FACULTY OF SCIENCES

SYLLABUS

of

Physics

For

Bachelor of Science

(Non-Medical & Computer Science)

(Semester V -VI)

(Under Credit Based Continuous Evaluation Grading System)

(12+3 System of Education)

Session: 2025-26

The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Semester System) (12+3 System of Education)

Session-2025-26

Bachelor of Science (Non. Medical/Computer Science)

Semester-V

Course Code		Course Name	Course Type	Credits	Total	Ext. L	Ext. P	CA	Examination time (in Hours)
BSNL/BCSL-5421 BSNL/BCSL-5031BSNL/BCSL-5431		**Punjabi**(Compulsory) [1]**Basic Punjabi** [2]**Punjab History and Culture**	C	4-0-0	100	80	-	20	3
BSNL/BCSL-5212		**English** (Compulsory)	C	4-0-0	100	80	-	20	3
BSNM/BCSM-5333	(I)	**Mathematics** (Dynamics)	C	4-0-0	100	80	–	20	3+3
	(II)	**Mathematics** (Number Theory)		3-0-0	75	60		15	
BSNM-5084	(I)	**Chemistry** (Inorganic Chemistry)	C	2-0-0	50	40	-	10	3+3+3.5
	(II)	**Chemistry** (Physical Chemistry)		3-0-0	75	60	-	15	
	(P)	**Chemistry**(Practical)		0-0-2	50	-	40	10	
BCSM-5134		**Computer Science** (Database Management System)	C	3-0-1	100	50	30	20	3+3
	(P)	**Computer Science** (Database Management System) (Practical)							
BSNM/BCSM-5395	(I)	**Physics** (Condensed Matter Physics)	C	3-0-0	75	60	-	15	3+3+3
	(II)	**Physics**(Electronics)		2-0-0	50	40	-	10	
	(P)	**Physics** (Practical)		0-0-2	50	-	40	10	
*SECI-5541/ SECJ-5551		**Innovation, Entrepreneurship and Creative Thinking/ Job readiness**	SEC		25	20	-	5	-

C-Compulsory

SEC- Skill Enhancement Course

[1] **Special paper in lieu of Punjabi (Compulsory).**

[2] **Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.**

***Marks of these papers will not be added in total marks and only grades will be provided.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Semester System) (12+3 System of Education)

Session-2025-26

Bachelor of Science (Non. Medical/Computer Science)

Semester-VI

Course Code		Course Name	Course Type	Credits	Total	Ext. L	Ext. P	CA	Examination time (in Hours)
BSNL/BCSL-6421 BSNL/BCSL-6031BSNL/BCSL-6431		**Punjabi**(Compulsory) [1]**Basic Punjabi** [2]**Punjab History and Culture**	C	4-0-0	100	80	-	20	3
BSNL/BCSL-6212		**English** (Compulsory)	C	4-0-0	100	80	-	20	3
BSNM/BCSM-6333	(I)	**Mathematics** (Linear Algebra)	C	4-0-0	100	80	–	20	3+3
	(II)	**Mathematics** (Numerical Analysis)		3-0-0	75	60		15	
BSNM-6084	(I)	**Chemistry (Physical Chemistry)**	C	2-0-0	50	-	40	10	3+3+3.5
	(II)	**Chemistry (Molecular spectroscopy)**		3-0-0	75	60	-	15	
	(P)	**Chemistry (Practical)**		0-0-2	50	-	40	10	
BCSM-6134		**Computer Science** (Information Technology)	C	3-0-1	100	50	30	20	3+3
	(P)	**Computer Science** (Information Technology) (Practical)							
BSNM/BCSM-6395	(I)	**Physics** (Nuclear Physics)	C	3-0-0	75	60	-	15	3+3+3
	(II)	**Physics**(Radiation and Particle Physics)		2-0-0	50	40	-	10	
	(P)	**Physics** (Practical)		0-0-2	50	-	40	10	

C-Compulsory

[1] **Special paper in lieu of Punjabi (Compulsory).**

[2] **Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.**

***Marks of these papers will not be added in total marks and only grades will be provided.**

Programme Specific Outcomes – B. Sc. C.Sc. (Phy. C.Sc. Maths.)

Upon successful completion of this program, students will be able to:

PSO 1. Demonstrate and communicate in regional and english language their understanding in mathematics and the mathematical concepts needed for a proper understanding of physics and computers.

PSO 2. Solve mathematical problems by critical understanding, analysis and synthesis.

PSO 3. Demonstrate and communicate their problems, understanding and knowledge of mechanics, electromagnetism, quantum mechanics, optics & lasers, waves & vibrations, spectroscopy, statistical physics, condensed matter physics, electronics, nuclear & particle physics in regional and english language and be able to apply this knowledge to analyse a variety of physical phenomena.

PSO 4. Demonstrate knowledge of various languages of Computer programming and apply this knowledge to interpret and analyse quantitative data.

PSO 5. Show and communicate their thoughts in regional and english language that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyse the measurements to draw valid conclusions.

PSO 6. Capable of oral and written scientific communication i.e. able to communicate effectively by oral, written, computing and graphical means.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

Bachelor of Science (Semester System) (12+3 System of Education)

Session-2025-26

PHYSICS (CONDENSED MATTER PHYSICS)

(THEORY)

Course code: BSNM-5395 (I) for Bachelor of Science (Non. Medical)
BCSM-5395 (I) for Bachelor of Science (Computer Science)

COURSE OUTCOMES

After passing this course, students will be able to:

CO1: Understand and explain the fundamental aspects of crystal structures in solids, including concepts of lattice, basis, unit cells (primitive and conventional), and Bravais lattices. They will study common crystal systems such as simple cubic, body-centered cubic (BCC), face-centered cubic (FCC), and hexagonal close-packed (HCP) structures. Additionally, they will learn the role of symmetry operations (rotation, reflection, inversion, translation) in determining the physical and mechanical properties of crystalline materials.

CO2: Understanding of the experimental techniques used to determine crystal structures, such as X-ray diffraction (XRD) and Laue diffraction methods. They will also learn to construct and interpret reciprocal lattices, understand the concept of Brillouin zones, and calculate structure factors and form factors, which are essential tools for analyzing and predicting diffraction patterns and crystal quality in material characterization.

CO3: Gain insights into the dynamics of atoms in a crystal lattice by studying lattice vibrations and their quantized modes, called phonons. They will explore how phonons contribute to the specific heat of solids, particularly at low temperatures. This includes a comparative understanding of classical (Dulong-Petit), Einstein, and Debye models, helping students to relate theoretical models to experimental observations in thermal properties of materials.

CO4: Build a progressive understanding of electronic properties of solids, beginning with the free electron model and moving to more refined models such as the nearly free electron model and the Kronig-Penney model. They will apply this knowledge to explain the formation of energy bands and band gaps, and differentiate between conductors, semiconductors, and insulators based on their electronic band structure. This understanding forms the theoretical foundation for modern electronic devices and materials science.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V)
Session-2025-26

PHYSICS (CONDENSED MATTER PHYSICS)

Course code: BSNM-5395 (I) for Bachelor of Science (Non. Medical)
BCSM-5395 (I) for Bachelor of Science (Computer Science)

Credits: 3-0-0 **Total Marks: 75 (ESE Marks: 60, CA: 15)**
Examination Time: 3 Hours **Pass Mark: 21**

Instructions for the Paper Setters:
Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **Each question carries 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I
Crystal structure, Symmetry operations for a two and three dimensional crystal, Two dimensional Bravais lattices, Three dimensional Bravais lattices, Basic primitive cells, Crystal planes and Miller indices, Diamond and NaCl structure.

UNIT–II
Crystal Diffraction: Bragg's law, Experimental methods for crystal structure studies, Laue equations, Reciprocal lattices of SC, BCC and FCC, Brag's law in reciprocal lattice, Brillioun zones and its construction in two and three dimensions, Structure factor and atomic form factor.

UNIT–III
Lattice vibrations, One Dimensional Monoatomic Lattice, Dispersion relation, phonons, phonon momentum during elastic and inelastic scattering, Inelastic scattering of photons by phonons, Specific heat of solids, Classical Model of specific heat of solids (Dulong and Petit's Law), Einstein and Debye Models of Specific Heat of Solids. T3 law.

UNIT–IV
Free electron model of metals, Free electron, Fermi gas and Fermi energy. Band Theory: Kronig Penney model, Metals and insulators, Conductivity and its variation with temperature in semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, band gap in semiconductors.

Books Suggested:
1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)
2. Elements of Modern Physics by S.H. Patil (TMGH, 1985).
3. Solid State Physics by Puri and Babbar.
4. Condensed Matter Physics by T.S. Bhatia (Vishal Publishing Co.)

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V)
Session-2025-26
PHYSICS (ELECTRONICS)
Course Code:BSNM-5395 (II) for Bachelor of Science (Non Medical)
BCSM-5395 (II) for Bachelor of Science (Computer Science)

COURSE OUTCOMES
After completing this course a student will be able to

CO1: Develop a solid understanding of the concepts of ideal and practical voltage and current sources and their significance in circuit design. They will be able to explain the working principles of p-n junction diodes and Zener diodes, including their I-V characteristics and real-world behavior under different biasing conditions. This foundational knowledge will be applied to analyze and implement basic electronic functions such as rectification (half-wave and full-wave), voltage regulation using Zener diodes, and waveform shaping using diode logic gates (AND/OR).

CO2: gain the ability to characterize the behavior of Bipolar Junction Transistors (BJTs) and Field Effect Transistors (FETs) under various biasing conditions. They will understand the input-output characteristics, operating regions (cut-off, active, saturation for BJT; ohmic, saturation for FET), and the significance of proper biasing for stable amplifier operation. This understanding will enable them to select and apply suitable transistor configurations in analog and digital circuits for switching and amplification purposes.

CO3: study the concepts and classification of feedback in amplifiers, focusing particularly on the role and benefits of negative feedback such as stability, gain control, and bandwidth enhancement. Through practical examples like the emitter follower (common collector configuration), students will understand how feedback improves circuit performance in real-world applications.

CO4: Students will understand the principles and functioning of electronic oscillators, specifically LC (Tank circuit-based) and RC (phase shift and Wien bridge) oscillators, which are essential for generating sinusoidal signals without external input. They will analyze the conditions for sustained oscillations (Barkhausen criteria), frequency determination, and waveform purity. The course will also guide students to compare LC and RC oscillators in terms of frequency stability, output frequency range, and circuit complexity, helping them choose appropriate oscillator circuits for specific applications such as communication systems and signal generation.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V)
Session-2025-26
PHYSICS (ELECTRONICS)
Course code:BSNM-5395 (II) for Bachelor of Science (Non Medical)
BCSM-5395 (II) for Bachelor of Science (Computer Science)

Credits: 2-0-0 **Total Marks: 50 (ESE Marks: 40, CA: 10)**
Examination Time: 3 Hours **Pass Mark: 14**

Instructions for the Paper Setters:
Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **Each question carries 8 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I
Concepts of current and voltage sources, p-n junction, Biasing of diode, V-I characteristics, Rectification: half wave, full wave rectifiers and bridge rectifiers, Efficiency, Ripple factor, Qualitative ideas of filter circuits (Shunt capacitor, L section and π filters), Zener diode and voltage regulation, Introduction to Photonic devices (construction and working of solar cell, photo diode and LED). Basic concepts of Boolean algebra, AND, OR ,NOT and NAND gates using diodes.

UNIT–II
Junction transistor : Structure and working relation between different currents in transistors, Sign conventions, Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics, Structure and characteristics of JEFT, Transistor biasing and stabilization of operating point, Voltage divider biasing circuit.

UNIT–III
Working of CE amplifier, Amplifier analysis using h-parameters, Equivalent circuits, Determination of current gain, Power gain, Input impedance, FET amplifier and its voltage gain, Feed back in amplifiers, Different types, Voltage gain, Advantage of negative feed back, Emitter follower as negative feedback circuit.

UNIT–IV
Barkausen criterion of sustained oscillations, LC oscillator (tuned collector, tuned base Hartley),RC oscillators, Phase shift Oscillator and Wein bridge Oscillator

Books Suggested:
1. Basic Electronics and Linear Circuits by N.N. Bhargave, D.C. Kulshreshtha and S.C. Gupta.
2. Foundations of Electronics by D. Chatophadhyay, P.C. Rakshit, B. Saha and N.N. Purkit.
3. Basic Electronics by D.C. Tayal (Himalaya Pub.)

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V)
Session-2025-26
PHYSICS PRACTICAL
Course code: BSNM-5395(P) for Bachelor of Science (Non Medical)
BCSM-5395(P) for Bachelor of Science (Computer Science)

Course Outcomes

After completing this course a student will be able to

CO1: Analyze and characterize the electrical behavior of p-n junction and Zener diodes through their I-V characteristics. They will understand their operational principles of rectifier circuits (half-wave and full-wave), filter circuits for smoothing output, and clipping/clamping circuits for waveform shaping. Additionally, they will learn to determine the energy band gap of semiconductors by studying the temperature dependence of the reverse saturation current, which is a fundamental property of semiconductor materials.

CO2: Students will acquire hands-on experience in operating a Cathode Ray Oscilloscope (CRO), enabling them to measure AC voltage, frequency, and waveform characteristics such as amplitude, time period, and phase difference. They will also learn how to use a CRO to analyze signal distortions and verify the performance of electronic circuits, which is a critical skill in electronics troubleshooting and diagnostics.

CO3: Characterize Bipolar Junction Transistors (BJTs) in common base (CB) and common emitter (CE) configurations by plotting input and output characteristics. They will understand the working principles of transistors and their role in signal amplification, including determining current gain, input/output resistance, and voltage gain.

CO4: How semiconductor diodes can be configured to perform basic logic operations such as AND and OR using diode-resistor logic. They will construct and test these basic logic gates in the lab, forming a bridge between analog and digital electronics.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V)
Session-2025-26
PHYSICS (PRACTICAL)
Course code: BSNM-5395(P) for Bachelor of Science (Non Medical)
BCSM-5395(P) for Bachelor of Science (Computer Science)

Credits: 2-0-0 **Total Marks: 50 (ESE Marks: 40, CA: 10) Examination Time: 3 Hours** **Pass Mark: 14**

Instructions to Practical Examiner

Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination
I. The distribution of marks is as follows: **Marks: 40**
i) One experiment **20 Marks**
ii) Brief Theory **5 Marks**
iii) Viva–Voce **10 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one session of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS-
1. Measurement of reverse saturation current in p-n-junction diode at various temperatures and to find the approximate value of energy gap.
2. To draw forward and reverse bias characteristics of a p-n junction diode.
3. To study working of CRO and its use to find AC signal voltage and its frequency.
4. Study of a diode as a clipping element.
5. To measure the efficiency and ripple factors for (a) halfwave (b) full wave and (c) bridge rectifier circuits.
6. To draw the characteristics of a Zener diode.
7. To study characteristics of Common Base transistor. and to find input resistance, output resistance, voltage gain and current gain.
8. To study characteristics of Common Emitter transistor. and to find h-parameters.
9. To study the gain of an amplifier at different frequencies and to find Band width
10. To study the reduction in the ripple in the rectified output with RC, LC and л filters.
11. To study logic gates (OR, AND, NOT and NAND).

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26
PHYSICS (NUCLEAR PHYSICS)
Course code: BSNM-6395 (I) for Bachelor of Science (Non Medical)
BCSM-6395 (I) for Bachelor of Science (Computer Science)

COURSE OUTCOMES

CO1: After completing this course, students will be able to understand and explain the fundamental properties of atomic nuclei, including nuclear composition, size, spin, parity, magnetic and electric moments. They will also gain insights into the nature of nuclear forces and their role in nuclear stability, enabling them to interpret and analyze nuclear behavior in various physical and technological contexts.

CO2: Students will develop a thorough understanding of radioactive decay processes, including the theories of alpha, beta, and gamma decay, and the significance of the neutrino hypothesis and parity violation. This knowledge will enable them to evaluate applications such as radioactive dating, nuclear medicine, and radiation protection through a deep understanding of decay laws and mechanisms.

CO3: Students will be able to describe and analyze different nuclear reactions, understand the concept of reaction cross section, apply conservation laws and kinematics, and explain the formation and role of the compound nucleus. This outcome prepares them to understand and interpret experimental nuclear physics data, including applications in nuclear reactors, particle physics experiments, and energy production.

CO4: Students will gain the ability to apply and critically evaluate nuclear models, particularly the Liquid Drop Model and the Shell Model, understanding their assumptions, limitations, and successes. This will allow them to predict nuclear stability, magic numbers, and ground state properties, and understand their relevance in nuclear structure research, reactor design, and isotope production.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26
PHYSICS (NUCLEAR PHYSICS)

Course code: BSNM-6395 (I) for Bachelor of Science (Non Medical)
BCSM-6395 (I) for Bachelor of Science (Computer Science)

Credits: 3-0-0 **Total Marks: 75 (ESE Marks: 60, CA: 15)**
Examination Time: 3 Hours **Pass Mark: 21**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **Each question carries 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Nuclear Properties: Constituents of nucleus, non-existence of electrons in nucleus, Nuclear mass and binding energy, features of binding energy versus mass number curve, nucleus radius, angular momentum and parity, nuclear moments: magnetic dipole moment and electric quadruple moment, properties of nuclear forces, Yukawa theory.

UNIT–II

Radioactive Decays: Modes of decay of radioactive nuclides and decay Laws, radioactive series and displacement law, radioactive dating, Alpha decay: Gamow's theory of alpha decay, barrier penetration as applied to alpha decay, Geiger Nuttal law, Beta decays: β-, β+ and electron capture decays, Neutrino hypothesis and its detection, parity violation in β decay, Gamma transitions, internal conversion.

UNIT–III

Nuclear Reactions: Types of nuclear reactions, reactions cross section, conservation laws, Kinematics of nuclear reaction, examples of nuclear reactions: proton, deuteron, alpha particle, neutron and photon induced reactions. Q-value and its physical significance, Compound nucleus

UNIT–IV

Nuclear Models: Liquid drop model, semi-empirical mass formula, condition of stability, evidence for nuclear magic numbers, Shell Model, energy level scheme, angular momenta of nuclear ground states, parity and magnetic moment of nuclear ground states.

Reference Books:

1. Basic Ideas and Concepts in Nuclear Physics by K. Hyde
2. Introduction to Nuclear Physics by H.A. Enge
3. Nuclear Physics by I. Kaplan (Addison Wesley)
4. Nuclei and Particles by E. Segre

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26
PHYSICS (RADIATION AND PARTICLE PHYSICS)
Course code: BSNM-6395 (II) for Bachelor of Science (Non Medical)
BCSM-6395 (II) for Bachelor of Science (Computer Science)

COURSE OUTCOME:

After successfully completing this course a student will be able to:

CO1: Understand the mechanisms through which different types of nuclear radiation and charged particles interact with matter. This includes heavy charged particles (like alpha particles), light charged particles (like electrons and positrons), and neutral radiation (gamma rays). They will study fundamental processes such as ionization, excitation, Bremsstrahlung, and annihilation, and use theoretical frameworks such as the Bethe-Bloch formula to estimate energy loss. This knowledge is essential for applications in radiation shielding, dosimetry, and detector design.

CO2: Understanding of the working principles, construction, and characteristics of various nuclear radiation detectors, including gas-filled detectors (ionization chambers, proportional counters, and Geiger-Müller tubes), scintillation detectors, semiconductor detectors, solid-state nuclear track detectors, nuclear emulsions, and the Cherenkov detector. They will be able to compare these detectors based on sensitivity, energy resolution, and suitability for detecting alpha, beta, gamma particles, and neutrons, enabling them to select appropriate detection methods for experimental or industrial use.

CO3: Understand the principles and functioning of different particle accelerators, such as linear accelerators (linacs) and cyclic accelerators like the cyclotron, synchrocyclotron, betatron, electron/proton synchrotrons, and colliding beam machines including an introduction to the Large Hadron Collider (LHC). They will also grasp the concept of phase stability and resonance necessary for sustained acceleration.

CO4: Classify elementary particles into fermions and bosons, and understand the nature of particle-antiparticle pairs. They will explore the four fundamental interactions (gravitational, electromagnetic, weak, and strong), and apply quantum numbers such as charge, baryon number, lepton number, parity, isospin, and strangeness to analyze and predict outcomes of nuclear and particle reactions. The course will introduce them to the quark model, hadrons and leptons, and the terminology of high-energy physics, laying the groundwork for advanced studies or research in modern particle physics.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26

PHYSICS (RADIATION AND PARTICLE PHYSICS)

Course code: BSNM-6395 (II) for Bachelor of Science (Non Medical)
BCSM-6395 (II) for Bachelor of Science (Computer Science)

Credits: 2-0-0 **Total Marks: 50 (ESE Marks: 40, CA: 10)**
Examination Time: 3 Hours **Pass Mark: 14**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **Each question carries 8 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Interaction of Radiation and Charged Particles with Matter: Derivation of Bethe-Bloch formula, Stopping power and range of heavy charged particles, Energy loss of electrons and positrons, Positrons annihilation, interaction of gamma rays with matter.

UNIT–II

Nuclear Radiation Detection: Gas-filled detectors, Proportional and Geiger-Mueller counters, Scintillation detectors, Semiconductor detectors, Cherenkov effect, Solid state nuclear track detectors. Bubble chamber

UNIT–III

Accelerators: Linear accelerators, Cyclic accelerators: Cyclotron, Synchrocyclotron, Betatron, Electron and proton synchrotron, Colliding beam machines: introduction to Large Hadron Collider

UNIT–IV

Elementary Particles: Historical introduction, high energy physics units, fermions and bosons, particles and antiparticles, Classification of particles, types of interactions, electromagnetic, weak, strong interactions, gravitational interactions, Quantum numbers and conservation laws: Charge, Baryon number, lepton number, parity, isospin, charge conjugation, strangeness. Introduction to quarks and qualitative discussion of the quark model

Reference Books:

1. Basic Ideas and Concepts in Nuclear Physics by K. Hyde
2. Introduction to Nuclear Physics by H.A. Enge
3. Nuclear Physics by I. Kaplan (Addison Wesley)
4. Nuclei and Particles by E. Segre
5. Introduction to High Energy Physics by D.H. Perkins
6. Elementary Particles by I.S. Hughes

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26
PHYSICS PRACTICAL
Course code: BSNM-6395 (P) for Bachelor of Science (Non Medical)
BCSM-6395 (P) for Bachelor of Science (Computer Science)

Course Outcome

After successfully completing this course a student will be able to:

CO1: Understanding of magnetic parameters such as magnetic field strength (H), magnetic flux density (B), magnetic permeability, and susceptibility. They will learn about the phenomenon of magnetic hysteresis, its physical interpretation, and its significance in the design of magnetic materials.

CO2: Understand the operation and characteristics of Zener diodes, focusing on their ability to maintain a constant voltage across a load regardless of variations in input voltage or load current. They will explore the breakdown mechanism in Zener diodes and design and implement voltage regulator circuits for use in power supplies and electronic devices. This knowledge is fundamental in understanding regulated DC power sources, especially in consumer electronics and embedded systems.

CO3: Study and analyze the characteristics and functioning of Field Effect Transistors (FETs), including their operation in ohmic and saturation regions. They will also examine the behavior of Light Dependent Resistors (LDRs) and their use in light-sensing applications. Additionally, students will explore the transient and steady-state responses of RC circuits to different types of input voltages (step, sine), gaining insight into their role as filters, integrators, and differentiators in analog electronics.

CO4: Students will learn to operate and interpret results from a Geiger-Müller (GM) counter, a fundamental tool in nuclear radiation detection. They will understand the concept of dead time (the period after each detection event during which the counter is unresponsive), and its correction techniques. They will also calculate the linear absorption coefficient for various materials, which is essential for radiation shielding and material identification.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI)
Session-2025-26
PHYSICS (PRACTICAL)
Course code: BSNM-6395 (P) for Bachelor of Science (Non Medical)
BCSM-6395 (P) for Bachelor of Science (Computer Science)

Credits: 2-0-0 **Total Marks: 50 (ESE Marks: 40, CA: 10)**
Examination Time: 3 Hours **Pass Mark: 14**

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination
I. The distribution of marks is as follows: **Marks: 40**
i) One experiment **20 Marks**
ii) Brief Theory **5 Marks**
iii) Viva–Voce **10 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one session of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS-

1. To trace the B-H curves for different materials using CRO and find the magnetic parameters from these.
2. To study the stabilization of output voltage of a power supply with Zener diode.
3. To draw output and mutual characteristics of an FET (Experiments) and determine its parameters.
4. To set up an oscillator and to study its output on CRO for different C values.
5. To draw the plateau of a GM counter and find its dead time.
6. To study the absorption of beta particles in aluminium using GM counter and determine the absorption coefficient of beta particles from it.
7. To study the characteristics of a thermistor and find its parameters.
8. To the characteristics of a differentiating circuit (or differentiator) of RC circuit.
9. To the characteristics of a integrating circuit (or integrator) of RC circuit.
10. To study characteristics of LDR.
11. To study the statistical fluctuations using GM counter.