M.Sc. Applied Physics

Semester – II

Course Code	**PT02CAPC51**	Title of the Course	**Classical Mechanics and Quantum Mechanics**
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	This course enables student to, 1. Understand the Lagrangian and Hamiltonian approaches in classical mechanics. 2. Explain the classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton-Jacobi equation 3. Theory of small oscillations in detail with basic of wave equation 4. Introduce fundamental knowledge about operators, their eigenvalues and eigenvectors. 5. Educate about various commutation and uncertainty relations.

Course Content

Unit	Description	Weight age*
1.	Constrained Motion: Constraints, Classification of constraints, Principle of virtual work, D'Alembert's principle and its application. Lagrangian formulation: - limitations of Newtonian formulation, degrees of freedom, generalised coordinates and velocities, Derivation of Lagrange's equation, derivation of Lagrange's equation from Hamilton's principle, simple application of Lagrange's equation, Cyclic coordinates, Symmetry and conservation theorems. Phase Space and the motion of the system Hamiltonian, Canonical transformations, Equations of Canonical transformations, Canonical transformations for the Harmonic Oscillator.	25%
2.	Poisson brackets and canonical invariants, equations of motion, Infinitesimal CT and conservation theorems in the Poisson bracket formulation, Hamilton Jacobi theory, Application to harmonic oscillator problem. Types of equilibrium, Theory of Small Oscillations, Secular equation, eigenvectors and eigen-frequencies, Orthogonality of eigenvectors; Normal coordinates; coupled Oscillation, Linear triatomic molecule, Small oscillations of particles on string, Introduction to nonlinear oscillations.	25%

3.	The Hilbert Space and Wave Functions, Dirac Notation, Operators: Hermitian Adjoint, Projection Operators, Commutator Algebra, Uncertainty Relation between Two Operators, Inverse and Unitary Operators, Eigenvalues and Eigenvectors of an Operator, Matrix Representation of Kets, Bras and Operators, Change of Bases and Unitary Transformations, Representation in Continuous Bases, Parity Operator.	25%
4.	Quantum theory of angular momentum and its eigenvalue spectrum. Matrix representation of angular momentum operators, spin angular momentum, Pauli matrices and their properties, total wave function, non-relativistic Hamiltonian including spin. Addition of angular momenta, definition of Clebsch-Gordan coefficients, Phase convention, spin-wave function for a system of two spin-1/2 particles, Identical particles with spin, addition of spin and orbital angular momenta.	25%

Teaching-Learning Methodology	• We make extensive use of chalk and board. • ICT tools such as multimedia projector, smart board, etc. are also used for better explanation of scientific concepts. • Detail lecture notes and other reference materials are also provided to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	On completion of the course student will be able to, 1. Describe and understand the motion of a mechanical system using Lagrange

	Hamilton formalism. 2. Understand and explain the differences between classical and quantum mechanics. 3. Uses Poisson brackets to find derivatives in phase space 4. Solve problems regarding the quantum mechanical operators, eigen function, angular momentum, matrix representation of angular momentum operators, spin angular momentum, Pauli matrices and their properties, total wave functionetc.

Suggested References:	
Sr. No.	References

1. Classical Mechanics – System of particles and Hamiltonian Dynamics, by Greiner: Springer International Ed. 2006
2. Classical Mechanics, 3rd Ed by Goldstein, Pole & Safko, Pearson Education, Pte. Ltd, Indian Branch, Delhi, India, 2002.
3. Classical Mechanics, by V. B. Bhatia; Narosa
4. Introduction to Classical Mechanics by R. G. Takwaleand P. S. Puranik; TMH
5. A text book of Quantum Mechanics, by P.M. Mathews and K. Venkatesan (TMH)
6. Introduction to Quantum Mechanics, by David J. Griffiths.
7. Quantum Mechanics by Ghatak & Loknathan; McMillan India Publication
8. Quantum Mechanics by G. Aruldas, Prentice-Hall India, Pvt., Ltd.
9. Quantum Mechanics Concepts and Applications by Nouredine Zettili, John Wiley and Sons, Ltd., Publication

On-line resources to be used if available as reference material
On-line Resources
https://nptel.ac.in/courses/115/106/115106123/ https://nptel.ac.in/courses/115/105/115105098/ https://nptel.ac.in/courses/115/103/115103115/ https://nptel.ac.in/courses/122/106/122106034/ https://nptel.ac.in/courses/115/101/115101107/

M.Sc. Applied Physics

Semester – II

Course Code	PT02CAPC52	Title of the Course	**Electrodynamics**
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	This course enables student to, 1. Understand the basic mathematical concepts related to electromagnetic vector fields and impart knowledge on the concepts of electrostatics, electric potential, energy density, magnetostatics, magnetic flux density, Magnetism in Matter, scalar and vector potential and its applications. 2. Learn Maxwell's equations and concepts of electromagnetic waves Guided waves and Transmission lines. 3. Gain knowledge of concepts of relativistic electrodynamics and its applications like Radiation from relativistically moving charges, and Larmor's generalization to relativistic case.

Course Content		
Unit	Description	Weight age*
1.	Applications of Electrostatics: Gauss' law of electrostatics, field due to linear, spherical and cylindrical charge distribution, Curl of electrostatic field and Electrostatic potential, Gauss's Law in Magnetism, Applications Involving Charged Particles Moving in a Magnetic Field, The Hall Effect, The Biot–Savart Law, The Magnetic Force Between two Parallel Conductors, Ampère's Law, Faraday's Law of Induction-Induced emf and Electric Fields-Generators and Motors-Eddy Currents. Displacement Current and General Form of Ampère's Law.	25%
2.	Maxwell's equations in matter, Continuity equation, Poynting theorem – Momentum conservation, Electromagnetic Waves in Vacuum: Wave equation for E and B fields, Monochromatic plane waves – Energy & momentum in electromagnetic waves, Polarization of electromagnetic waves: linear and circular polarization. Application of Brewster's law, Electromagnetic waves in matter: Propagation in linear media- Boundary conditions Reflection and Refraction – Snell's law. Total internal reflections, EM waves in isotropic linear conducting media – skin depth.	25%

3.	Wave Guides: Bounded waves, TE, TM and TEM waves, Rectangular and cylindrical wave guides, Resonant cavities. Dielectric wave guides (Optical fibers)-Propagation mechanism, angle of acceptance, Numerical aperture, Modes of propagation, Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient. Optical fiber sensors- Intensity based displacement sensor and Temperature sensor based on phase modulation Transmission Lines: Distributed line parameters, transmission line equations, Input Impedance, SWR and Power, Smith chart, some applications of transmission lines, microstrip transmission line	25%
4.	Electromagnetic Radiation: Electromagnetic potentials Scalar and vector potentials Gauge transformations Gauge conditions (Lorentz and Coulomb gauges). Retarded Potentials Radiations from extended sources: Electric and Magnetic dipole radiation, Center-fed linear antenna- Hertzian dipole antenna – Small loop antenna. Radiation from Moving point charges: Lienard-Wiechert potentials- Fields of a moving point charge- Power radiated by a point charge (Larmor formula), Radiation from a slowly moving charges, Radiation from relativistically moving charges, Larmor's generalization to relativistic case – Synchrotron radiation – Bremsstrahlung radiation	25%

Teaching-Learning Methodology	• We make extensive use of chalk and board. • ICT tools such as multimedia projector, smart board, etc. are also used for better explanation of scientific concepts. • Detail lecture notes and other reference materials are also provided to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	On completion of the course student will be able to, 1. Evaluate fields, forces and potentials in Electrodynamics and Magneto dynamics using Maxwell's equations. 2. Analyze radiation systems in which the electric dipole, magnetic dipole or electric quadruple dominate, wave guides, transmission lines, from moving point charges. 3. Understand the concept of retarded time for charges undergoing acceleration. 4. Have basic understanding of applications of electrodynamics

Suggested References:	
Sr. No.	References:

1. Classical Electrodynamics by J D Jackson, 2nd Ed; Wiley Eastern Ltd. 1975.
2. Introduction to Electrodynamics by David J Griffiths, 3rd Ed Prentice Hall, India, 2002.
3. Classical electromagnetic Theory by Jack Vanderlinde, John Wiley & sons, Inc.1993.
4. Elements of Electromagnetics by Sadiku 2nd Ed. Oxford Univ. Press. Inc. 1995.
5. Classical Electrodynamics by Griener, Springer Verlag, New York, Inc. 1998.

On-line resources to be used if available as reference material
On-line Resources
https://nptel.ac.in/courses/115/104/115104088/ https://nptel.ac.in/courses/115/106/115106122/ https://nptel.ac.in/courses/115/101/115101004/ https://nptel.ac.in/courses/115/101/115101005/ https://nptel.ac.in/courses/117/101/117101056/

M.Sc. Applied Physics

Semester – II

Course Code	**PT02CAPC53**	Title of the Course	**Elements of Applied Physics**
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	This course enables student to, 1. Recognition of importance of vacuum in modern technology and research 2. Understand the role of X-ray and Neutron scattering for structure evolution 3. Obtaining basic knowledge on Thermal analytical methods in qualitative and quantitative analysis 4. Explain the working principle of counters and semiconductor detectors.

Course Content		
Unit	Description	Weight age*
1.	Introduction of vacuum, Applications for Vacuum Pumps, Classification of vacuum pumps, Rotary pump, Diffusion pump, Molecular drag pump, Gettering and ion pumping, Sputter ion pump, measurement of pumping speed: constant pressure method, constant volume method. Classification of vacuum gauges: McLeod gauge, Thermal conductivity gauge, Thermocouple gauge,Hot cathode ionization gauge, Bayard-Alpert gauge, Cold cathode ionization gauge, Penning gauge, Magnetron gauge.	25%
2.	X-ray Diffraction: X-ray sources, Production of X-rays, continuous X-rays, characteristics X-rays, X-ray filters, X-ray absorbers, scattering by electrons, atom and unit cell, Electron Diffraction: Introduction to electron diffraction, Transmission Electron microscopes, Neutron Scattering: Slow neutron scattering in solid, Elastic Scattering, Cross – section, Coherent Scattering.	25%
3.	Thermal Analysis and its applications: Thermo gravimetric analysis, Differential thermal analysis and Differential scanning calorimetry, X-Ray Photoelectron Spectroscopy Surface Analysis Technique, X-ray fluorescence spectroscopy, UV-Visible spectroscopy, atomic absorption spectroscopy.	25%

4.	Ionization Chamber, Proportional Counter, Geiger-Mueller Counter, Scintillation detector: organic scintillator, Inorganic scintillator, Light guides, Photomultiplier tubes, Scintillation Spectrometer, Energy resolution of a scintillation spectrometer, Semiconductor detectors: Diode detector, Diffused junction detector, Surface barrier detector, Ion implanted layer detectors, Fully depleted detectors, Lithium doped germanium detector [Ge (Li)], High purity germanium detector (HPGe), Cherenkov Detector, Photographic emulsion, Cloud Chamber, Bubble Chamber, Spark Chamber.	25%

Teaching-Learning Methodology	• We make extensive use of chalk and board. • ICT tools such as multimedia projector, smart board, etc. are also used for better explanation of scientific concepts. • Detail lecture notes and other reference materials are also provided to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	On completion of the course student will be able to, 1. Understand basic mechanisms and characteristics of vacuum system components such as pumps, valves and gauges 2. Learns basic concept related to X-ray productions, detections, absorptions, diffraction and scattering. 3. Give a theoretical and experimental basis for the practical application of SEM and TEM 4. Understand the principles, instrumentation and measurement of TGA, DTA and DSC, XPS, XRF, UV-Visible spectroscopy, atomic absorption spectroscopy. 5. Explain the working and applications of various counters and semiconductor

	detectors.

Suggested References:	
Sr. No.	References

1. Vacuum Science and Technology V.V. Rao, T.B. Ghosh and K.L. Chopra Allied Publishers Limited (India)
2. Elements of X-ray diffraction Cullity and Stock
3. An introduction to lattice dynamic L.S Kothari
4. Biomedical instrumentation & measurements L. Cromwell
5. Instrumental method of analysis Willard
6. Fundamentals of Nuclear Physics. Jagdish Varma, Roop Chand Bhandary, D.R.S. Somayajulu.
7. Device Materials and Fabrication Techniques

On-line resources to be used if available as reference material
On-line Resources

https://nptel.ac.in/content/storage2/courses/112101004/downloads/(38-8-3)%20NPTEL%20-%20Vacuum%20Technology.pdf
https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-mm06/
https://onlinecourses.nptel.ac.in/noc20_mm14/preview
https://www.iitk.ac.in/che/pdf/resources/TGA-DSC-reading-material.pdf
https://nptel.ac.in/courses/115/103/115103030/
https://nptel.ac.in/content/storage2/courses/112101007/downloads/Lecturenotes/Lecture37.pdf

M.Sc. Applied Physics

Semester – II

Course Code	PT02CAPC54	Title of the Course	Experimental Methods-III
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	This course enables students to, 1. To gain practical knowledge by applying the experimental methods to correlate with the theory. 2. To learn the usage of different systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data.

Course Content
1. Determine Hall Coefficient using Hall Effect 2. Solar Cell I-V Characteristic in Series and Parallel combination on Solar Panel 3. Determination of maximum power point and solar cell efficiency 4. Determination of semiconductor magneto-resistance 5. Measurement of Curie temperature of ferroelectric materials 6. Determination of compressibility of nanofluids with variation of nanoparticles at different temperature 7. Characteristics of Photo-sensors.

Teaching-Learning Methodology	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	• Practical's are conducted based on theory papers in order to strengthen the understanding behind concepts. • Students are exposed to electronic devices and analytical instruments.

Suggested References:	
Sr. No.	References

On-line resources to be used if available as reference material
On-line Resources

M.Sc. Applied Physics

Semester – II

Course Code	**PT02CAPC55**	Title of the Course	**Experimental Methods-IV**
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	This course enables students to, 1. To gain practical knowledge by applying the experimental methods to correlate with the theory. 2. To learn the usage of different systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data.

Course Content
1. Measurement of Op-Amp characteristics 2. IC-555 Timer circuit 3. Uni-junction Transistor characteristic 4. He-Ne LASER diffraction studies 5. Error estimation and least-square fitting 6. To study thermal and electrical conductivity of metals at constant temperature gradient and determination of Lorentz number. 7. Optical Fiber characterization and Transmission

Teaching-Learning Methodology	-----

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	• Practical's are conducted based on theory papers in order to strengthen the understanding behind concepts. • Students are exposed to electronic devices and analytical instruments.

Suggested References:	
Sr. No.	References

On-line resources to be used if available as reference material
On-line Resources

M.Sc. Applied Physics

Semester – II

Course Code	**PT02CAPC56**	Title of the Course	**Comprehensive Viva**
Total Credits of the Course	1	Hours per Week	2

Course Objectives:	Comprehensive viva is conducted to evaluate the overall knowledge gained by the student during the entire semester and related to the project work

Course Content	
Comprehensive viva contains all theory topics mentioned in paper code PT02CAPC01-3 & PT02EAPC1-2.	
Teaching-Learning Methodology	• Individual/group discussion • Interactive session • Problem solving • Written work

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Comprehensive viva is conducted so as to evaluate the overall knowledge gained by the student during the entire semester.

Suggested References:	
Sr. No.	References

On-line resources to be used if available as reference material

On-line Resources:--------------------

M.Sc. Applied Physics
Semester – II

Course Code	**PT02EAPC51**	Title of the Course	**Fundamentals of Materials Science**
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	This course enables student to, 1. Become familiar with the basic mechanical properties of materials. 2. Learn the fundamental knowledge on the physics of polymer materials, their properties and applications 3. Learns the fabrication and applications of traditional and advanced ceramics 4. Educate the classification and industrial application of different Metals & Alloys

Course Content		
Unit	Description	Weight age*
1.	**Introduction to Materials and Properties** Introduction to Materials & Materials Science, types of materials, levels of structure, structure- property – processing relationship, properties of materials (Mechanical properties stress-strain curves, strength and modulus under various modes of deformation, flexural strength, hardness, impact strength etc.) processing of materials, environmental effect on materials behavior, Materials selection criteria.	25%
2.	**Physics of polymers & Polymeric Materials** Macromolecular concepts, types of polymers, structural feature of polymers, correlation between structure and properties of various polymers, polymerization reactions, polymerization techniques, polymer blends, molecular weight concept, crystallinity in polymers, electrical and thermal properties of polymers, conducting polymers.	25%
3.	**Ceramic Materials** Various types of ceramics, properties of ceramics, oxide-non oxide ceramics, phase diagrams, properties and synthesis of ceramic powders, sintering of ceramics, principles of main fabrication techniques, and applications of traditional and advanced ceramics,	25%

	electroceraics.	
4.	Fe-Fe_3C phase diagram, pearlite, bainite, martensite, cementite, heat treatments processes, classification of steels and their applications. Aluminium alloys, magnesium alloys, copper alloys, nickel, cobalt, zinc alloys, titanium alloys, refractory metals.	25%

Teaching-Learning Methodology	• We make extensive use of chalk and board. • ICT tools such as multimedia projector, smart board, etc. are also used for better explanation of scientific concepts. • Detail lecture notes and other reference materials are also provided to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	On completion of the course student will be able to, 1. Understand the principles behind the mechanical behavior of metals and alloys 2. Obtain a basic understanding on the viscoelastic, crystallinity, electrical and thermal properties of polymers 3. Describe the role of types of ceramics, properties of ceramics, synthesis methods and applications 4. Gain knowledge related to classification of alloys, properties and applications.

Suggested References:

Sr. No.	References

1. The Science and Engineering of Materials, Donald R. Askeland PWS-Kent Publishing
2. Polymer Science, V R. Gowarikar, N. V. Vishwanathan and J. Sreedhar, Wiley Publications
3. Principles of Polymer Science, P. Bahadur and N. V. Sastry, Narosa Publishers, New Delhi
4. Callister's Materials Science and Engineering, William D. Callister, Jr, R. Balasubramanian
5. Physical Metallurgy: Principles and Practice, V. Raghavan, PHI Learning Publishers
6. Science of Engineering Materials: Manas Chanda, Macmillan Publishers
7. Ceramic Hardness, Ian McColm, Springer Publications
8. Physics of polymers by Strobl, Gert R., Springer Publications

On-line resources to be used if available as reference material

On-line Resources

https://nptel.ac.in/courses/112/104/112104203/
https://nptel.ac.in/courses/113/104/113104096/
https://nptel.ac.in/courses/112/108/112108150/

M.Sc. Applied Physics
Semester – II

Course Code	**PT02EAPC52**	Title of the Course	**Electronics Devices & Photovoltaics**
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	This elective course acts as a bridge between a Physic and Electronics Devices. This course enables student to, 1. Explains the behavior of metal-semiconductor contacts and pn junctions under different bias condition and temperature 2. exposed to the characteristics of basic electronic devices and circuits

Course Content		
Unit	Description	Weight age*
1.	Contact between materials and pn Junctions, Contact between two materials Metals Semiconductors contacts, I/V characteristics, thermoelectric effects, The pn Junction – equilibrium conditions, zero bias, forward bias and reverse bias, The effect of temperature on diode characteristics, diode equivalent circuits, properties of the depletion layer, abrupt junction, junction potential, width of depletion layer and depletion layer capacitance, reverse breakdown mechanism.	25%
2.	Graded junctions, practical pn junction, Bipolar junction Transistor - emitter efficiency and base transport factor, d.c. characteristics of a transistor, C-B characteristic, distribution of excess charge in base, variation of current gain with collector current, common emitter characteristics, transistor breakdown voltages, The Ebers-Moll model, charge control of a transistor, measurement of _B and _C.	25%
3.	The hybrid _ equivalent circuit of BJT and equivalent circuit of FET, light absorption in semiconductors, working principle LDR, photo-diode, photo-transistor and LED, liquid crystal display devices. IC operational amplifiers, frequency compensation, op-Amp switching application, op-Amp inverter, precision rectifier, peak clipper, Schmitt trigger, UTP, LTP and adjustment, comparator, monostable, astable multivibrator.	25%
4.	Introduction to the photovoltaic systems, merits and limitations of solar PV systems, prospects of solar PV systems-principle of a	25%

	photovoltaic cell, V-I characteristics of a solar cell-Inter connections of solar cells, efficiency of solar cell and its spectral response, - Configuration of a solar PV systems, PV cell technology, Structures of solar cells-M-S solar cells, MIS solar cells, solid – liquid junction solar cells, comparison of p-n junction, Schottky junction, M-S, M-I-S solar cells.	

Teaching-Learning Methodology	• We make extensive use of chalk and board. • ICT tools such as multimedia projector, smart board, etc. are also used for better explanation of scientific concepts. • Detail lecture notes and other reference materials are also provided to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	On completion of the course student will be able to, 1. Understand the theory related to junction potential, properties of the depletion layer, depletion layer capacitance, reverse breakdown mechanism for pn junction and metal-semiconductor junction. 2. Understand the operation, the function and application of the diodes, bipolar junction and field effect transistors, BJT, UJT, op-Amp, LDR, Schmitt trigger, photovoltaic systems and PV cell technology in electronic circuits.

Suggested References:	
Sr. No.	References
1.	Electronic Devices and Components, by J. Seymore (Longmann Scientific & Technical).
2.	Integrated Electronics, by K. R. Botkar, (Khanna Publishers.)
3.	Integrated Electronics: Analog and Digital Circuits Systems, by J. Millman and C. C. Halkias(Tata McGraw -Hill Publishing Company Ltd.).
4.	Solid State Pulse Circuits, by David A. Bell (Prentice Hall of India Pvt. Ltd).
5.	Energy Technology (Non conventional, Renewable and conventional), by S. Rao and Dr. P. B. Parrulkar (Khanna Publishers.)

On-line resources to be used if available as reference material
On-line Resources
https://nptel.ac.in/courses/117/103/117103063/ https://nptel.ac.in/courses/108/108/108108112/ https://nptel.ac.in/courses/117/106/117106091/