COURSE OUTCOMES

SEMESTER- I

COURSE TITLE: MATHEMATICAL PHYSICS COURSE CODE: PAE 101

On succcessful complétion of course students will:

1. Master the basic elements of complex mathematical analysis
2. Solve differential equations like Legendre, Bessel and Hermite that are common in physical sciences.
3. Understand the different partial differential equations encountered in physical problems.
4. To develop expertise in mathematical techniques that are required in physics.
5. To solve transfer functions in Instrumentation using Laplace transforms.
6. Use Fourier transforms in Holography.
7. Use Matrices in the study of electrical circuits, Quantum Mechanics and Optics.
8. To formulate, interpret and draw inferences from mathematical solutions.
9. Use the knowledge of Tensors to understand phenomenon like stress and strain.

COURSE TITLE: CLASSICAL MECHANICS COURSE CODE: PAE 102

On succcessful completion of course students will:

1. Use Newton's laws of motion to solve advanced problems involving the dynamic motion of classical mechanical systems.
2. Use conservation law of energy and linear and angular momentum to solve dynamics problems.
3. Understand the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulations of classical mechanics.
4. Solve Lagrangian for a charged particle in electromagnetic field,
5. Gain knowledge on the application of Hamilton's equations in solving the equation of motion of a particle in a central force field, projectile motion of a body.
6. Understand Cyclic coordinates and conservation theories
7. Understand basic mechanical concepts related to discrete and continuous mechanical systems,
8. Obtain the vibrations of discrete and continuous mechanical systems

COURSE TITLE: QUANTUM MECHANICS COURSE CODE: PAE 103

On succcessful completion of course student will:

1. Able to pinpoint the aspects of development of quantum mechanics
2. Understand and explain the differences between classical and quantum mechanics
3. Understand the idea of wave function
4. Derive Normalization and Orthogonality of wave functions
5. Understand the physical significance of commuting and non-commuting operators.

6. Understand the uncertainty relations
7. Solve Schrödinger equation for simple potentials
8. Identify and relate the Eigen value problems for energy, momentum, angular momentum and central potentials explain the idea of spin.

COURSE TITLE: SOLID STATE PHYSICS COURSE CODE: PAE 104

On succcessful completion of course student will:

1. Understand different types of crystal structures in terms of the crystal lattice and the basis of constituent atoms
2. Formulate the theory of X-ray diffraction in the reciprocal lattice (k-space) formalism and apply this knowledge to generalize the formulation for matter waves
3. Understand the different physical mechanisms involved in crystal binding identifying the repulsive and attractive interactions and correlate these with the atomic properties
4. Formulate the theory of lattice vibrations (phonons) and to determine thermal properties of solids
5. Formulate the problem of electrons in a periodic potential, examine its consequence on the band-structure of the solid and develop a framework that explains the physical properties of solids in terms of its band-structure
6. Apply the knowledge to make a judicious choice of a solid in terms of its desired property
7. Understand expression for electron & hole concentrations in intrinsic and extrensic semiconductors
8. Understand the experimental techniques for crystal growth from solution and melt

SEMESTER -II

COURSE TITLE: ELECTROMAGNETIC THEORY COURSE CODE: 201

On succcessful completion of course student will:

1. Derive general wave equation using Maxwell's equations
2. Derive Laplace equations for electrostatic potential in Cartesian, spherical and cylindrical coordinates
3. Obtain scalar and vector magnetic potentials
4. Understand the propagation of EM waves in different media
5. Understand the propagation of EM waves in bounded and unbounded media and Boundary conditions for EDB and H.
6. Derive poynting theorem
7. Derive Fresnel relations- Reflection (R) and Transmission(T) coefficients Brewester's angle
8. Understand the concept of EM radiation of Inhomogeneous wave equation ,harmonically oscillating source& from accelerated charges

COURSE TITLE: STATISTICAL MECHANICS COURSE CODE: 202

On succcessful completion of course student will:

1. Gain knowledge about classical and quantum statistical mechanics, including Boltzmann, Fermi-Dirac, and Bose-Einstein statistics.
2. use the formalism of statistical mechanics and probability theory to derive relations between thermo dynamical quantities
3. Gain knowledge and broad understanding of Statistical Mechanics, and show a critical awareness of the significance and importance of the topics, methods and techniques.
4. Have a deep understanding of physical statistics and its relation to information theory.
5. Able to solve statistical mechanics problems for simple non-interacting systems,
6. Have a basic understanding of the phase transitions,
7. Be able to use linear response theory and kinetic equation approach.
8. Have a deep understanding of universality in second order phase transitions

COURSE TITLE: QUANTUMMECHANICS II COURSE CODE: PAE 203

On succcessful completion of course student will:

1. Understand the kinematics of scattering process
2. Derive partial wave analysis using Born approximation method
3. Use time Independent perturbation theory for non degenerate case
4. Understand WKB approximation method to study alpha decay
5. Understand time dependent perturbation theory
6. Understand the interaction of an atom with eiectromagnetic radiation
7. Understand the relativistic quantum mechanics using Klein Gordon equation
8. Study the properties of gamma matrices

COURSE TITLE: ELECTRONICS COURSE CODE: PAE 204

On succcessful completion of course student will:

1. Acquire knowledge of operational amplifier circuits and their applications.
2. Gain knowledge on combinational logic circuits, simplification techniques using karnaugh maps.
3. Understand the operation of decoders, encoders, multiplexers, adders and subtractors.
4. Understand the working of latches, flip-flops, designing registers, counters, a/d and d/a converters.
5. Understand the simplification techniques using karnaugh maps.
6. Design and Analyze synchronous and asynchronous sequential circuits.

7. Apply the knowledge gained in the design of counters, registers and a/d& d/a converters
8. Understand the architecture, instruction set and basic programs of 8085 microprocessor.

SEMESTER- III

COURSE TITLE: MODERN OPTICS COURSE CODE: P 301 T

On succcessful completion of course student will:

1. Gain knowledge on laser rate équations for Two, Three, Four-level laser systems.
2. Understand Einstein relations for émission and absorption of radiation
3. Gain knowledge on classification of laser systems
4. Gain knowledge on application of various laser systems
5. Understand basic principles of holography and its applications
6. Understand the concept of recording and reconstruction of a hologram
7. Understand the fourier transforming properties of lenses
8. Understand the applications of non-linear optics.

COURSE TITLE: ADVANCED SOLID STATE PHYSICS COURSE CODE: P 302 T

On succcessful completion of course student will:

1. Acquire knowledge in different experimental approaches to study Fermi surfaces in different materials.
2. Understand macroscopic electrostatics as an approach to calculate local electric fields and dielectric response functions.
3. Understand piezo-, pyro- and Ferro electricity, ferroelectric domains and hysteresis.
4. Be introduced to diamagnetic and paramagnetic response in solids through a semi-classical approach.
5. Understand basic theories of magnetic materials (ferromagnetism, ferrimagnetism, anti-ferromagnetism).
6. Understand phenomena related to magnetic phase transitions, such as domain formation, and hysteresis.
7. Acquire basic knowledge on (low temperature) superconductivity in type I and type II super conductors, and receive and introduction in different theoretical approaches to super conductivity (BCS).
8. Understanding of various phenomena related to super conductivity, such as the Meissner effect, flux quantization, Giæver- and Josephson tunneling.

COURSE TITLE: ELECTRONIC INSTUMENTATION COURSE CODE: P 303 T/EI

On succcessful completion of course student will:

1. Measure various electrical parameters with accuracy, precision, resolution.
2. Design different types of amplifiers and filters.
3. Select specific instrument for specific measurement function.
4. Understand principle of operation, working of different electronic instruments like digital multi meter, vector voltmeter, power factor meter .
5. Understand functioning, specification, and applications of signal generators and signal analyzing instruments.
6. Understand working & principle of various signal analyzers like wave analyzer, distortion analyzer & spectrum analyzers
7. Test and troubleshoot electronic circuits using various electronic measuring instruments.
8. Understand various types of test and measuring instruments

COURSE TITLE: DIGITAL LOGIC CIRCUITS COURSE CODE: P 304A/T/EI

On succcessful completion of course student will:

1. Acquire the basic knowledge of digital logic levels and itsapplication.
2. Gain knowledge on digital arithmetic operations for algebraic simplification.
3. Design Decoders, Encoders, Digital multiplexers, Adders and Subtractors, Binary comparators, Latches and Flip-Flops
4. Design registers and Counters, A/D and D/A converters.
5. Understand, analyze and design of programmable logic devices and VHDL
6. Identify basic requirements for a designing a combinational logic circuit
7. Identify and prevent various hazards and timing problems in a digital circuit.
8. Understand digital IC terminology and characteristics of TTL, MOS,ECL families.

SEMESTER-IV

COURSE TITLE: NUCLEAR PHYSICS COURSE CODE: P 401 T

On succcessful completion of course student will:

1. Understand Nuclear Force And Nuclear Models
2. Solve the semi empirical mass formula and its applications using liquid drop model and shell model
3. Understand the concept of Nuclear Decay Processes
4. Study α-decay using Gamow's theory,

5. Study of β-decay using Fermi's theory.
6. Understand the Classification of nuclear reactions
7. Understand Born approximation, stripping and pick-up reactions
8. Understand the Classification of elementary Particles and their Quantum Numbers

COURSE TITLE: SPECTROSCOPY COURSE CODE: P 402 T

On succcessful completion of course student will:

1. Understand the basic principles of atomic absorption spectroscopy,
2. Understand the different types of atomic absorption spectrometers,
3. Understand the working principles, taking spectrum and outline of atomic absorption spectroscopy device,
4. Compare and contrast atomic and molecular spectra.
5. Interpret Micro-wave and UV-visible spectroscopy,
6. Interpret IR spectroscopy and Raman spectroscopy,
7. Understand the basic principles of NMR spectroscopy and its applications
8. Understand the basic principles of ESR spectroscopy and its applications

COURSE TITLE: INTRUMENTATION FOR MEASUREMENT AND DATA TRANSMISSION
COURSE CODE: PEI 403 T/EI

On succcessful completion of course student will:

1. Understand the classification of transducers
2. Understand measurement of strain using different types of strain gauges –
3. Pressure measurement using bourdon tube-&bellows –
4. Understand the classification of temperature measuring devices
5. Understand the classification of flow meters
6. Understand open loop control &closed loop control systems
7. Gain the knowledge on working of dc and ac servomotors
8. Understand the classification of telemetry system

COURSE TITLE: EMBEDDED SYSTEMS COURSE CODE: PEI 404A/T/EI

On succcessful completion of course student will:

1. Understand the models of embedded systems using different processor technologies.
2. Understand various types of peripherals used in embedded system.

3. Analyze a given embedded system design and identify its performance
4. Use modern engineering tools necessary for integrating software and hardware components in embedded system designs.
5. Understand the programming model and Instruction set of 8051 Microcontroller. Addressing mode supported by 8051 instruction set.
6. Gain knowledge on assembly language programming..
7. Serial data transfer using 8051. Interrupts in 8051.I/o ports and port expansion. DAC, ADC, Stepper motor,
8. Gain knowledge on LCD, A/D & D/A, key board and stepper motor interfacing to 8051 Microcontroller.