Digital Circuits and Combinational Logic

After studying this course students would have a thorough understanding of the fundamental concepts and techniques used in digital electronics.

Digital Design

On completion of this course students will have the skills and confidence to conceive and implement a complex digital system.

Microprocessor Architecture, Programming and Applications with the 8085

Design system using memory chips and peripheral chips for 8085 microprocessor and understand the devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors.

The 8051- Microcontroller and Embedded Systems

Students will be able to analyse abstract problems and apply a combination of hardware and software to address the problem. They will also be able to use standard test and measurement equipment to evaluate digital interfaces

VHDL

Students will be confident to write efficient hardware designs and perform high-level HDL simulations and will be able to design advanced combinational and sequential digital circuits by using VHDL

Photonic devices and power electronics

In-depth knowledge and critical understanding of the theory and principles of Power electronic circuits and also of the design, fabrication, operation and performance of advanced photonic devices for a variety of applications.

Computer hardware

A student will be able to Assemble/setup and upgrade personal computer systems and Perform installation, configuration, and upgrading of microcomputer hardware and software. Student also will be able to Install/connect associated peripherals and Diagnose and troubleshoot computer systems hardware and software, and other peripheral equipment.

Computer networks

Upon the completion of this course a student can describe and analyze the hardware, software, components of a network and the interrelations.

Schematic Capture, simulation and Layout Design Using Computer aided design

Students studying this paper will be able to design sequential and combinational logic by using schematic capture tools and verify the circuit by simulation. He/She will be able to design complex digital circuits based on hierarchy approaches

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper: I/I

Subject: ELECTRONICS

Title: Circuit Analysis

Course Objectives:

- Study the basics characteristics of Resistors, Capacitor and Inductors.
- Study the Alternating Current and Voltage and Construct the Simple circuits.
- Find the currents in the network using the various method with the help of Kirchoff's voltage and current laws.
- Study and Verify the Network theorems like as Superposition Theorem, Thevenin's Theorem, Norton's Theorem, etc,
- Study and find unknown values of capacitance and inductance using the AC Bridges.
- Study voltage or current characteristics with frequency using RL and RC circuits.
- Study the characteristics of series and parallel resonance of RLC circuits.

Course Outcome:

The student will be able to

- Determine the value of resistance of resistor, inductance of inductor and capacitance of capacitor using colour code method.
- Construct and verify the network theorems.
- Construct and determine value unknown inductance of inductor and capacitance using AC brides.
- Determine the time constant of RL and RC circuits.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper: II/II

Subject: ELECTRONICS

Title: Electronic Devices

Course Objectives:

- Study the Voltage and Current Characteristics of Diodes
- Study the Voltage and Current Characteristics of Bipolar Junction Transistors (BJT)
- Study the two port network analysis and determine the hybrid, impedance, admittance parameters.
- Study the construction details and characteristics of Field Effect Transistor (FET)
- Study the construction details and characteristics of Uni Junction Transistor (UJT)
- Study the construction details and characteristics of Silicon Controlled Rectifier (SCR):
- Study characteristics of Photo Electric Devices
- Know the function of Cathode ray oscilloscope (CRO)

Course Outcome:

The student will be able to

- Determine forward resistance and reverse resistance of diodes using Voltage and Current characteristics.
- Verify the input and out put characteristics of Bipolar Junction Transistors (BJT).
- Verify the out put and transfer characteristics of Uni Junction Transistor (UJT).
- Construct circuit and verify the characteristics of Field Effect Transistor (FET).
- Verify current characteristics of photo diodes with intensity of light.
- Determine the voltage and time period of AC current using CRO.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper: III/III

Subject: ELECTRONICS

Title: Power Supplies & Analog Circuits

Course Objectives:

- Study the Full wave and bridge Rectifiers
- Study the Full wave and bridge Rectifiers with capacitor and inductor filters
- Study the Regulated Power Supplies (78XX, 79XX).
- To know the working principle and of switch mode power supply (SMPS).
- Study the Amplifiers and feedback Amplifiers.
- Study Oscillators and relaxation oscillators.

Course Outcome:

The student will be able to

- Determine ripple factor and find the efficiency of Full wave and Bridge rectifier.
- Determine ripple factor and find the efficiency of Full wave and Bridge rectifier with capacitor and inductor filter.
- Construct the circuit and find the DC voltage using 79XX and 78XX regulators.
- Construct the circuit and verify the frequency response characteristics of RC coupled amplifier.
- Construct the circuit and find the frequency of phase shift Oscillator.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper : IV/IV

Subject: ELECTRONICS

Title: Operational Amplifiers and Communications

Course Objectives:

- Understanding the basics of Operational Amplifier -741 and study its ideal characteristics.
- Solving simple second order differential equations.
- The applicability of op-Amp in designing for solving various mathematical and logical operations.
- Understanding the 555-timer and its applications in designing various relaxation oscillators.
- Understanding the concept of modulation and de modulation. AM, FM and Phase modulation techniques and their differences.
- Qualitative analysis of PAM, PWM, PPM, PCM, and Delta modulations.

Course Outcome:

The student will be able to

- Design various circuits using Op-Amp 741 such as summing, difference, average, logarithmic amplifiers etc.
- Design monostable and astable-multivibrators using IC 555.
- Design AM and FM modulators and detectors.
- Know and analyse the modulation techniques such as PAM, PWM, PCM etc.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper : V/V

Subject: ELECTRONICS

Title: Digital Electronics

Course Objectives:

- Understanding the basics of Digital Electronics and different number systems and conversion between them.
- Design and construction of the basic and universal logic gates.
- Studying the Boolean algebra and simplification of Boolean expression using different methods.
- Study and construction of sequential logic circuits, understanding various design of flip flops.
- Studying the programmable logic devices, shift registers, counters and various memory devices.

Course Outcome:

The student will be able to

- Gain knowledge between different types of number systems, and their conversions.
- Design various logic gates and simplify Boolean equations.
- Design various flip flops, shift registers and determining outputs.
- Design different types of counters.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper: V/VI

Subject: ELECTRONICS

Title: Microprocessor –Intel 8085

Course Objectives:

- Understanding the basics of computers and different blocks in it.
- Understanding the architecture of 8085 micro processor and various blocks in it.
- Understanding various registers, buses etc.
- Learn various groups of instructions of 8085 µp for programming.
- Learn various addressing modes.
- Write programs using various instructions of 8085 µp.
- Understanding types of interrupts.

Course Outcome:

- Differentiate various types of computers and processors.
- Knowledge regarding the inner blocks of processor and their specific functions.
- Knowledge in types of instructions and their usage.
- Write different programs using instructions of 8085 µp.
- Differentiate various interrupts with their priorities.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper : VI/VII

Subject: ELECTRONICS

Title: Fundamentals of Embedded Systems

Course Objectives:

- Understanding the embedded systems, basics and the importance of 8051 micro controller.
- Study the block diagram / architecture of 8051 µC.
- Studying the instruction set of 8051 µC and understanding various addressing modes.
- Writing programs using instructions of 8051 µC.
- Simple applications of embedded systems in real time.

Course Outcome:

The student will be able to

- Gain knowledge of embedded systems.
- Write simple programs based on 8051 µC.
- Design simple applications using 8051 µC kit.

COURSE OBJECTIVES AND OUTCOMES

Course: B.Sc.

Semester / paper: VI/VIII

Subject: ELECTRONICS

Title: Embedded Systems and Applications

Course Objectives:

- Understanding various interfacing devices such as - Keyboard interfacing [8279]-DMA controller [8257], Interrupt Controller (PIC) [8259A], Programmable peripheral interface [8255].
- Understanding various types of data converters such as digital to analog and analog to digital converters.
- R-2R ladder and successive approximation methods of conversion.
- Interfacing of 8085 µp to a ADC 0801, stepper motor LED display etc.
- RS-232 pin configuration and connection (IC-MAX-232).
- Temperature measurement, displaying information on a LCD, Interfacing a keyboard, generation of different types of waveforms.
- Microcontroller as event counter using IR sensor interfacing.
- Introduction to EDA tools: Edsim51, Keil, Proteus lite simulation software. Package specifications, available menu and features. Assembling and running the code in a PC based design environment. Overview other microcontrollers like PIC, AVR, ARM.

Course Outcome:

- Concept of interfacing, and various devices.
- Features of interfacing devices and applications.
- Differentiate various types of data converters and different methods of conversion.
- Intefacing various devices such as LED, LCD, data converters and stepper motor to 8085 µp and also 8051 µc.
- Knowledge regarding types of communication, RS-232 standards.
- Knowledge in various simulation softwares like Edsim51, Keil, Proteus lite etc.
- Knowledge in assembling and running the code in a PC based design environment. Overview other microcontrollers like PIC, AVR, AR

Postgraduate Physics Learning Outcomes
M.Sc (Electronic Communications and Bio Physics)

SEM - I

Course Outcomes
Course Title : **Mathematical Physics**
Course code: PAE 101 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Identify different special mathematical functions like Bessel's functions, Legendre's function
- Explain linear dependence and linear combination of vectors as quantities in physics
- Differentiate between Fourier transform and Laplace transform, use Fourier transform to obtain the Fourier series of periodic functions in physics and apply transform methods to solve elementary differential equations
- Understand different types of matrix systems and use matrices and determinants to solve sets of simultaneous linear equations arising from physical problems;

SEM - I

Course Outcomes
Course Title : **Classical Mechanics**
Course code: PAE 102 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Use Newton's laws of motion to solve advanced problems involving the dynamic motion of classical mechanical systems.
- Represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulations of classical mechanics
- Apply Poisson brackets for Hamilton's equation
- Understand the mechanics of continuous systems like triatomic molecule

SEM - I

Course Outcomes
Course Title : **Quantum Mechanics - I**
Course code: PAE 103 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Use different quantum mechanical operators and write matrix representations of vectors and operators
- Solve harmonic oscillator problems using operator method
- Understand the concept of symmetries in Quantum Mechanics
- Write commutation relations and solve angular momentum problems
- Differentiate Classical and Quantum Mechanics

SEM - I

Course Outcomes
Course Title : **Solid State Physics**
Course code: PAE 104 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Identify different crystal structures and systems along with the planes
- Calculate different crystal parameters with the help of X-ray Diffractometry
- Understand lattice vibrations and thermal vibrations in solids
- Analyse band theory of solids with the concept of electrons and holes
- Differentiate materials on the basis of conductivity and band theory
- Grow crystals in the laboratory using different techniques and find the imperfections such as color centers, dislocations

SEM - II

Course Outcomes
Course Title : **Electromagnetic Theory**
Course code: PAE 201 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Apply vector calculus to static electric-magnetic fields in different experimental conditions.
- Analyze Maxwell's equations in both differential and integral forms and apply them to diverse engineering problems.
- Examine the phenomena of wave propagation in different media and its interfaces and applications
- Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

SEM - II

Course Outcomes
Course Title : Statistical Mechanics
Course code: PAE 202 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Understand the relation between Thermodynamics and Statistical Mechanics
- Have a basic understanding of the phase transitions
- Correlate all the three distribution laws; Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein
- Conceptualize white dwarfs
- Use linear response theory and kinetic equation approach. Have a deep understanding of universality in second order phase transitions

SEM - II

Course Outcomes
Course Title : Quantum Mechanics - II
Course code: PAE 203 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Understand scattering process and solve potential well problems
- Solve harmonic oscillator problems and apply to alpha decay process
- Learn perturbation theories and interaction of an atom with electromagnetic radiation
- Relate quantum Mechanics to different systems like wave, matrices, magnetic fields
- Derive Dirac's equation in covariant form

SEM - II

Course Outcomes
Course Title : Electronics
Course code: PAE 204 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as oscillators, amplifiers, vibrators etc.
- Sketch, explain and design the amplifier circuit for given specification and analyze them discuss oscillator principles, oscillator types, and frequency stability as it relates to its operation. Draw and explain the structure of different operational amplifiers.
- Explain the operation of IC 555 and its application for generating waves.
- Analyze and Design the different types of Oscillators. Discuss ideal and practical operational amplifier (op amp) their electrical parameters, need for op amp. Explain and design different application circuits using op amp.
- Sketch and explain the Logic circuits; Decoder, Registers, Flip-flops, converters and counters

SEM - III

Course Outcomes
Course Title : Modern Optics
Course code: PAE 301 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Understand Lasers, their types, production
- Know the difference between several lasers systems like solid, liquid and gaseous
- Learn the principle involved in holography and their applications
- Exercise Fourier optics for thin and thick lens functions
- Get the knowledge of nonlinear optics implications

SEM - III

Course Outcomes
Course Title : Advanced Solid State Physics
Course code: PAE 302 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Describe the electronic properties of solids and fermi surfaces of different lattices
- Analyse the effect of electric and magnetic fields on fermi surfaces
- Conceptualize dielectrics and ferroelectrics, spontaneous polarization and ferroelectric hysteresis
- Understand Magnetism and magnetic properties by differentiating materials para,dia and ferro.
- Know about anti ferromagnetism, ferrites and their applications
- Explain superconductivity phenomenon and its applications

Specialization: Electronics & Communications

SEM - III

Course Outcomes
Course Title : 8051 Micro Controller and Its applications
Course code: PAE 303 T/EC
Program: M.Sc (E.C)

Student should be able to:

- Draw architecture of microcontroller 8051 and its other members
- Write instructions and programme codes like jump, loop, call, pulse frequency and pulse width measurements
- Operate input and output programming
- Use programming language for communication interrupts
- Apply 8051 Microcontroller for interfacing various devices like key board, LED,LCD, Converters and stepper motor

SEM - III

Course Outcomes
Course Title : 8051 Microcontroller and applications
Course code: PAE 304A T/EC
Program: M.Sc (E.C)

Student should be able to:

- Learn the basics of communication like, data rate, band width, analog and digital

transmission, wireless transmission

- Understand digital data communication techniques, errors detection and correction
- Link different switches for control signaling
- Write algorithms for switching networks
- Manage traffic with frame relay congestion control
- Operate Local Area Networks both fiber and wireless
- Know about IEEE 802.11, architecture and services

SEM - III

Course Outcomes
Course Title : Digital Transmission techniques and Information theory
Course code: PAE 304B T/EC
Program: M.Sc (E.C)

Student should be able to:

- Learn the basics of digital signals, the sampling theorem and modulation techniques like Pulse code modulation, ASK, PSK, FSK, QPSK; generation and detection
- Discriminate between messages and information and calculate average information
- Calculate Entropy of information and prove the Shannon's theorem
- Know about the capacity of Gaussian channel and derive its efficiency
- Code the digital signals and analyse Trellis decoded modulation
- Formulate optimum receivers and matched filter and calculate the probability of error in binary PCM

Specialization: Bio-Physics

SEM - III

Course Outcomes
Course Title : **Molecular Biophysics**
Course code: PAE 303 T/BP
Program: M.Sc (Bio)

Student should be able to:

1. Learn about basic functions of macromolecules
2. Enzymes classification of different models.
3. Statistic thermodynamics, Entropy, application to biological system.
4. Optical activity: CD and ORD, Proteins.
5. Different spectroscopic techniques and their applications to bio molecules.
6. X-Ray diffraction; Structure determination.

7. X-Ray diffraction patterns:- protein fibres, analysis.

SEM - III

Course Outcomes
Course Title : **Physico – chemical Techniques**
Course code: PAE 304A T/BP
Program: M.Sc (Bio)

Students should be able to

1. Learn about different techniques in order to get information about Polymers and Biomolecules.
2. Methods and techniques employed are: Molecular weight determination, sedimentation, scattering, chromatography, electrophoresis and microscopy.
3. The above techniques are used to discuss the biological applications to bio molecules.

SEM - III

Course Outcomes
Course Title : **Medical Biophysics**
Course code: PAE 304B T/BP
Program: M.Sc (Bio)

Students should be able to learn about

1. Haematology and principles of Hemodynamic.
2. Properties of Blood.
3. Different systems like: Respiratory, cardiovascular and Renal syatem.
4. Physics inolved these systems.

IV Semester M.Sc Physics, E.C and Biophysics

SEM - IV

Course Outcomes
Course Title : Nuclear Physics
Course code: PAE 401 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Learn about the nucleus of atom, its properties and models
- Understand the concept of magnetic moments and electric quadrupole moments
- Establish the nuclear decay processes with an understanding of Gamow’s theory of alpha

decay and Fermi's theory of beta decay
- Learn the selection rules of decay processes
- Do experiments for radiation detection using scintillation and solid state detectors
- Classify nuclear reactions, kinematics and Q-value of reactions
- Understand particles Physics and the elementary particles such as Leptons and Baryons

SEM - IV

Course Outcomes
Course Title : Spectroscopy
Course code: PAE 402 T
Program: M.Sc (E.C & Bio)

Student should be able to:

- Write the energy levels of spectra, selection rules and intensity rules of alkali like spectra
- Understand the many electron atomic systems and the hyperfine splitting of spectral lines
- Distinguish different types of molecular spectra with special focus on diatomic molecule as rigid rotator
- Analyze Raman and Infrared spectra and also the vibrations of CO2 and H2O molecules
- Learn FTIR principle and working
- Assess the Nuclear Magnetic Resonance, ESR spectroscopy and their applications

Specialization: Electronics & Communications

SEM - IV

Course Outcomes
Course Title : 8051 Mobile Cellular communications
Course code: PAE 403 T/EC
Program: M.Sc (E.C)

Student should be able to:
- Learn the basic concepts of mobile communications through radio propagation
- Get knowledge on code division multiple access and signal paths
- Differentiate carrier sense multiple access and compare S/T/F CDMA
- Understand telecommunication systems
- Know how GPS system works and how routing is done is with examples
- Conceptualize digital video broadcasting

SEM - IV

Course Outcomes
Course Title : Data and computer communications-II
Course code: PAE 404A T/EC
Program: M.Sc (E.C)

Students should be able to:

- Draw TCP/IP models and operate them with applications
- Learn the protocols of internet working and assemble IPV6 structure
- Know about Multicasting, connection oriented transport mechanisms
- Develop programs for internet security from attacks
- Send and receive electronic mail SMTP and MIME and also HTTP

SEM - IV

Course Outcomes
Course Title : Optical fiber communications
Course code: PAE 404B T/EC
Program: M.Sc (E.C)

Student should be able to:

- Study about optical fibers, their types, structures and applications
- Derive WKB approximations for estimating number of modes in index fibers
- Study about different materials used for the synthesis of optical fibers
- Learn about optical sources and detectors
- Design and apply junction diodes, LED's and laser diodes
- Review optical time division multiplexing, wavelength division multiplexing and coherent optical detection

Specialization: Bio-Physics

SEM - IV

Course Outcomes
Course Title : Cell membrane biophysics
Course code: PAE 403 T/BP
Program: M.Sc (Bio)

Students should be able to:

1. Cell structure, division and cellular oscillations.
2. Cell Dielectrophoresis: different configurations.
3. Membrane models and Sensor Organs.
4. Bio aerodynamic principles: Physics of natural flying machines, different models and power requirement.

SEM - IV

Course Outcomes
Course Title : Radiation Biophysics
Course code: PAE 404A T/BP
Program: M.Sc (Bio)

Students should be able to:

1. Action of light, light sources; Ionizing radiations, interaction with tissues and chromosomes; different theories with examples.
2. Diagnostic X-Ray, X-Ray machine, CT Scan, MRI Scan and PET Scan with their applications.
3. Nuclear medicine: different therapies, effects of radiation and basic instrumentation involved.

SEM - IV

Course Outcomes
Course Title : Biophysical techniques in medicine
Course code: PAE 404B T/BP
Program: M.Sc (Bio)

Students should be able to:

1. Different electrodes, transducers, amplifiers and recording systems.
2. Image processing: EEG, ECG, EMG, ERG and ultrasonic imaging.
3. Bioinformatics; definitions and applications, structural Bioinformatics (Proteins and RNA).

Astronomy is one of the oldest sciences, practiced and preached by ancient civilizations. Presently, space-physics is referred to as the frontier of exploration by mankind. Introducing this subject at UG level, allow our students to visualize the universe and our place in it. In addition to this, students can enlarge their horizons and explored to our national ongoing space research activities. This subject is an observational science, which provides a on the scales of space, time and physical conditions in the universe. It emphasizes the underlying physical concepts of the stars and galaxies. Indian space exploration and observations are changing every year based on our discoveries as well as around the world, which indeed reflecting in our Chandrayan mission and Mars Mission. Therefore, it is necessary to create interest among our undergraduate students; an auxiliary subject at UG level is highly recommendable.

Good understanding of physics and astrophysics, together with specialized engineering skills is certainly strengthens our national space programme.

Undergraduate Physics Learning Outcomes

SEM - I

Course Outcomes
Course Title : **Mechanics**
Course code: PHY DSC-IA
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Learn about Scalars and Vectors, curl, gradient of the fields and apply them to Stoke's, Gauss' and Green's theorem
- Understand Newton' laws of motion with applications, conservation of energy and momentum and scattering cross-section
- Get knowledge about rigid body and its kinematics and its application in the form of a top and gyroscope
- Differentiate forces as central, non-central and explain Kepler's laws pertaining to planets and orbits
- Conceptualize theory of relativity, verify experimentally and deriving expression relevant to time dilation

SEM- II

Course Outcomes
Course Title : **Waves and Oscillations**
Course code: PHY DSC - IB
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- To solve the classical and wave mechanics problems
- Formulate experiments with strings, bars and rods to calculate transverse and longitudinal vibrations in them
- Get knowledge of ultrasonics; production and application in daily life

SEM- III

Course Outcomes
Course Title : **Statistical Thermodynamics**
Course code: PHY DSC - IC
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Understand the laws of thermodynamics and their application in various processes and

approach to the concept of entropy

- Learn the kinetics of gases at different temperatures using Kinetic theory and calculations
- Know the behavior of gases in low temperatures and the working of refrigeration machines
- Apply distribution function to quantum and classical systems
- Evaluate thermal properties of solids using statistical approach
- Explain the transport phenomenon through radiation of energy and its distribution using different statistics; Bose-Einstein, Maxwell-Boltzmann and Fermi-Dirac

SEM- IV

Course Outcomes
Course Title : **Optics and Lasers**
Course code: PHY DSC - ID
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Differentiate different optical material instruments like, lenses, eye-piece, telescope etc.
- Analyze the intensity variation of light due to interference, diffraction and Polarization,
- Explain working principle of lasers and their applications in daily life
- Learn the construction of holograms and their uses
- Get knowledge on optical fiber cables and data communication using those cables

SEM- V

Course Outcomes
Course Title : **Electricity and magnetism**
Course code: PHY DSC - IE
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Learn the laws of Electricity and Magnetism such as, Gauss, Faraday, Lenz, Ampere
- Formulate and solve the problems on Electromagnetism by applying the laws to different geometrical systems
- Understand the famous Hysteresis loop formation in ferromagnetic materials
- Prepare induction coils and transformers

SEM- V

Course Outcomes
Course Title : **Spectroscopy & Quantum Mechanics (Elective 1)**
Course code: PHY DSC – IE, E1
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Analyze the spectral lines of atoms and molecules
- Write the spectral notations with respect to the atomic levels
- Understand normal and anomalous Zeeman effects
- Explain the matter waves, wave-particle duality and the Heisenberg's uncertainty principle
- Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles

SEM- V

Course Outcomes
Course Title : **Elements of Modern Physics (Elective 2)**
Course code: PHY DSC – IE, E2
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Learn Bohr's quantization rule and applying it to spectra of Hydrogen like atoms
- Deduce the Schrodinger's time dependent and time independent wave equations
- Differentiate between the terms atomic number, atomic mass, isotopes etc.
- Understand the concept of radioactivity and various decay processes
- Explain the terms fission, fusion and apply it to the working of nuclear reactor

SEM- VI

Course Outcomes
Course Title : **Basics of electronics**
Course code: PHY DSC – IF
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Differentiate alternate and direct currents, L, C and R and derive their Q-factor
- Classify solids on the basis of band theory and to calculate conductivity of semiconductors
- Explain the working p-n junction diode, zener diode and transistors
- Learn digital principles of Electronics like Boolean Algebra, dMorgan's laws and logic gates and their application in electronic equipment

SEM- VI

Course Outcomes
Course Title : **Nuclear Physics &Solid State Physics (Elective 1)**
Course code: PHY DSC – IF (E1)
Program: B.Sc (M.P.C & M.P.E)

Student should be able to :

- Calculate Q-value of nuclear reactions and describe particle detectors and accelerators
- Learn about Cosmic ray showers of the universe
- Analyze the structural properties of elemental solids using X-ray diffractometry
- Calculate electronic conductivity of solids
- Classify magnetic and supercounducting behavior of solids

SEM- VI

Course Outcomes
Course Title : **Solid State Physics (Elective 2)**
Course code: PHY DSC – IF (E2)
Program: B.Sc (M.P.C & M.P.E)

Student should be able to:

- Learn the concept of crystallization and the structure of different of crystal systems, planes and indices
- Understand the concept of phonons – acoustical and optical
- Differentiate dia, para and ferro magnetic materials
- Analyze dielectrics and their constants
- Study semiconductors on the basis of band theory
- Conceptualize superconductivity in solids at different temperatures