

# DYAL SINGH COLLEGE, KARNAL

**NAME OF THE PROGRAMME : BACHELOR OF SCIENCE (B.Sc.) Non-medical**  
**DURATION : THREE YEARS**

<b>PROGRAMME OUTCOMES (POs)</b>		
PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems.
PO4	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research-based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO6	Modern Tool Usage	Ability to use and learn techniques, skills and modern tools for scientific practise.
PO7	Science and Society	Ability to apply reasoning to access the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout the life.
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development.
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices.
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects.

<b>PROGRAMME SPECIFIC OUTCOMES (PSOs)</b>	
The objective of the program designed for BSc course is to foster the scientific talent of students for proficient skill in the field of education and research.	
PSO1	Acquire a thorough acquaintance, understanding and knowledge of the basic perceptions of Physics and be able to recognize how various phenomena detected in nature follow from a small set of fundamental laws through rational reasoning.
PSO2	Be accomplished with the understanding of the core physical laws to understand the basic concepts, latest advancement and applications of certain fields of Physics such as Mechanics, Electricity and Magnetism, Properties of Matter, Semiconductor Electronics, Optics, Thermodynamics, Statistical Physics, Nuclear Physics, Atomic and Molecular Spectroscopy, Quantum Mechanics and Solid-State Physics.
PSO3	Gain hands-on skills for carrying out certain basic and various branch related experiments of Physics and attain the ability of critical thinking, problem mapping and solving using fundamental principles of Physics, systematic analysis and interpretation of results.
PSO4	Have a new vision to look at the world with scientific temperament that empowers them to pursue studies at higher and research level.
PSO5	Have awareness of the impact of Physics on community and various commercial and environmental issues.

### Classical Mechanics and Theory of Relativity (PH-101)

**Course Objectives:**The aim of this course is to introduce the basic concepts of Classical mechanics, Generalized Notations, Theory of relativity and Applications of theory of relativity.

**Course Outcomes:**At the end of this course, the students will be able to:

PH-101.1 Understand the mechanics of single and system of particles along with conservation laws.

PH-101.2 Understand generalized co-ordinates, Hamilton's Principle, Lagrange's equation and their applications.

PH-101.3 Learn the basic concepts of the theory of relativity, frames of references, Michelson's Morley experiment.

PH-101.4 Understand the concepts of special theory of relativity including Lorentz invariance, length contraction, time dilation, twin paradox, mass variation and energy-mass equivalence.

#### CO-PO Mapping Matrix for Course Code: PH-101

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-101.1	3	2	3	3	3	3	3	3	2	2	3
PH-101.2	3	2	3	3	3	3	2	3	2	2	3
PH-101.3	3	2	3	3	2	3	3	2	2	2	2
PH-101.4	3	2	3	3	3	3	2	2	2	2	2
Average	3	2	3	3	2.75	3	2.5	2.5	2	2	2.5

#### CO-PSO Mapping Matrix for Course Code: PH-101

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-101.1	3	3	2	2	2
PH-101.2	3	3	2	2	2
PH-101.3	3	3	3	2	3
PH-101.4	2	3	3	2	3
Average	2.75	3	2.5	2	2.5

## Electricity, Magnetism and Electromagnetic theory (PH-102)

Course Objectives: The aim of this course is to introduce Vector background and Electric field, Magnetism, Electromagnetic theory and A. C. Analysis of simple circuits.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-102.1 Understand the scalar and vector potentials with significance, Gauss's law of electrostatics and its applications.

PH-102.2 The important properties of magnetic field and theories of dia, para and ferromagnetic materials.

PH-102.3 Derive Maxwell's equations and introduce the role of displacement current, boundary conditions at interface between different media, propagation of electromagnetic waves.

PH-102.4 Analysis of AC circuits with combination of capacitance, resistance and inductance, Q- factor.

### CO-PO Mapping Matrix for Course Code: PH-102

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-102.1	3	3	3	2	2	1	2	3	1	2	2
PH-102.2	3	3	3	2	2	1	2	3	1	2	2
PH-102.3	3	3	3	2	2	1	2	3	1	2	2
PH-102.4	3	3	3	2	2	2	2	3	1	2	2
Average	3	3	3	2	2	1.25	2	3	1	2	2

### CO-PSO Mapping Matrix for Course Code: PH-102

CO	PSO1	PSO2	PSO3	3	PSO5
PH-102.1	3	3	2	3	2
PH-102.2	3	3	2	3	2
PH-102.3	3	3	2	3	2
PH-102.4	3	3	2	3	2
Average	3	3	2	3	2

### Properties of matter and kinetic theory of gases (PH-201)

**Course Objectives:** The aim of this course is to introduce the moment of inertia, Elasticity, kinetic theory of gases and experimental verifications of Maxwell's Law.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-201.1 Understand the concept of Moment of Inertia and theorems of perpendicular and parallel axes and evaluation of moment of inertia of different objects like sphere, spherical shell etc.

PH-201.2 Describe the basic concepts of Hooke's Law, Poisson's ratio, determination of coefficient of modulus of rigidity for different materials.

PH-201.3 Understand the assumptions of kinetic theory of gases, degree of freedom, specific heat of gases and Vander wall's equations.

PH-201.4 Study the experiment verifications of Maxwell's Law of speed distribution: most probable speed, average and r.m.s. speed, mean free path etc.

#### CO-PO Mapping Matrix for Course Code: PH-201

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-201.1	3	2	3	3	3	3	3	3	2	2	2
PH-201.2	3	2	3	3	3	3	2	3	2	2	3
PH-201.3	3	2	3	3	3	2	3	3	2	2	3
PH-201.4	3	3	2	3	3	3	3	3	2	2	3
Average	3	2.25	2.75	3	3	2.75	2.75	3	2	2	2.75

#### CO-PSO Mapping Matrix for Course Code: PH-201

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-201.1	3	3	3	3	2
PH-201.2	3	3	2	2	2
PH-201.3	3	2	2	3	2
PH-201.4	3	3	3	2	2
Average	3	2.75	2.5	2.25	2

### Semiconductor Devices (PH-202)

**Course Objectives:** The aim of this course is to introduce the basic concepts of semiconductor, transistor, amplifiers and oscillators.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-202.1 Understand the basic concepts of semiconductor devices including PN junction diode, Zener diode, rectifiers, LED, photodiode, solar cell and filter circuits.

PH-202.2 Understand the basic characteristics of transistors, biasing and stabilization.

PH-202.3 Study different amplifiers, their classifications concept of feedback, coupling and distortion in amplifiers.

PH-202.4 Understand the principle of oscillation, classification of oscillators, and condition for self-sustained oscillation, tuned collector common emitter oscillator, Hartley oscillator and C.R.O.

#### CO-PO Mapping Matrix for Course Code: PH-202

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-202.1	3	3	3	2	3	3	2	3	1	2	3
PH-202.2	3	3	3	2	3	3	2	3	1	2	3
PH-202.3	3	3	3	2	3	3	2	3	1	2	3
PH-201.4	3	3	3	2	3	3	2	3	1	2	3
Average	3	3	3	2	3	3	2	3	1	2	3

#### CO-PSO Mapping Matrix for Course Code: PH-202

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-202.1	3	3	3	3	2
PH-202.2	3	3	3	3	2
PH-202.3	3	3	3	3	2
PH-202.4	3	3	3	3	2
Average	3	3	3	3	2

### Computer Programming and Thermodynamics: (PH-301)

**Course Objectives:** The aim of this course is to introduce Computer Programming, Applications of FORTRAN programming, and thermodynamics.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-301.1 Learn about the basic computer organization, Problem solution with the help of algorithm and flow charts, Fundamentals of Fortran Programming including control structures and Function subprogram and sub routine.

PH-301.2 Learn to solve various mathematical problems using Fortran Programming language learnt in the previous chapter.

PH-301.3 Understand the basic concepts of thermodynamics, the first and the second law of thermodynamics, Joule-Thomson effect, Joule-Thomson (Porous plug) experiment, the concept of entropy and the associated theorems, calculations of entropy of reversible & irreversible process, T-S diagram and Nernst's law (third law of thermodynamics).

PH-301.4 Students will learn to derive the Clausius-Clapeyron latent heat equations and understand their significance. The students will also be able to learn about Maxwell's thermodynamic relations, their physical interpretations and their application to derive the relation between two specific heats, to derive Clausius-Clapeyron equation, to derive Joule Thomson Effect.

#### CO-PO Mapping Matrix for Course Code: PH-301

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-301.1	3	3	3	2	3	3	2	3	1	2	3
PH-301.2	3	3	3	2	3	3	2	3	1	2	3
PH-301.3	3	3	3	2	2	2	2	2	1	2	2
PH-301.4	3	3	3	2	2	2	2	2	1	2	2
Average	3	3	3	2	2.5	2.5	2	2.5	1	2	2.5

#### CO-PSO Mapping Matrix for Course Code: PH-301

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-301.1	3	3	3	3	2
PH-301.2	3	3	3	3	2
PH-301.3	3	3	2	2	2
PH-301.4	3	3	2	2	2
Average	3	3	2.5	2.5	2

### Wave & optics –I (PH-302)

**Course Objectives:** The aim of this course is to introduce the optical phenomena: interference and applications related to interference, diffraction and application, experiment based on diffraction.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-302.1 Understand the concept of interference and applications under division of wavefront: Fresnel's Biprism, Lloyd's mirror and phase change.

PH-302.2 Interference concept due to division of amplitude, thin film reflection and transmission, Newton's rings, wedge shaped film and Michelson Interferometer.

PH-303.3 Understand the basic concept of diffraction: Fresnel's diffraction, zone plate and application under Fresnel's diffraction.

PH -303.4 Solve problems and application based on Fraunhofer's diffraction, plane transmission diffraction grating, resolving & dispersive power of telescope and grating.

#### CO-PO Mapping Matrix for Course Code: PH-302

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-302.1	3	3	3	3	3	2	2	2	2	3	2
PH-302.2	3	3	3	2	2	2	2	2	2	2	2
PH-302.3	3	2	2	3	2	2	2	2	1	1	2
PH-302.4	3	3	3	3	2	2	2	2	2	2	2
Average	3	2.75	2.75	2.75	2.25	2	2	2	1.75	2	2

#### CO-PSO Mapping Matrix for Course Code: PH-302

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-302.1	3	3	2	3	3
PH-302.2	3	3	2	2	2
PH-302.3	2	2	3	2	2
PH-302.4	2	3	3	2	3
Average	2.5	2.75	2.5	2.25	2.5

### Statistical Physics:(PH-401)

**Course Objectives:**The aim of this course is to introduce the Statistical Physics, Quantum Statistics and Theory of Specific Heat of Solids.

**Course Outcomes:** At the end of this course, the students will be able to:

PH-401.1 Learn about the basic concepts of Probability, thermodynamic probability, distribution of distinguishable and indistinguishable particles in boxes of equal size and in compartments of different size, condition of equilibrium between two systems in thermal contact. Students will be able to understand the relation between Thermodynamics and Probability (Boltzmann relation).

PH-401.2 Learn about the concept of phase space and its division into cells, basic approach to three kinds of statistics, Maxwell Boltzmann statistics applied to derive the energy distribution, speed distribution and velocity distribution laws. Application of these laws to derive RMS and Average speeds and velocities.

PH-401.3 Understand the need and application of Quantum Statistics: Bose-Einstein & Fermi-Dirac statistics and their application to derive important laws of Physics like Planck's Radiation Law and energy distribution law for electron gas in metals. Also students will be able to articulate the connection as well as comparison between classical statistical mechanics and quantum statistical mechanics.

PH-401.4 Learn and understand the different law's and theory of specific heat of solids and their significance.

#### CO-PO Mapping Matrix for Course Code: PH-401

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-401.1	3	3	3	2	3	2	2	3	1	2	2
PH-401.2	3	3	2	2	2	1	2	2	1	2	2
PH-401.3	3	3	2	2	2	1	2	2	1	2	2
PH-401.4	3	3	2	2	2	1	2	2	1	2	2
Average	3	3	2.25	2	2.25	1.25	2	2.25	1	2	2

#### CO-PSO Mapping Matrix for Course Code: PH-401

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-401.1	3	3	2	2	2
PH-401.2	3	3	2	2	2
PH-401.3	3	3	2	2	2
PH-401.4	3	3	2	2	2
Average	3	3	2	2	2



## Wave & Optics –II: (PH-402)

**Course Objectives:** The aim of this course is to introduce the concept of polarization, Fourier theorem and series, Fourier Transform, aberrations and fiber optics.

**Course Outcomes:** At the end of this course, the students will be able to :

PH-402.1 Understand the theory of polarization, Nicol prism, plane polarized light, circularly and elliptically polarized light. Also able to understand optical rotation, specific rotation and polarimeters.

PH-402.2 Understand Concept of Fourier theorem and series, applications based on Fourier series: square wave, triangular wave etc.

PH- 402.3 Concept of Fourier Transform, its properties and applications, basic concept of matrix methods, unit planes, nodal planes.

PH-402.4 Understand the concept of aberrations and concept of fiber optics along with its applications.

### CO-PO Mapping Matrix for Course Code: PH-402

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-402.1	3	3	3	2	3	2	2	2	2	2	2
PH-402.2	3	3	3	2	3	2	3	2	2	2	2
PH-402.3	3	2	3	3	2	2	2	2	1	1	2
PH-402.4	3	3	3	2	2	2	2	2	2	2	2
Average	3	2.75	3	2.25	2.5	2	2.25	2	1.75	1.75	2

### CO-PSO Mapping Matrix for Course Code: PH-402

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-402.1	3	3	2	2	3
PH-402.2	2	3	2	2	2
PH-402.3	3	2	2	2	2
PH-402.4	2	3	2	2	2
Average	2.5	2.75	2	2	2.25

### Quantum Mechanics and Laser: PH-501

**Course Objectives:** The aim of this course is to introduce Origin of quantum physics (Experimental basis), Application of Schrodinger wave equation and Laser Physics.

**Course Outcomes:** At the end of this course, the students will be able to

PH-501.1 Get insights of the inability of classical mechanics to explain various phenomenon which leads to the development of Quantum mechanics which includes developing the idea of probability interpretation. Discussion of the formulation of Schrodinger equation which includes both time dependent and time independent cases.

PH-501.2 Understand the behaviour of quantum particle encountering infinite potential barrier, step potential, quantum tunnelling and linear harmonic oscillator.

PH-501.3 Familiarize with optical phenomena and different concepts related to laser physics, characteristics of Laser Light, and different types of pumping.

PH-501.4 Qualitative understanding of basic lasing mechanism, types of Lasers (Solid state laser and Low power gas laser), application of laser in medicine, industry and military.

#### CO-PO Mapping Matrix for Course Code: PH-501

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-502.1	3	3	3	2	2	1	2	3	1	2	2
PH-502.2	3	3	3	2	2	1	2	3	1	2	2
PH-502.3	3	3	3	2	2	1	2	2	1	2	2
PH-502.4	3	3	3	2	2	1	2	2	1	2	2
Average	3	3	3	2	2	1	2	2.5	1	2	2

#### CO-PSO Mapping Matrix for Course Code: PH-501

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-502.1	3	3	2	2	2
PH-502.2	3	3	2	2	2
PH-502.3	3	3	2	3	2
PH-502.4	3	3	2	2	3
Average	3	3	2	2.25	2.25

### NUCLEAR PHYSICS: PH-502

**Course Objectives:** The aim of this course is to introduce the structure, properties, stability and energy content of the nucleus along with origin, interaction, detection and acceleration of nuclear particles.

**Course Outcomes:** At the end of this course, the students will be able to

PH-502.1. Understand the structure, properties, their determination and the stability of the nucleus.

PH-502.2. Understand origin and interaction of nuclear particles like  $\alpha$ ,  $\beta$  and  $\gamma$  with matter.

PH-502.3. Understand detection and acceleration of nuclear particles.

PH-502.4. Understand the nuclear reactions, Q-value, fission, fusion and nuclear reactors to harness nuclear energy.

#### CO-PO Mapping Matrix for Course Code: PH-502

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-502.1	3	3	3	2	2	1	2	3	1	2	2
PH-502.2	3	3	3	2	2	1	2	3	1	2	2
PH-502.3	3	3	3	2	2	2	2	2	2	2	2
PH-502.4	3	3	3	2	2	2	2	2	2	2	2
Average	3	3	3	2	2	1.5	2	2.5	1.5	2	2

#### CO-PSO Mapping Matrix for Course Code: PH-502

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-502.1	3	3	2	2	2
PH-502.2	3	3	2	2	2
PH-502.3	3	3	2	3	2
PH-502.4	3	3	2	2	3
Average	3	3	2	2.25	2.25

### SOLID STATE AND NANO PHYSICS: PH-601

**Course Objectives:** The aim of this course is to introduce the crystalline structures and their determination, superconductivity and its uses, nanomaterials and their applications.

**Course Outcomes:** At the end of this course, the student will be able to

PH-601.1. understand crystals, crystal lattice, unit cell, crystal structure, their characteristics and symmetries, Bravais lattices, crystal planes, Miller indices and the structures of some crystals like diamond, sodium chloride and zinc sulphide.

PH-601.2. understand crystal structure determination using x-ray diffraction and reciprocal lattice and their properties.

PH-601.3. understand basic ideas of superconductivity, classification of superconductors, London and BCS theory of superconductivity and the applications of superconductivity.

PH-601.4. understand the concept of nanomaterials, nanotechnology, Nano-Physics and the applications of nanomaterials and nanotechnology.

#### CO-PO Mapping Matrix for Course Code: PH-601

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-601.1	3	3	3	2	2	2	2	3	1	2	3
PH-601.2	3	3	3	2	2	2	2	2	1	2	2
PH-601.3	3	3	3	2	2	2	2	2	2	2	1
PH-601.4	3	3	3	2	2	2	3	3	2	2	3
Average	3	3	3	2	2	2	2.25	2.5	1.5	2	2.25

**CO-PSO Mapping Matrix for Course Code: PH-601**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-601.1	3	3	2	2	3
PH-601.2	3	3	2	2	2
PH-601.3	3	3	2	2	3
PH-601.4	3	3	2	3	3
Average	3	3	2	2.25	2.75

**Atomic and Molecular spectroscopy: PH-602**

**Course Objectives:** The aim of this course is to introduce the Historical background of atomic spectroscopy, Vector atom model (single and two valance electrons) and Atom in External Field.

**Course Outcomes:** At the end of this course, the student will be able to

PH-602.1 Acquire knowledge about the historical background and developments of atomic spectroscopy through the study of spectral series in Hydrogen atom, effect of nuclear motion on line spectra (correction of finite nuclear mass), short comings of Bohr's theory, Wilson Sommerfeld quantization rule, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory and finally Vector atom model.

PH-602.2 Understand and explain the vector atom model, various coupling schemes and atomic spectra of one and two electron atoms.

PH-602.3. Explain the influence on the spectra of atoms in the presence of external applied electric and magnetic field i.e. Zeeman effect, Paschen-Back effect, Stark effect.

PH-602.4 Have basic idea about the rotational, vibrational and rotational-vibrational spectra of diatomic molecules and basic idea of Raman Effect.

**CO-PO Mapping Matrix for Course Code: PH-602**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-602.1	3	3	3	2	2	2	2	3	1	2	3
PH-602.2	3	3	3	2	2	2	2	2	1	2	2
PH-602.3	3	3	3	2	2	1	2	2	1	2	1
PH-602.4	3	3	3	2	2	1	3	3	2	2	3
Average	3	3	3	2	2	1.5	2.25	2.5	1.25	2	2.25

**CO-PSO Mapping Matrix for Course Code: PH-602**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-602.1	3	3	2	2	3
PH-602.2	3	3	2	2	2
PH-602.3	3	3	2	2	3
PH-602.4	3	3	2	3	3
Average	3	3	2	2.25	2.75

**B.SC -1 Lab Practical : PH-203**

**Course Objectives:** The aim of this course is to have hands on experience with different instruments related to mechanics and electronics.

**Course Outcomes:**At the end of this course:

PH-203.1 Students are able to understand the different concepts related to different experiments in Physics.

PH-203.2 Verify some fundamental principles, effects and concepts of physics through experiments.

PH-203.3 Performed experiments related to mechanics: bar pendulum, flywheel, Young's modulus, Modulus of rigidity, Searle's method.

PH-203.4 Verify basic laws of electronics using PN junction, photo cell, Zener diode, sonometer, impedance of A. C circuits. Learn to present observations, results and analysis in suitable form.

**CO-PO Mapping Matrix for Course Code: PH-203**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-203.1	3	3	3	2	2	2	2	3	1	2	3
PH-203.2	3	3	3	2	2	2	2	2	1	2	2
PH-203.3	3	3	3	2	2	1	2	2	1	2	1
PH-203.4	3	3	3	2	2	1	3	3	2	2	3
Average	3	3	3	2	2	1.5	2.25	2.5	1.25	2	2.25

**CO-PSO Mapping Matrix for Course Code: PH-203**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-203.1	3	3	2	2	3
PH-203.2	3	3	2	2	2
PH-203.3	3	3	2	2	3
PH-203.4	3	3	2	3	3
Average	3	3	2	2.25	2.75

**B.SC -2 Lab Practical: PH-403**

**Course Objectives:** The aim of this course is to have hands on experience with different instruments related to optics, electronics and Fortran language.

**Course Outcomes:**At the end of this course:

PH-403.1 Understand various optical phenomena, principle, and applications.

PH-403.2 Verified: interference and diffraction related experiments like Newton's rings, Diffraction grating, prism and resolving power of telescope.

PH-403.3 Basic concept of Fortran, statements under Fortran and program based on Fortran :  
Ascending–descending order, even/odd number, area of sphere, circle and triangle.

PH-403.4 Learn to present observations, results and analysis in suitable form.

**CO-PO Mapping Matrix for Course Code: PH-403**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-403.1	3	3	3	2	2	2	2	3	1	2	3
PH-403.2	3	3	3	2	2	2	2	2	1	2	2
PH-403.3	3	3	3	2	2	1	2	2	1	2	1
PH-403.4	3	3	3	2	2	1	3	3	2	2	3
Average	3	3	3	2	2	1.5	2.25	2.5	1.25	2	2.25

**CO-PSO Mapping Matrix for Course Code: PH-403**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-403.1	3	3	2	2	3
PH-403.2	3	3	2	2	2
PH-403.3	3	3	2	2	3
PH-403.4	3	3	2	3	3
Average	3	3	2	2.25	2.75

**B.SC -3 Lab Practical: PH-603**

**Course Objectives:** The aim of this course is to have hands on experience with different instruments related to optics, electronics and Fortran language.

**Course Outcomes:** At the end of this course:

PH-603.1 Perform experiments to determine the resistance & band gap of semiconductor materials and handling of different instruments such as C.R.O.

PH-603.2 Learn the concepts of diffraction and interference by performing experiments like: resolving power of prism and grating, diameter of Lycopodium powder, wavelength of light by Fresnel's biprism etc.

PH-603.3 Understand the applications of FORTRAN in various mathematical problems: Simpson's 1/3 rule, least square fitting, sum of finite series and standard deviation.

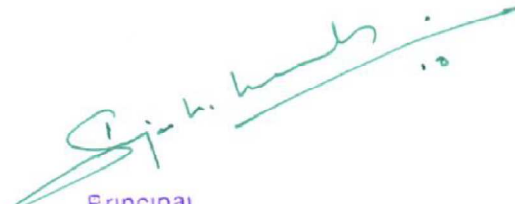
PH-603.4 Learn to present observations, results and analysis in suitable form.

**CO-PO Mapping Matrix for Course Code: PH-603**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PH-603.1	3	3	3	2	2	2	2	3	1	2	3
PH-603.2	3	3	3	2	2	2	2	2	1	2	2
PH-603.3	3	3	3	2	2	1	2	2	1	2	1
PH-403.4	3	3	3	2	2	1	3	3	2	2	3
Average	3	3	3	2	2	1.5	2.25	2.5	1.25	2	2.25

**CO-PSO Mapping Matrix for Course Code: PH-603**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
PH-603.1	3	3	2	2	3
PH-603.2	3	3	2	2	2
PH-603.3	3	3	2	2	3
PH-603.4	3	3	2	3	3
Average	3	3	2	2.25	2.75

  
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