Part A: Introduction				
Program: Diploma Course		**Class: B.Sc.**	**Semester-III**	Session: **2023-2024**
1	**Course Code**	**PSCC-003T**		
2	**Course Title**	**THERMAL PHYSICS AND STATISTICAL MECHANICS**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able 1. Learn the basic concepts of thermodynamics. 2. The first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. 3. They are also expected to learn Maxwell's thermodynamic relations. 4. Know the fundamentals of the kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.		
7	Credit Value	Theory 03		
8	Total Marks	Max. Marks: 75	Min Passing Marks:25	

	Part-B Content of Course	
	Total Hours -45	
Unit	**Topics**	**No. of Lectures**
I	Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient, Reversible and irreversible processes, Second law and Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero. Thermodynamical Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations and applications - Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations.	12
II	Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases	11
III	Theory of Radiation: Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.	11
IV	Statistical Mechanics: Phase space, Macro state and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann law - distribution of velocity - Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law -	11

	photon gas - comparison of three statistics	

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill. • A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press. • Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications. • Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill • Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears and G.L. Salinger. 1988, Narosa • University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole. • Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-15 Marks Semester Exam (SE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 15
		Total **Marks: 75**

Part A: Introduction				
Program: Diploma Course		**Class: B.Sc.**	**Semester-IV**	Session: **2023-2024**
1	**Course Code**	**PSCC-004T**		
2	**Course Title**	**WAVES AND OPTICS**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able 1. Solve wave equation and understand the significance of transverse waves 2. Acquire skills to identify and apply formulas of optics and wave physics 3. Understand the properties of light like interference, diffraction, and polarization 4. Understand the applications of interference in the design and working of interferometers. 5. Understand the resolving power of grating 6. Get knowledge about laser and its application.		
7	Credit Value	Theory 03		
8	Total Marks	Max. Marks: 75	Min Passing Marks:25	

	Part-B Content of Course	
	Total Hours -45	
Unit	**Topics**	**No. of Lectures**
I	Waves in Medium: Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Group velocity and phase velocity and the relationship between them. Interference: Interference: Division of amplitude and division of wave-front. Young's Double Shit experiment. Fresnel's Biprism. Phase change on reflection: Stokes's treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer: Formation of fringes, Determination of wavelength, Wavelength difference.	12
II	Diffraction: Fresnel Diffraction: Half-period zones. Zone plate. Fresnel diffraction pattern at a straight edge, at a slit and at a wire using half-period zone analysis. Fraunhofer diffraction: Single slit, Double slit, Multiple slits & Plane Diffraction Grating, Resolving Power of Grating.	11
III	Polarization: Polarized light and its mathematical representation, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, production and analysis of circularly and elliptically polarized light. Optical activity and Fresnel theory. Laurent's Hals shade Polarimeter and Bi-Quartz Polarimeter...	11
IV	LASER: Basic properties of LASERs, coherence length and	11

	coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, and population inversion. Types of Laser: Ruby, He-Ne Laser and Semiconductor Laser, Application of Laser in Communication and Holography.	

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • Fundamentals of Optics, FAJenkinsandHEWhite, 1976,McGraw-Hill • 2. Principles of Optics, B.K.Mathur, 1995,GopalPrinting • 3. Fundamentals of Optics, H.R.GulatiandD.R. Khanna, 1991,S.ChandPublication • 4. University Physics. FWSears, MWZemanskyandHDYoung 13/e, 1986.Addison-Wesl • 5. Physical Optics, A.K. Ghatak • 6. Berkely Physics Course: Vol.-III, 'Waves and Oscillations'

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-15 Marks Semester Exam (SE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 15
		Total **Marks: 75**

Part A: Introduction				
Program: **Diploma Course**		**Class: B.Sc.**	**Semester-III & IV**	Session: **2023-2024**
1	**Course Code**	**PSCC-003P & 004P**		
2	**Course Title**	**THERMAL PHYSICS AND STATISTICAL MECHANICS And WAVES AND OPTICS**		
3	**Course Type**	**Practical**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	Expected Outcomes • Students able to get working knowledge of laws and methods of thermodynamics and elementary statistical mechanics and to use this knowledge students can explore various application related to physics of condensed matter. • Students experience experimental evidence of laws of wave optics and how light has wave nature is confirmed through experiment.		
7	Credit Value	Practical 01+01=02		
8	Total Marks	Max. Marks: 25+25=50	Min Passing Marks:9+9	

	Part-B Content of Course
	Total Hours -15 +15
Tentative Practical List	At least 14 experiments from the following. 1. To determine the thermal conductivity of a non-conducting material by Lee's disc method. 2. To determine the specific rotation of sugar solution with the help of a polarimeter. 3. To verify Newton's law of cooling. 4. To study the binomial distribution law of probability using 4 coins. 5. To determine the frequency of the electric generator by Melde's experiment. 6. To determine the coefficient of thermal conductivity (k) by the rubber tubing method. 7. To study the heat efficiency of an electric kettle with varying voltage. 8. To determine the frequency of A.C. mains using sonometer. 9. To determine the ratio of specific heat at constant pressure and constant volume (Y=Cp/Cv) of air Clement and Desorme's method. 10. To study the variation of thermos-Emf of thermos coupled with the Difference of Temperature of its Two Junctions. 11. To determine the refractive index of the material of the prism with the help of a spectrometer. 12. To determine the refractive index of the material of Calcite/ Quartz prism with the help of a spectrometer. 13. To determine the radius of curvature of a plano-convex lens by Newton's circular ring method. 14. To find out the wavelength of the monochromatic light source with the help of Newton's Ring. 15. To determine the wavelength of laser light by diffraction grating.

	16. To determine the resolving power of a telescope. 17. To determine the resolving power of a plane diffraction grating. 18. To determine the wavelength of monochromatic light source by single slit diffraction. 19. To determine the dispersive power of the prism with the help of a spectrometer. 20. To determine the refractive index of ordinary and extra-ordinary rays for the calcite prism using spectrometer. 21. To determine the refractive index of water using laser light and photocell.

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • Advanced Practical Physics for students, B.L. Flint & H. T. Worsnop, 1971, Asia Publishing House. • Advanced level Physics Practical's, Michael Nelson and Jon M.Ogborn, 4thEdition, reprinted1985, Heinemann Educational Publishers • A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11* Edition, 2011, Kitab Mahal, NewDelhi. • A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal, 1985, Vani Publication.

Part D: **Assessment and Evaluation**
Suggested Continuous Evaluation Methods: Maximum Marks: 25+25=50, Minimum Marks: 09+09=18

Part A: Introduction				
Program: Diploma Course		**Class: B.Sc.**	**Semester-III**	Session: **2023-2024**
1	**Course Code**	**PHYDSEC-001T**		
2	**Course Title**	**ELECTRONICS AND QUANTUM MECHANICS**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of the course, the student is expected to have an idea/concept of the following, 1. After an exposition of the inadequacies of classical mechanics in explaining microscopic phenomena, quantum theory formulation is introduced through Schrodinger equation. 2. The interpretation of wave function of quantum particle and probabilistic nature of its location and subtler points of quantum phenomena are exposed to the student. 3. This course provides the fundamental skills to understand the basic of semiconductor and components. 4. To develop the understanding in Diode and Transistor.		
7	Credit Value	Theory 03		
8	Total Marks	Max. Marks: 75	Min Passing Marks:25	

	Part-B Content of Course	
	Total Hours -45	
Unit	**Topics**	**No. of Lectures**
I	Semiconductor Devices Semiconductor Diode: P and N type Semiconductor, Barrier formation in P-N junction Diode, Qualitative idea of current flow mechanism in forward and reverse bias Diode, P-N junction and its Characteristic.	11
II	Half -wave and Full-wave Rectification: Half-wave Rectification, Full-wave rectification, Bipolar junction transistors, and Amplifiers. Bipolar junction transistors: p-n-p and n-p-n transistors, Characteristics of CB, CE, and CC configurations, Active, cutoff and saturation region.	12
III	Quntum Mechanics: Quntum Theory of Radiation, Characteristics of Photon, matter wave, D'Broglie wave-length, concept of wave function, Schrodinger equation, Stationary state.	11
IV	Expectation value of quantum variables, transitions probability, the free particle in box, Linear harmonic oscillator, Eigen values and Eigen functions.	11

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • Physics of Semiconductor Devices, S.M. Sze & K.K. Ng, 3rd Ed.2008, John Wiley & Sons • Electronic devices and integrated circuits, A.K. Singh, 2011, PHI Learning Pvt. Ltd. • Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education. • Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan. • Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co. • Quantum Mechanics, R. Eisberg and R. Resnick, John Wiley & Sons. • Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-15 Marks Semester Exam (SE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 15
		Total **Marks: 75**

Part A: Introduction				
Program: **Diploma Course**		**Class: B.Sc.**	**Semester-IV**	Session: **2023-2024**
1	**Course Code**	**PHYDSEC-002T**		
2	**Course Title**	**ATOMIC MOLECULAR AND NUCLEAR PHYSICS**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able 1. Learn the ground state properties of a nucleus – the constituents and their properties. 2. Learn the concepts of packing fraction and binding energy, binding energy, and binding energy graph. 3. To develop an understanding of the atomic and molecular structure. 4. To develop an understanding of the interaction of atomic and molecular systems with external homogeneous static electric and magnetic fields.		
7	Credit Value	Theory 03		
8	Total Marks	Max. Marks: 75	Min Passing Marks:25	

	Part-B Content of Course	
	Total Hours -45	
Unit	**Topics**	**No. of Lectures**
I	Hydrogen Atom: Spectra of Hydrogen and explanation by Bohr's model, Spectrum of Deuteron, Bohr's and Sommerfield's atomic model, Spatial quantization, Concept of spin vector atomic model.	11
II	Molecular spectra, Discrete set of electronic energies of molecules, pure vibrational spectra, transitions rule, pure rotational spectra, transitions rules. Raman effect: stokes and anti-stokes lines.	12
III	Nucleus, Proton-electron theory, Angular momentum of nucleus, General properties of nucleus, mass defect and packing fraction, nuclear binding energy, Binding energy curve.	11
IV	Particle accelerator, Cyclotron, Frequency modulated cyclotron, Detection of charged particles, Wilson cloud chamber, Geiger Muller counter.	11

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** Atomic and Nuclear Physics Vol. II" by Ghoshal Fundamentals in Nuclear Physics by Jean-Louis Basdevant and James Rich NUCLEAR PHYSICS" by D C Tayal Introduction to Nuclear and Particle Physics" by A Das and T Ferbel

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-15 Marks Semester Exam (SE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 15
		Total **Marks: 75**

Part A: Introduction				
Program: Diploma Course		**Class: B.Sc.**	**Semester-III & IV**	Session: **2023-2024**
1	**Course Code**	**PHYDSEC-01P & 02P**		
2	**Course Title**	**LAB-1 &2** **Electronics, Quantum Mechanics, Atomic, Molecular, and Nuclear Physics**		
3	**Course Type**	**Practical**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	Expected Outcomes • Students able to get Learn basic concepts of semiconductor diodes, junction transistors and their applications to rectifier through experiment. • Learn basic concepts of Digital circuits viz: logic gates and its various combinations through experiments.		
7	Credit Value	Practical 01+01=02		
8	Total Marks	Max. Marks: 25+25=50	Min Passing Marks:9+9	

	Part-B Content of Course
	Total Hours -15 +15
Tentative Practical List	At least 14 experiments from the following. 1. Specific resistance and energy gap of a semiconductor 2. Study of half wave and full wave rectification. 3. Characteristics of Zener diode. 4. Characteristics of tunnel diode. 5. Characteristics of JFET. 6. Characteristics of Transistors. 7. Study of regulated power supply. 8. Study of RC coupled amplifier. 9. Determination of Plank's constant. 10. Determination of e/m using Thomson's method. 11. Hall probe method for measurement of resistivity. 12. Digital Electronics – Verify logic Gates 13. Half and Full adder circuits 14. Verification of De-Morgan's Laws 15. Realization of NAND and NOR Gates using Diode and Transistors.

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • B.Sc. Practical Physics by C.L.Arora • Practical Physics by G.L.Squires, Cambridge University Press • Advanced Practical Physics for Students by Worsnop and Flint • Practical Physics by R.K.Shukla • B.Sc. Practical Physics by Harnam Singh

Part D: **Assessment and Evaluation**
Suggested Continuous Evaluation Methods: Maximum Marks: 25+25=50, Minimum Marks: 09+09=18

Part A: Introduction				
Program: Diploma Course		**Class: B.Sc.**	**Semester-III**	Session: **2023-2024**
1	**Course Code**	**PHYSEC-002T**		
2	**Course Title**	**Elementary Physics and Measurements Part-1**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of the course, the student is expected to have an idea/concept of the following, 1. Students learn to measure any body by using Vernier and Meter scale. 2. Students learn to measure volume, area of any cylinder or wire by using Screw Guage. 3. They are also learn the elementary knowledge of properties of matter, current electricity and Electrostatic		
7	Credit Value	Theory 02		
8	Total Marks	Max. Marks: 50	Min Passing Marks:17	

	Part-B Content of Course	
	Total Hours -30	
Unit	**Topics**	**No. of Lectures**
I	**Measurement** Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier caliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.	10
II	**Properties of Matter** Types of force, Elasticity, Poisson's Ratio, Surface tension, Viscosity, Stokes law, Ideal gas laws.	07
III	**Electrostatics** Charge, Coulomb's law, Electric field,, Field intensity, Electric lines of force, Electric dipole, Electric potential, capacitors.	07
IV	**Current Electricity** Electric current, Resistance, and capacitance, electric cells, Kirchhoff's law, potentiometer	06

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • https://ncert.nic.in/pdf/publication/sciencelaboratorymanuals/classXI/physics/kelm102.pdf • Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education • Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings. • Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands, 2008, Pearson Education • Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press. • Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press. • Unified Physics B.Sc. I year by R.P. Goyal

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-10 Marks Semester Exam (SE): 40 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 10
		Total **Marks: 50**

Part A: Introduction				
Program: **Diploma Course**		**Class: B.Sc.**	**Semester-IV**	Session: **2023-2024**
1	**Course Code**	**PHYSEC-003T**		
2	**Course Title**	**Elementary Physics and Measurements Part-2**		
3	**Course Type**	**Theory**		
4	**Pre-requisite (if any)**	**As Per Norms**		
6	**Course Learning. Outcomes (CLO)**	At the end of the course, the student is expected to have an idea/concept of the following, 1. Students understand how to use soldering iron. 2. Students learn to measure current and voltage by using Ammeter and voltmeter. 3. They also learn the elementary knowledge of the thermal effect of current, Magnetostatic, and time-varying fields.		
7	Credit Value	Theory 02		
8	Total Marks	Max. Marks: 50	Min Passing Marks:17	

	Part-B Content of Course	
	Total Hours -30	
Unit	**Topics**	**No. of Lectures**
I	**Measurement** Use of Multimeter, soldering of electrical circuits having, discrete components (R, L, C, diode). Use of a voltmeter, Ammeter to measure current and voltage.	10
II	**Thermal Effect of Current** Heating effect, Joule's law of heating, Thermo electricity, Thermo electric Power, Peltier effect, Thomsen effect.	07
III	**Magneto statics** Magnetism, Coulomb's law, Magnetic moment, Magnetic field of a bar magnet, Magnetic lines of force, Properties of magnetic material.	07
IV	**Time-varying field** Faraday's experiments, cause of induced e.m.f., Laws of electromagnetic induction, Lenz's law.	06

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** • https://learn.sparkfun.com/tutorials/how-to-use-a-multimeter/measuring-voltage • **Magnetic Effects of Current by Priyanka jangid** • https://ncert.nic.in/textbook/pdf/gesc114.pdf • https://ncert.nic.in/textbook/pdf/leph103.pdf • Unified Physics B.Sc. I year by R.P. Goyal

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): 2 Internal and Assignment-10 Marks Semester Exam (SE): 40 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test-02 1 Assignment/Presentation	Total Marks: 10
		Total **Marks: 50**