electronics Lab (PHSADSE06P)					using Transistor
	February	12	12	Analog Modulation	2. To study envelope detector for demodulation of AM signal 3. To study FM - Generator and Detector circuit
	March	10	10	Analog Pulse Modulation	4. To study AM Transmitter and Receiver 5. To study FM Transmitter and Receiver
	April	10	10	Digital Pulse Modulation	6. To study Time Division Multiplexing (TDM) 7. To study Pulse Amplitude Modulation (PAM)
	May	10	12	Introduction to Communication and Navigation systems	8. To study Pulse Width Modulation (PWM) 9. To study Pulse Position Modulation (PPM)
	June	10	8	Mobile Telephony System	10. To study ASK, PSK and FSK modulators

SKILL ENHANCEMENT COURSE (SEC) - 3rd AND 4TH SEM (For CBCS) & 1st AND 2nd SEM (For NEP)

	Month	**No of lectures 30 (NEP: 45) Credit 2 (NEP:3)**		**Topic**	
		Theory	**Practical**	**Theory**	**Practical**
SEM 3 & SEM 5 (Odd) & SEM 1 (NEP) Skill Enhancement Courses (SEC) Basic	July	2 (NEP:2)	3 (NEP:4)	Basic of Measurement, Electronic Voltmeter	1. Use of an oscilloscope. 2. CRO as a versatile measuring device. 3. Circuit tracing of Laboratory electronic equipment, 4. Use of Digital multimeter/VTVM for measuring voltages 5. Circuit tracing of Laboratory electronic equipment,
	August	2 (NEP:2)	3 (NEP:4)	Cathode Ray Oscilloscope	Laboratory Exercises: 6. Winding a coil / transformer. 7. Study the layout of receiver circuit.

Instrumentation Skills (PHSSSEC01M)					8. Trouble shooting a circuit 9. Balancing of bridges
	September	2 (NEP:2)	3 (NEP:4)	Signal Generators and Analysis Instruments	Laboratory Exercises: 1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance. 2. To observe the limitations of a multimeter for measuring high frequency voltage and currents. 3. To measure Q of a coil and its dependence on frequency, using a Q-meter.
	October	1 (NEP:2)	4 (NEP:5)	Impedance Bridges & Q-Meters	Laboratory Exercises: 4. Measurement of voltage, frequency, time period and phase angle using CRO. 5. Measurement of time period, frequency, average period using universal counter/ frequency counter. 6. Measurement of rise, fall and delay times using a CRO.
	November	1 (NEP:2)	4 (NEP:8)	Digital Instruments	Laboratory Exercises: 7. Measurement of distortion of a RF signal generator using distortion factor meter. 8. Measurement of R, L and C using a LCR bridge/ universal bridge.
	December	1 (NEP:2)	4 (NEP:8)	Digital Multimeter	Open Ended Experiments: 1. Using a Dual Trace Oscilloscope 2. Converting the range of a given measuring instrument (voltmeter, ammeter)
SEM 4 & SEM 6 (Even) & SEM 2 (NEP)	January	1 (NEP:2)	4 (NEP:4)	Introduction: Usage of linux, Algorithms and Flowcharts. Examples.	1. Exercises on syntax on usage of FORTRAN 90/95 or C++ 2. Usage of GUI Windows, Linux Commands, familiarity with DOS commands and working in an editor to write sources codes in FORTRAN 90/95 or C++. 3. To print out all natural even/ odd

Skill Enhancement Courses (SEC) Computational Physics Skills (PHSSSEC02M)					numbers between given limits. 4. To find maximum, minimum and range of a given set of numbers. 5. Calculating Euler number using exp(x) series evaluated at x=1
	February	1 (NEP:2)	4 (NEP:4)	Scientific Programming	1. To compile a frequency distribution and evaluate mean, standard deviation etc. 2. To evaluate sum of finite series and the area under a curve. 3. To find the product of two matrices 4. To find a set of prime numbers and Fibonacci series.
	March	1 (NEP:2)	4 (NEP:4)	Control Statements	5. To write program to open a file and generate data for plotting using Gnuplot. 6. Plotting trajectory of a projectile projected horizontally.
	April	1 (NEP:2)	4 (NEP:5)	Programming	7. Plotting trajectory of a projectile projected making an angle with the horizontally. 8. Creating an input Gnuplot file for plotting a data and saving the output for seeing on the screen. Saving it as an eps file and as a pdf file.
	May	1 (NEP:2)	4 (NEP:8)	Scientific word processing: Introduction to LaTeX	9. To find the roots of a quadratic equation. 10. Motion of a projectile using simulation and plot the output for visualization.
	June	1 (NEP:2)	4 (NEP:8)	Visualization	11. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs for visualization. 12. Motion of particle in a central force field and plot the output for visualization.

MDC (Physics) (SEM –I) (NEP)

Current Perspective of Physics

	Month	No of lectures 45 Credit 3		Topic	
		Theory	**Practical**	**Theory**	**Practical**
SEM 1 (NEP) Current perspective of Physics – MDC (Physics)	July	5		Module 1: Introduction, How Physics works: Galilean and Newtonian Dynamics	
	August	4		Module 1: Different empirical laws of Electromagnetism	
	September	5		Module 1: Atomic spectra and Black-body radiation	
	October	13		Module 2: The grand scheme of Physics	
	November	10		Module 3: Light and it's dual nature	
	December	8		Module 3: The Electromagnetic Spectrum	