

Shivaji University, Kolhapur

June 2025/May 2026

B.Sc.-M.Sc. Nanoscience and Technology (5 Years Integrated)

Branch: -

 Programme Educational Objectives (PEO)

- 1 Interdisciplinary Scientific Expertise: To impart strong educational and scientific competencies in the interdisciplinary core science (physics, chemistry, biotechnology, mathematics, electronics, statistics, AI, ML, and environmental science) integrated with nanoscience and nanotechnology.
- 2. Practical Skills and Research Capacity Building: To equip with practical and technical competencies through skill-based laboratory courses and industrial/research internships. Impart research competency through exposure to research methodologies and advanced characterization techniques promoting creativity, critical thinking, and original contribution to the field.
- 3. Ethical, Environmental and Societal Responsibility: To educationally sensitize and create ethical leaders with the knowledge of environmental with societal responsibilities enabling to develop sustainable nanotechnological solutions and promoting green innovation.

 Programme Outcome (PO) & Programme Specific Outcome (PSO) :

- PO1** - Fundamental Understanding of Nanoscience & Nanotechnology: Apply the knowledge of basic Physics, Chemistry, Biotechnology, Mathematics, Statistics, Electronics & Environmental Science to the solution of complex Nanoscience & Nanotechnology problems.
- PO2** - Problem analysis: Identify, formulate and analyze Nanoscience & Nanotechnology problems to arrive at substantiated conclusions using principles of basic and applied sciences.
- PO3** - Research based learning: To use research-based training for designing scientific projects through experiments, analysis and interpretation of data and synthesis of the information to provide scientific conclusions.
- PO4** - Nanoscience for Society relevance: Application of the Nanoscience & Nanotechnology knowledge for the solutions of societal problems like environmental, industrial and health for sustainable development.
- PO5** - Research Ethics & Communication: Apply research ethical principles and commit to professional ethics, responsibilities and norms of the scientific communication practice.
- PSO1** - To provide trained professional human resources in Nanoscience & Nanotechnology for capacity building of the Nation.
- PSO2** - Capture and nurture rural students at early stage to develop ignited manpower.

 Subject: 88785 - Mechanics

 Course Outcome (CO):

- CO1** - Understand basic concepts of vectors, differential equations, laws of motion and how fictitious forces arise in a frame.
- CO2** - Recall and relate basic knowledge of mechanics behind momentum and energy. Understand the analogy between translational and rotational dynamics and application of both motions.
- CO3** - Apply Kepler’s law to describe the motion of planets and satellites through the law of gravitation. Explain the phenomena of simple harmonic motion and the concept of frequency of nanoscale matters.
- CO4** - Understand basic concepts of elasticity in nanoscale matters, surface tension, nanostructured surfaces, simple principles of fluid flow and fluid dynamics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	1	1	1
CO2	2	2	2	2	1	1	1
CO3	2	1	2	1	1	1	1
CO4	2	2	2	2	1	1	1
Average	2.00	1.75	1.75	1.50	1.00	1.00	1.00

 Subject: 88786 - Atomic Structure,Bonding,Gen.Organic Chem.& Aliphatic Hydrocarbons

 Course Outcome (CO):

- CO1** - Explain the atomic structure, Quantum mechanics and their important concepts.
- CO2** - Define the Chemical bonding and Molecular structure with some important theories.
- CO3** - Demonstrate the fundamentals of Organic Chemistry and Stereochemistry.
- CO4** - How Aliphatic Hydrocarbons are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	0	1	1	1
CO2	1	0	0	0	1	1	1
CO3	1	0	1	1	1	1	1
CO4	1	1	1	0	1	1	1
Average	1.00	0.25	0.50	0.25	1.00	1.00	1.00

 Subject: 88787 - Cell Biology

 Course Outcome (CO):

- CO1** - Understand basic architecture of cells, structures, functions and mechanisms involved in livingness of the cells.
- CO2** - Know the cellular assemblies present in micro and nanoscale structures.
- CO3** - Demonstrate the fundamentals of vascular systems of the cells as well as extracellular matrices with their regulations.
- CO4** - Understand the role of nanotechnology in the cancer, carcinogenesis and characteristics of cancer cells as well as the stem cells.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	2	2	2	3	2
CO3	3	3	3	2	2	3	2
CO4	3	2	3	3	3	3	2
Average	3.00	2.25	2.50	2.25	2.00	3.00	2.00

 Subject: 88788 - Differential Calculus

 Course Outcome (CO):

- CO4** - To be able to study the surfaces in the three dimensional space and study the extreme values of such surfaces.
- CO2** - To be able use the theory of complex numbers to find the roots of certain polynomials.
- CO1** - Learn some theoretical aspects of continuity and differentiability of the functions
- CO3** - To learn the numerical techniques to study the rate of change of the discrete functions that arise in the experimental set up.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	
	-
Average	-

 Subject: 88789 - Network Analysis and Analog Electronics

 Course Outcome (CO):

- CO1** - Understand the concepts of Voltage source, Current source, the network theorems and the two–port network parameters with an ability to analyze the electronic circuits using network theorems and find out/calculate two-port network parameters.
- CO2** - Describe the construction and working of different types of diodes, BJT, JFET & UJT. Also Comprehend the I-V characteristics of them.
- CO3** - Illustrate about rectifiers and transistor amplifiers & its biasing. Also calculate the parameter’s values and compare the performances of them.
- CO4** - Memorizes the concepts of feedback, working of BJT amplifiers and design the oscillators.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	0	0	1	1	1	1
CO2	1	0	0	1	1	1	2
CO3	1	1	1	1	0	1	2
CO4	2	1	1	1	1	1	2
Average	1.50	0.50	0.50	1.00	0.75	1.00	1.75

 Subject: 88790 - English

 Course Outcome (CO):

CO1 - Enhance narration skills. To know what is first person narration, second person narration and third person narration. Learn poetry.

CO2 - To learn descriptive functions of language. Learn how to describe image, object, things, instrument, place, birds, animals, habits, routine and description of a person,

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	0	1	1	0	2	2	0
CO2	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 88795 - Electricity And Magnetism

 Course Outcome (CO):

CO1 - Understand line, surface and volume integrals of vector fields, Gauss-divergence and Stoke's theorem.

CO2 - Learn basic laws and theorems of electrostatic at nanoscale.

CO3 - Verify various circuit laws, network theorems using simple electric circuits. Understand the basic concepts of memristor and spintronics.

CO4 - Classify the laws of electromagnetic induction. Acquire basic knowledge of electromagnetic waves. Understand the concept of nanoelectrodynamics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	1	1	1
CO2	3	2	1	2	1	1	1
CO3	2	1	2	2	1	1	1
CO4	2	1	2	2	1	1	1
Average	2.25	1.50	1.50	1.75	1.00	1.00	1.00

 Subject: 88796 - Chemical Energetics Equilibria & Functional Organic Chemistry

 Course Outcome (CO):

CO1 - Explain the concepts of Thermodynamics, Thermochemistry and Chemical Equilibrium.

CO2 - Define the Ionic Equilibria with some important concepts.

CO3 - How Aromatic Hydrocarbons, Alkyl and Aryl Halide are prepared and their reactions.

CO4 - How Alcohol, Phenol and Ether are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	1	0	0	1	1	0
CO2	1	1	0	1	1	0	0
CO3	1	0	1	0	1	0	0
CO4	1	0	1	0	1	0	1
Average	1.00	0.50	0.50	0.25	1.00	0.25	0.25

 Subject: 88797 - Mammalian Physiology

 Course Outcome (CO):

- CO1** - Understand basic concepts of digestion, exchange of gases, various fates of nanomaterials in body and mechanism of artificial respirocytes.
- CO2** - Understand the Circulation and composition of blood, hematopoiesis, coagulations as wll as the working of the heart and Nanoparticles: Blood Components Interactions.
- CO3** - Knowing Muscle physiology and osmoregulation and Role of nanotechnology in tissue engineering.
- CO4** - Study the Nervous and endocrine coordination as well as Nanotechnology in neuroscience.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	3	2	2	2	3	2
CO3	3	2	3	3	2	3	2
CO4	3	2	3	3	3	3	2
Average	3.00	2.25	2.50	2.50	2.00	3.00	2.00

 Subject: 88798 - Differential Equations

 Course Outcome (CO):

- CO1** - Solve the differential equations arising in the study of Physics and Chemistry.
- CO2** - Learn various applications of the differential equations naturally arising in the study of fundamental sciences.
- CO3** - Solve Higher ordered differential equations
- CO4** - Find the numerical solutions of the differential equations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 88799 - Linear And Digital Integrated Circuits

 Course Outcome (CO):

- CO1** - Recognize the DC and AC characteristics of operational amplifiers and design the linear and non linear applications oriented circuits using Op-Amp.
- CO2** - represent and convert the numbers in powers of base. Reduce/simplify Boolean expressions using the knowledge of basic logic gates, Boolean algebra & techniques.
- CO3** - Analyze and design the simple combinational and sequential logic circuits.
- CO4** - Understand the working and methods of D-A and A-D Conversion.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	1	0	0	1	0	1	2
C02	1	0	0	1	1	1	1
C03	1	1	1	1	1	2	2
C04	1	1	1	1	0	1	1
Average	1.00	0.50	0.50	1.00	0.50	1.25	1.50

 Subject: 88800 - English

 Course Outcome (CO):

- CO1** - To get acquainted with skills of telecommunications
- CO2** - To understand the importance of English for Special Purposes

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	0	1	1	0	2	2	0
C02	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 88801 - LAB-1

 Course Outcome (CO):

- CO1** - Understand basic kinematics and dynamics of linear and rotational motion. Extend the skills and practical use of different types of pendulum, micrometer screw gauge, vernier calliper and travelling microscope.
- CO2** - Learn the concepts related to elasticity of materials and viscosity of fluids.
- CO3** - Understand basic concepts of electricity and magnetism and their applications.
- CO4** - Learn the use of multimeters for measuring resistances, AC and DC Voltages and checking electrical fuses.
- CO5** - Equips the student with required prerequisites to understand electrodynamic phenomena.
- CO6** - Extend the skills and practical use of sonometer, ballistic galvanometer and different types of LCR circuits.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	3	1	1	2	1
C02	3	2	2	1	1	1	1
C03	2	1	2	1	1	1	1
C04	3	1	2	2	1	1	1
C05	2	1	1	1	1	1	1
C06	1	1	2	1	1	1	1
Average	2.33	1.33	2.00	1.17	1.00	1.17	1.00

 Subject: 88802 - LAB-2

 Course Outcome (CO):

- CO1** - Experiment with given inorganic samples to determine different characteristics such as Normality , Concentration, Strength. Experiments with Vinegar solution to determine the amount of acetic acid.
- CO2** - Identification of various cations from a given mixture by chromatography technique. Estimation of amount of Aspirin from Aspirin tablets. Identification of Organic compounds qualitatively.
- CO3** - Preparation of standard and required pH buffer solutions. Measurement of pH of different solutions like fruit juices, shampoos and soaps.
- CO4** - Determination of melting and boiling points of given samples. Preparation of organic compounds.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	1	0	0	0	1	0	0
C02	1	0	0	1	1	1	0
C03	1	0	1	0	1	0	0
C04	1	1	1	0	1	0	1
Average	1.00	0.25	0.50	0.25	1.00	0.25	0.25

 Subject: 88803 - LAB-3

 Course Outcome (CO):

- CO1** - Perform experiments to understand membrane properties including permeability, dialysis, plasmolysis, and de-plasmolysis in model systems.
- CO2** - Identify and differentiate prokaryotic and eukaryotic cells, perform subcellular fractionation, and analyze organelle-specific functions.
- CO3** - Demonstrate microtomy techniques and cell division studies using prepared animal and plant tissue samples.
- CO4** - Perform hematological tests such as blood grouping, RBC, WBC counts (TLC, DLC), hemoglobin estimation, and coagulation time measurement.
- CO5** - Conduct biochemical and enzymatic assays using blood samples to understand physiological functions and enzyme actions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	2	1	3	2
C02	3	3	2	2	2	3	2
C03	3	2	3	2	2	3	2
C04	3	3	2	2	2	3	2
C05	3	2	3	2	2	3	2
Average	3.00	2.40	2.40	2.00	1.80	3.00	2.00

 Subject: 88804 - LAB-4

 Course Outcome (CO):

- CO1** - To find the derivatives of the discrete functions by using various Numerical methods.
- CO2** - Interpret the solutions of the differential equations to get back some information of the original experiment.
- CO3** - Choose the appropriate equipment and measuring instruments to supply and measure electrical quantities. Verify the network theorems and operation of electronic circuits.
- CO4** - Design and test the different types of combinational and sequential logic circuits. Compose the application oriented digital circuits and test it.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	3	1	1	1	2	1
C02	3	3	1	1	1	2	1
C03	3	3	1	1	1	2	1
C04	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 89444 - Fundamental of Mathamatics Computing and Calculus I

 Course Outcome (CO):

- CO1 - To revise basic concepts in Mathematical computations
- CO2 - To understand important real valued Functions and their properties related to Derivatives

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 89445 - Fundamental Understanding of Life Science I

 Course Outcome (CO):

- CO1 - Explain the fundamental concepts and characteristics that define life and the origin theories related to it.
- CO2 - Classify living organisms based on cell structures and domain/kingdom-level taxonomies.
- CO3 - Describe the role and diversity of microbes and viruses in the biosphere.
- CO4 - Analyze the mechanisms of cell cycle, cell division, and reproductive processes in plants.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	2	2	1	3	2
CO3	2	3	2	2	1	3	2
CO4	3	3	2	2	2	3	2
Average	2.75	2.50	2.00	2.00	1.25	3.00	2.00

 Subject: 89446 - Fundamental of Mathamatics Computing and Calculus II

 Course Outcome (CO):

- CO1 - To be able to compute Integration of standard Real valued functions
- CO2 - To understand basics of Differential Equations and applications of integral towards solving the Differential Equations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 89447 - Fundamental Understanding of Life Science II

 Course Outcome (CO):

- CO1** - Describe the components and functions of the immune system and differentiate between innate and adaptive immunity.
- CO2** - Explain the role of antigens, antibodies, and immunogenicity in human health and disease.
- CO3** - Identify and classify the building blocks of life, including amino acids, proteins, carbohydrates, and lipids.
- CO4** - Interpret the structural organization and biological significance of proteins, carbohydrates, and lipids in living organisms.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	2	3	2	2	2	3	2
CO3	3	2	2	2	1	3	2
CO4	3	2	3	2	2	3	2
Average	2.75	2.25	2.25	2.00	1.50	3.00	2.00

 Subject: 91129 - Thermal Physics And Statistical Mechanics

 Course Outcome (CO):

- CO1** - Learn the basic concept of thermodynamics, the concept of entropy and the associated theorems.
- CO2** - Learn about Maxwell's thermodynamics relations
- CO3** - Learns the basic aspects of kinetic theory of gases, Maxwell's law of distribution, equation of energies.
- CO4** - Learn about basic concept of radiation
- CO5** - Learn about basic concept of Statistical Mechanics

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	1	1	1	1
CO2	2	2	2	1	1	1	1
CO3	2	2	1	1	1	1	1
CO4	2	2	2	1	1	1	1
CO5	2	2	2	1	1	1	1
Average	2.20	2.00	1.80	1.00	1.00	1.00	1.00

 Subject: 91130 - Conductane Corrosion, Electroplating, Electrochemistry, Thermodynamics ..

 Course Outcome (CO):

- CO1** - Systematic and coherent understanding of the fundamental concepts in Physical Chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry, and all other related allied chemistry subjects.
- CO2** - Measures and understands the conductivity, EMF, and pH of electrolytes and nanomaterials in the solution phase.
- CO3** - Learning and understanding of the theoretical basis of the adsorption phenomenon, the dynamic nature of the surface, and its applications. Learning and understanding of basic concepts in gravimetric analysis.
- CO4** - Learning and coherently understanding column and ion exchange chromatography. Learning about the working of petroleum industries, understanding biofuels, copyrights, and trademarks.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	2	1	1	1	1	1
C02	2	1	1	1	1	1	1
C03	2	1	1	1	1	1	1
C04	2	1	1	1	1	1	1
Average	2.00	1.25	1.00	1.00	1.00	1.00	1.00

 Subject: 91131 - Fundamentals of Microbiology and Biochemistry

 Course Outcome (CO):

- CO1** - Understand the fundamentals of General Microbiology- History and Microbial evolution, classification, Prokaryotic and Eukaryotic cells with examples
- CO2** - Learn the techniques of cultivation and maintenance of microorganisms, nutritional requirements, microbial growth and factors affecting to it, bacterial reproduction and control measures of microorganisms.
- CO3** - Study the biomolecules including structure, classification and significance of carbohydrates, lipids, proteins, enzymes, nucleic acids, vitamins and minerals, etc.
- CO4** - Understand the helpfulness and harmfulness of the microbes to the humans, also the antimicrobial abilities of nanomaterials will be addressed.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	2	1	3	2
C02	3	3	2	2	2	3	2
C03	3	2	2	2	1	3	2
C04	3	2	3	3	2	3	2
Average	3.00	2.25	2.25	2.25	1.50	3.00	2.00

 Subject: 91132 - Statistical Methods For Physical Sciences -I

 Course Outcome (CO):

CO1 - Represent and analyze data graphically using histograms, frequency curves, polygons, ogives, and boxplots for physical science applications

CO2 - Compute and interpret measures of central tendency (mean, median, mode, weighted & geometric means) for ungrouped & grouped data

CO3 - "Calculate and interpret measures of dispersion (range, mean deviation, variance, standard deviation, coefficient of variation) and moments for physical science data. Analyze skewness & kurtosis of a frequency distribution using moment-based and other coefficients, and interpret their physical significance "

CO4 - Compute and interpret correlation coefficients (Pearson & Spearman) and perform regression analysis (simple & multiple linear regression) for physical science data.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	1	2	1	0	0	0
C02	2	2	1	1	0	0	0
C03	2	2	1	1	0	0	0
C04	2	1	1	1	0	0	0
Average	2.00	1.50	1.25	1.00	0.00	0.00	0.00

 Subject: 91133 - Electronic Instrumentation

 Course Outcome (CO):

CO1 - Understanding physical and technical knowledge of sensors, actuators, and signal conditioning systems

CO2 - Describe basic laws and phenomena that define the behavior of sensors and actuators

CO3 - Apply knowledge about the working principles and architecture of a large number of sensors and their elements

CO4 - Analyze various approaches, procedures, and results related to sensors, actuators, and signal conditioning systems

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	1	2	2	2	3	3
C02	3	1	2	1	2	3	1
C03	2	3	1	3	2	3	2
C04	1	3	2	2	2	2	3
Average	2.25	2.00	1.75	2.00	2.00	2.75	2.25

 Subject: 91138 - Waves and Optics

 Course Outcome (CO):

- CO1** - Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.
- CO2** - Understand the principle of superposition of waves, so describe the formation of standing waves.
- CO3** - Understand the ultrasonic sound and applications of ultrasonic sound.
- CO4** - Understand and explain the working mechanisms of electroacoustic transducers such as microphones and loudspeakers.
- CO5** - Understand the basics of acoustics of hall.
- CO6** - Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.
- CO7** - The cardinal points help us define the image properties of an optical system

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	PO1	PO2	PO3	PO4	PO5	PS01	PS02
CO1	3	2	1	2	1	2	1
CO2	2	2	1	2	1	2	1
CO3	3	1	1	1	1	1	1
CO4	2	2	1	1	1	1	1
CO5	3	2	1	2	1	2	1
CO6	2	2	1	2	1	1	1
CO7	2	2	2	1	1	1	1
Average	2.43	1.86	1.14	1.57	1.00	1.43	1.00

 Subject: 91139 - Coordination Chemistry, Semi Micro Qualtitative Analysis, Carbohydrates, Stereochemistry

 Course Outcome (CO):

- CO1** - Understand the fundamentals of coordination chemistry, including the structure, bonding, and stability of coordination complexes, and evaluate the significance of chelates in analytical applications.
- CO2** - Demonstrate comprehensive knowledge of the periodic properties and behaviors of 3d and 4f series elements, including their magnetic, spectral, and chemical characteristics.
- CO3** - Apply theoretical and practical knowledge of organic chemistry to explain the synthesis, properties, and reactivity of carboxylic acids, amines, diazonium salts, aldehydes, ketones, and their role in qualitative analysis.
- CO4** - Analyze the stereochemical aspects and structural features of organic molecules, including the classification and conformational analysis of carbohydrates and selected organic compounds.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	PO1	PO2	PO3	PO4	PO5	PS01	PS02
CO1	2	1	2	2	1	2	1
CO2	2	1	1	1	1	1	1
CO3	2	1	1	1	1	1	1
CO4	2	1	1	1	1	1	1
Average	2.00	1.00	1.25	1.25	1.00	1.25	1.00

 Subject: 91140 - Fundamentals of Immunology And Nanodiagnostics

 Course Outcome (CO):

- CO1** - Understand basics of Immunology terms and concepts- Immunity, Immune system, cells and organs of the immune system, Antigen, Antibody, etc.
- CO2** - Can deal with T- lymphocytes and B-lymphocytes immune response, Antibody MHC complexes, Autoimmune & Immunodeficiency diseases, Vaccines, Vaccination, ELIZA, RIA, etc.
- CO3** - Can understand different techniques and applications of nanoparticles, nanochips, nanobiosensor, nanoprobes, etc in nanodiagnostics of different diseases.
- CO4** - Can understand applications of nanotechnology in immunology.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	2	1	3	2
C02	3	3	2	2	2	3	2
C03	3	2	3	3	2	3	2
C04	3	2	3	3	2	3	2
Average	3.00	2.25	2.50	2.50	1.75	3.00	2.00

 Subject: 91141 - Statistical Methods For Physical Sciences - II

 Course Outcome (CO):

- CO1** - Distinguish between random and non-random experiments and understand the concepts of sample space, events, and probability definitions (classical & axiomatic)
- CO2** - Apply discrete probability distributions (Uniform, Bernoulli, Binomial, Poisson) and continuous distributions (Exponential, Normal) to model nano-scale phenomena and compute expectations, mean, and variance.
- CO3** - Explain sampling theory, differentiate sampling methods (SRS, stratified, systematic, cluster), and understand sampling distributions and errors for experimental nano-science data.
- CO4** - Perform small-sample and large-sample hypothesis tests (using t, F, χ^2 distributions) to analyze and interpret nano-science experiments.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	2	1	1	0	0	0
C02	2	2	1	1	0	0	0
C03	2	2	1	1	0	0	0
C04	2	2	1	1	0	0	0
Average	2.00	2.00	1.00	1.00	0.00	0.00	0.00

 Subject: 91142 - Analytical instrumentation

 Course Outcome (CO):

- CO1** - Knowledge of operating principles and techniques of analytical instrumentation
- CO2** - Understanding how light interacts with matter and how it can be used for quantitative analysis
- CO3** - Apply problem-solving skills to various scientific domains
- CO4** - Analyze the basic components of spectroscopic instrumentation.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	3	2	3	3
CO2	3	2	1	2	1	2	1
CO3	2	3	3	2	3	3	3
CO4	2	3	2	1	2	1	2
Average	2.50	2.50	2.00	2.00	2.00	2.25	2.25

 Subject: 91143 - LAB - I

 Course Outcome (CO):

- CO1** - Extend the skills to perform experiments related to black body and thermal Physics, viz., determinations of Stefan’s constant, coefficient of thermal conductivity, temperature coefficient of resistance.
- CO2** - Understand thermo-emf of a thermocouple.
- CO3** - Understand various optical phenomena, principles, working and applications of optical instruments.
- CO4** - Analyze wave motion and its properties.
- CO5** - Broaden the expertise to perform experiments related to diffraction, interference and radiation.
- CO6** - Hands-on experience of using various optical instruments.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	1	2	2	2	2	1
CO2	2	1	2	2	2	2	1
CO3	3	1	2	2	1	3	1
CO4	2	1	1	1	1	1	1
CO5	3	2	1	1	1	2	1
CO6	3	1	1	1	1	2	1
Average	2.50	1.17	1.50	1.50	1.33	2.00	1.00

 Subject: 91144 - LAB - II

 Course Outcome (CO):

- CO1** - Qualitative and Quantitative analysis of organic and inorganic compounds.
- CO2** - Prepare organic and inorganic compounds.
- CO3** - Measures and determines the concentrations of the solution using a Conductometer.
- CO4** - Solve and measure the order of reaction, rate constant, and energy of activation for the chemical reactions.
- CO5** - Understand the quantitative analysis of the inorganic compounds by gravimetric analysis.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	1	1	2	1
CO2	2	1	1	1	1	1	1
CO3	2	1	1	1	1	1	1
CO4	2	2	1	1	1	1	1
CO5	2	1	1	1	1	1	1
Average	2.00	1.40	1.20	1.00	1.00	1.20	1.00

 Subject: 91145 - LAB - III

 Course Outcome (CO):

- CO1** - Perform core microbiological techniques including isolation, cultivation, staining, enumeration, micrometry, and characterization of microorganisms, including studies on metal tolerance and antimicrobial nanomaterials.
- CO2** - Apply biochemical and analytical techniques such as buffer preparation, chromatography, qualitative and quantitative estimation of biomolecules, and colorimetric methods for biochemical analysis.
- CO3** - Demonstrate immunological laboratory techniques including hematological tests, antigen–antibody interaction assays, immunodiffusion methods, haemagglutination, immunofluorescence, and ELISA-based diagnostics.
- CO4** - Prepare and evaluate nanoformulations and understand the design principles and applications of nanodiagnostic devices in biomedical and clinical diagnostics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	2	2	2	3	2
CO2	3	2	3	2	2	3	2
CO3	3	3	3	2	2	3	2
CO4	3	2	3	3	2	3	2
Average	3.00	2.50	2.75	2.25	2.00	3.00	2.00

 Subject: 91146 - LAB - IV

 Course Outcome (CO):

- CO1** - Demonstrate knowledge of instrumentation principles, data acquisition, and data processing techniques
- CO2** - Apply practical skills in operating electronic instruments and material characterization tools such as UV-Vis, IR, Raman, XRD, SEM, FESEM, and AFM
- CO3** - Design and conduct experiments involving sensors, actuators, and signal conditioning systems for data collection
- CO4** - Analyze and interpret experimental data to draw meaningful conclusions and evaluate system performance

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	1	1	3	2
CO2	3	2	3	2	2	3	3
CO3	2	2	3	2	3	2	1
CO4	3	2	3	2	3	3	2
Average	2.75	2.00	2.75	1.75	2.25	2.75	2.00

 Subject: 91147 - Enviroment Studies

 Course Outcome (CO):

- CO1** - Rendering about the environment's importance & our role for conservation and understanding the background of concept, structure and function of ecosystem
- CO2** - Learning pollution problems its sources and impacts and traditional mitigation techniques in air, water and soil pollution
- CO3** - Understanding Natural Resources and Associated Problems for water, forest, food and mineral resources, also gain knowledge about non-renewable resources and their benefits
- CO4** - learning about global and local Biodiversity, its importance, and ways of conservation, and understanding about Social Issues related to the environment, with legal aspects to it
- CO5** - learning about Social Issues and the Environment connection and its mitigation. Knowledge of sustainable techniques and eco-friendly solutions for environmental problems.
- CO6** - Understanding global Environmental issues, their impact, and possible solutions. Provide practical and field experience in Water, Air and Soil Quality monitoring, social and flora fauna survey and possible solutions through the Project.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	3	2	2	2
CO2	2	2	2	3	2	2	1
CO3	2	2	2	3	2	2	2
CO4	2	2	2	3	2	2	2
CO5	2	2	2	3	3	2	1
CO6	2	2	2	3	2	2	1
Average	2.00	2.00	2.00	3.00	2.17	2.00	1.50

 Subject: 93682 - Mechanics

 Course Outcome (CO):

- CO1** - Understand basic concepts of vectors, laws of motion and how fictitious forces arise in a frame.
- CO2** - Recall and relate basic knowledge of mechanics behind momentum and energy. Understand the analogy between translational and rotational dynamics and application of both motions.
- CO3** - Apply Kepler’s law to describe the motion of planets and satellites through the law of gravitation. Explain the phenomena of simple harmonic motion and the concept of frequency of nanoscale matters.
- CO4** - Understand basic concepts of elasticity in nanoscale matters, surface tension, nanostructured surfaces, simple principles of fluid flow and fluid dynamics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	1	1	1
CO2	2	2	2	2	1	1	1
CO3	2	1	2	1	1	1	1
CO4	2	2	2	2	1	1	1
Average	2.00	1.75	1.75	1.50	1.00	1.00	1.00

 Subject: 93683 - Atomic Structure,Bonding,Gen.Organic Chem.& Aliphatic Hydrocarbons

 Course Outcome (CO):

- CO1** - Explain the atomic structure, Quantum mechanics and their important concepts.
- CO2** - Define the Chemical bonding and Molecular structure with some important theories.
- CO3** - Demonstrate the fundamentals of Organic Chemistry and Stereochemistry.
- CO4** - How Aliphatic Hydrocarbons are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	0	1	1	1
CO2	1	0	0	0	1	1	1
CO3	1	0	1	1	1	1	1
CO4	1	1	1	0	1	1	1
Average	1.00	0.25	0.50	0.25	1.00	1.00	1.00

 Subject: 93684 - Cellular Foundation of Life

 Course Outcome (CO):

- CO1** - Understand basic architecture of cells, structures, functions and mechanisms involved in livingness of the cells.
- CO2** - Know the cellular assemblies present in micro and nanoscale structures.
- CO3** - Demonstrate the fundamentals of vascular systems of the cells as well as extracellular matrices with their regulations.
- CO4** - Understand the role of nanotechnology in the cancer, carcinogenesis and characteristics of cancer cells as well as the stem cells.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	1	1	1	1	2	3
CO2	2	1	1	1	1	2	3
CO3	1	1	1	1	1	1	3
CO4	1	1	1	2	2	2	3
Average	1.50	1.00	1.00	1.25	1.25	1.75	3.00

 Subject: 93685 - Differential Calculus

 Course Outcome (CO):

- CO1** - Learn some theoretical aspects of continuity and differentiability of the functions.
- CO2** - To be able use the theory of complex numbers to find the roots of certain polynomials.
- CO3** - To learn the numerical techniques to study the rate of change of the discrete functions that arise in the experimental set up.
- CO4** - To be able to study the surfaces in the three dimensional space and study the extreme values of such surfaces.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 93686 - Analog Electronics

 Course Outcome (CO):

- CO1** - Understand the concepts of Voltage source, Current source, the network theorems and the two–port network parameters with an ability to analyze the electronic circuits using network theorems and find out/calculate two-port network parameters.
- CO2** - Describe the construction and working of different types of diodes, BJT, JFET & UJT. Also Comprehend the I-V characteristics of them.
- CO3** - Illustrate about rectifiers and transistor amplifiers & its biasing. Also calculate the parameter’s values and compare the performances of them.
- CO4** - Memorizes the concepts of feedback, working of BJT amplifiers and design the oscillators.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	0	0	1	1	1	1
CO2	1	0	0	1	1	1	2
CO3	1	1	1	1	1	0	2
CO4	2	1	1	1	1	1	2
Average	1.50	0.50	0.50	1.00	1.00	0.75	1.75

 Subject: 93687 - English

 Course Outcome (CO):

- CO1** - Enhance narration skills. To know what is first person narration, second person narration and third person narration. Learn poetry.
- CO2** - To learn descriptive functions of language. Learn how to describe image, object, things, instrument, place, birds, animals, habits, routine and description of a person,

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	0	1	1	0	2	2	0
CO2	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 93688 - Fundamental of Mathamatics Computing and Calculus I

 Course Outcome (CO):

- CO1** - To revise basic concepts in Mathematical computations
- CO2** - To understand important real valued Functions and their properties related to Derivatives

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 93689 - Fundamental Understanding of Life Science I

 Course Outcome (CO):

- CO1** - Explain the fundamental concepts and characteristics that define life and the origin theories related to it.
- CO2** - Classify living organisms based on cell structures and domain/kingdom-level taxonomies.
- CO3** - Describe the role and diversity of microbes and viruses in the biosphere.
- CO4** - Analyze the mechanisms of cell cycle, cell division, and reproductive processes in plants.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	2	2	1	3	2
CO3	2	3	2	2	1	3	2
CO4	3	3	2	2	2	3	2
Average	2.75	2.50	2.00	2.00	1.25	3.00	2.00

 Subject: 94954 - Electricity And Magnetism

 Course Outcome (CO):

- CO1** - Understand line, surface and volume integrals of vector fields, Gauss-divergence and Stoke's theorem.
- CO2** - Learn basic laws and theorems of electrostatic at nanoscale.
- CO3** - Verify various concepts related to A. C. LCR series and parallel circuits. Understand the basic concept of memristor. Classify the laws of electromagnetic induction. Learn various concepts related to ballistic galvanometer.
- CO4** - Learn different types of magnetic materials alongwith their properties. Understand the basic concepts of spintronics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	1	1	1
CO2	3	2	1	2	1	1	1
CO3	2	1	2	2	1	1	1
CO4	2	1	2	2	1	1	1
Average	2.25	1.50	1.50	1.75	1.00	1.00	1.00

 Subject: 94955 - Chemical Energetics Equilibria & Functional Organic Chemistry

 Course Outcome (CO):

- CO1** - Explain the concepts of Thermodynamics, Thermochemistry and Chemical Equilibrium.
- CO2** - Define the Ionic Equilibria with some important concepts.
- CO3** - How Aromatic Hydrocarbons, Alkyl and Aryl Halide are prepared and their reactions.
- CO4** - How Alcohol, Phenol and Ether are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	1	0	0	1	1	0
CO2	1	1	0	1	1	0	0
CO3	1	0	1	0	1	0	0
CO4	1	0	1	0	1	0	1
Average	1.00	0.50	0.50	0.25	1.00	0.25	0.25

 Subject: 94956 - Chemical Foundation of Life Sciences

 Course Outcome (CO):

- CO1** - Explain the chemical basis of life by understanding atoms, molecules, water, biomolecules, and the transformation of energy and matter in living systems.
- CO2** - Describe the structure, classification, and biological significance of major biomolecules such as carbohydrates and proteins, including their structural organization and functional roles.
- CO3** - Understand the classification, structure, and functions of lipids, nucleic acids, vitamins, and minerals, and analyze their roles in cellular organization and nanotechnological applications.
- CO4** - Explain enzyme structure, catalytic mechanisms, and classification, and understand the properties and applications of biopolymers and bioplastics in biological and sustainable systems.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	2	2	1	3	2
CO3	3	2	3	2	2	3	2
CO4	3	3	2	3	2	3	2
Average	3.00	2.25	2.25	2.25	1.50	3.00	2.00

 Subject: 94957 - Differential Equations

 Course Outcome (CO):

- CO1** - Solve the differential equations arising in the study of Physics and Chemistry.
- CO2** - Learn various applications of the differential equations naturally arising in the study of fundamental sciences.
- CO3** - Solve Higher ordered differential equations
- CO4** - Find the numerical solutions of the differential equations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 94958 - Linear And Digital Integrated Circuits

 Course Outcome (CO):

- CO1** - Recognize the DC and AC characteristics of operational amplifiers and design the linear and non linear applications oriented circuits using Op-Amp.
- CO2** - Represent and convert the numbers in powers of base. Reduce/simplify Boolean expressions using the knowledge of basic logic gates, Boolean algebra & techniques.
- CO3** - Analyze and design the simple combinational and sequential logic circuits.
- CO4** - Understand the specifications and working of different logic families.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	1	0	1	2
CO2	1	0	0	1	1	1	1
CO3	1	1	1	1	1	2	2
CO4	2	1	2	1	1	1	2
Average	1.25	0.50	0.75	1.00	0.75	1.25	1.75

 Subject: 94959 - English

 Course Outcome (CO):

- CO1** - To learn what is advertising, different media for advertisement, structure of the advertisement and its techniques
- CO2** - To understand the importance of English for Special Purposes

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	0	1	1	0	2	2	0
CO2	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 94960 - Fundamental of Mathamatics Computing and Calculus II

 Course Outcome (CO):

- CO1** - To be able to compute Integration of standard Real valued functions
- CO2** - To understand basics of Differential Equations and applications of integral towards solving the Differential Equations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 94961 - Fundamental Understanding of Life Science II

 Course Outcome (CO):

- CO1** - Describe the components and functions of the immune system and differentiate between innate and adaptive immunity.
- CO2** - Explain the role of antigens, antibodies, and immunogenicity in human health and disease.
- CO3** - Identify and classify the building blocks of life, including amino acids, proteins, carbohydrates, and lipids.
- CO4** - Interpret the structural organization and biological significance of proteins, carbohydrates, and lipids in living organisms.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	2	3	2	2	2	3	2
CO3	3	2	2	2	1	3	2
CO4	3	2	3	2	2	3	2
Average	2.75	2.25	2.25	2.00	1.50	3.00	2.00

 Subject: 94962 - Laboratory Course - I

 Course Outcome (CO):

- CO1** - Understand basic kinematics and dynamics of linear and rotational motion. Extend the skills and practical use of different types of pendulum, micrometer screw gauge, vernier calliper and travelling microscope.
- CO2** - Learn the concepts related to elasticity of materials and viscosity of fluids.
- CO3** - Understand basic concepts of electricity and magnetism and their applications.
- CO4** - Learn the use of multimeters for measuring resistances, AC and DC Voltages and checking electrical fuses.
- CO5** - Equip the student with the required prerequisites to understand electromagnetic phenomena.
- CO6** - Extend the skills and practical use of sonometer, ballistic galvanometer and different types of LCR circuits.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	3	1	1	2	1
C02	3	2	2	1	1	1	1
C03	2	1	2	1	1	1	1
C04	3	1	2	2	1	1	1
C05	2	1	1	1	1	1	1
C06	1	2	2	2	1	1	1
Average	2.33	1.50	2.00	1.33	1.00	1.17	1.00

 Subject: 94963 - Laboratory Course - II

 Course Outcome (CO):

- CO1** - Experiment with given inorganic samples to determine different characteristics such as Normality , Concentration, Strength. Identification of various cations from a given mixture by chromatography technique.
- CO2** - Estimation of amount of Aspirin from Aspirin tablets. Identification of Organic compounds qualitatively.
- CO3** - Preparation of standard and required pH buffer solutions. Measurement of pH of different solutions like fruit juices, shampoos and soaps.
- CO4** - Determination of melting and boiling points of given samples. Preparation of organic compounds.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	1	0	0	0	1	0	0
C02	1	0	0	1	1	1	0
C03	1	0	1	0	1	0	0
C04	1	1	1	0	1	0	1
Average	1.00	0.25	0.50	0.25	1.00	0.25	0.25

 Subject: 94964 - Laboratory Course - III

 Course Outcome (CO):

- CO1** - Prepare and use laboratory buffers and apply basic laboratory techniques for handling and analysis of biochemical samples.
- CO2** - Separate and qualitatively analyze biomolecules such as amino acids, carbohydrates, lipids, and proteins using chromatographic and chemical test methods.
- CO3** - Apply principles of colorimetry and spectrophotometry, including verification of Beer–Lambert’s law, for quantitative estimation of biomolecules.
- CO4** - Perform quantitative biochemical assays for estimation of amino acids, proteins, and sugars using standard biochemical methods and interpret the experimental results.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	2	1	3	2
C02	3	2	3	2	2	3	2
C03	3	3	3	2	2	3	2
C04	3	2	3	2	2	3	2
Average	3.00	2.25	2.75	2.00	1.75	3.00	2.00

 Subject: 94965 - Laboratory Course - IV

 Course Outcome (CO):

- CO1** - To formulate the differential equations associated with certain experiments.
- CO2** - Interpret the solutions of the differential equations to get back some information of the original experiment.
- CO3** - Design and construct the circuits using Op-Amp for basic linear and non-linear applications.
- CO4** - Design and test the different types of combinational and sequential logic circuits. Compose the application oriented digital circuits and test it.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	3	1	1	1	2	1
C02	3	3	1	1	1	2	1
C03	3	3	1	1	1	2	1
C04	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 96134 - Thermal Physics and Statistical Mechanics

 Course Outcome (CO):

- CO1** - Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.
- CO2** - Learn about Maxwell's thermodynamic relations.
- CO3** - Learn mean free path of molecular collisions, viscosity, thermal conductivity, diffusion
- CO4** - Learn about the black body radiations, Stefan- Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significance.
- CO5** - Understand the concepts of microstate, macrostate, ensemble, phase space, thermodynamic probability and partition function.
- CO6** - Learn the quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi- Dirac statistics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	1	1	1	1
C02	2	2	2	1	1	1	1
C03	2	2	1	1	1	1	1
C04	2	2	2	1	1	1	1
C05	2	2	2	1	1	1	1
C06	2	2	2	1	1	1	1
Average	2.17	2.00	1.83	1.00	1.00	1.00	1.00

 Subject: 96135 - Solutions,Phase Equilibrium,Conductance,Electrochemistry & Functional Group Organic Chemistry-II

 Course Outcome (CO):

- CO1** - Systematic and coherent understanding of the fundamental concepts in Physical Chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry, and all other related allied chemistry subjects.
- CO2** - Measures and understands the conductivity, EMF, and pH of electrolytes and nanomaterials in the solution phase.
- CO3** - Learning and understanding of the theoretical basis of the adsorption phenomenon, the dynamic nature of the surface, and its applications. Learning and understanding of basic concepts in gravimetric analysis.
- CO4** - Learning and coherently understanding column and ion exchange chromatography. Learning about the working of petroleum industries, understanding biofuels, copyrights, and trademarks.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	2	1	1	1	1	1
C02	2	1	1	1	1	1	1
C03	2	1	1	1	1	1	1
C04	2	1	1	1	1	1	1
Average	2.00	1.25	1.00	1.00	1.00	1.00	1.00

 Subject: 96136 - Fundamentals of Microbiology and Biochemistry

 Course Outcome (CO):

- CO1** - Understand the fundamentals of General Microbiology- History and Microbial evolution, classification, Prokaryotic and Eukaryotic cells with examples
- CO2** - Learn the techniques of cultivation and maintenance of microorganisms, nutritional requirements, microbial growth and factors affecting to it, Bacterial reproduction and control measures of microorganisms.
- CO3** - Study the biomolecules including structure, classification and significance of carbohydrates, lipids, proteins, enzymes, nucleic acids, vitamins and minerals, etc.
- CO4** - Understand the helpfulness and harmfulness of the microbes to the humans, also the antimicrobial abilities of nanomaterials will be addressed.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	3	2	2	2	3	2
CO3	3	2	2	2	1	3	2
CO4	3	2	3	3	2	3	2
Average	3.00	2.25	2.25	2.25	1.50	3.00	2.00

 Subject: 96137 - Statistical Techniques for Nanotechnology

 Course Outcome (CO):

- CO1** - Represent and analyze data graphically using histograms, frequency curves, polygons, ogives, and boxplots for physical science applications
- CO2** - Compute and interpret measures of central tendency (mean, median, mode, weighted & geometric means) for ungrouped & grouped data
- CO3** - "Calculate and interpret measures of dispersion (range, mean deviation, variance, standard deviation, coefficient of variation) and moments for physical science data. Analyze skewness & kurtosis of a frequency distribution using moment-based and other coefficients, and interpret their physical significance
- CO4** - Compute and interpret correlation coefficients (Pearson & Spearman) and perform regression analysis (simple & multiple linear regression) for physical science data.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	2	0	0	0
CO2	2	2	1	1	0	0	0
CO3	2	1	1	1	0	0	0
CO4	2	1	1	1	0	0	0
Average	2.00	1.50	1.00	1.25	0.00	0.00	0.00

 Subject: 96138 - Electronic Instrumentation

 Course Outcome (CO):

- CO1 - Understand basic principles of electronic instrumentation
- CO2 - Understand the basic principles of measurement and error, SI units, and the standard of measurement
- CO3 - Apply problem-solving skills to various instrumentation domains
- CO4 - Understand the physical and technical knowledge of sensors, actuators, and signals conditioning systems

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	1	2	2	2	3	3
CO2	3	1	2	1	2	3	1
CO3	2	3	1	3	2	3	2
CO4	1	3	2	2	2	2	3
Average	2.25	2.00	1.75	2.00	2.00	2.75	2.25

 Subject: 96140 - Indian Knowledge System-IKS in Nanoscience

 Course Outcome (CO):

- CO1 - Importance of Ancient knowledge and unique aspects of IKS and its relevance in modern day’s studies, research, and Sustainability.
- CO2 - Basic framework for good health and disease management as spelt out in Ayurveda.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	2	2	1	2	2
CO2	1	1	1	2	2	2	2
Average	1.00	1.50	1.50	2.00	1.50	2.00	2.00

 Subject: 96141 - Waves and Optics

 Course Outcome (CO):

- CO1** - Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.
- CO2** - Understand the principle of superposition of waves, so describe the formation of standing waves.
- CO3** - Understand the ultrasonic sound and applications of ultrasonic sound.
- CO4** - Understand and explain the working mechanisms of electroacoustic transducers such as microphones and loudspeakers.
- CO5** - Understand the basics of acoustics of hall.
- CO6** - Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.
- CO7** - The cardinal points help us define the image properties of an optical system

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	1	2	1	2	1
C02	2	2	1	2	1	2	1
C03	3	1	1	1	1	1	1
C04	2	2	1	1	1	1	1
C05	2	2	1	1	1	1	1
C06	2	2	2	1	1	1	1
C07	2	2	1	1	1	1	1
Average	2.29	1.86	1.14	1.29	1.00	1.29	1.00

 Subject: 96142 - Coordination Chemistry,Semi-Micro Qualtitative Analysis,Transition Elements,Chelation,Carboxylic acids,Carbonyl Compounds,Amines,Diazonium Salts,Carbohydrates,Stereochemistry

 Course Outcome (CO):

- CO1** - Understand the fundamentals of coordination chemistry, including the structure, bonding, and stability of coordination complexes, and evaluate the significance of chelates in analytical applications.
- CO2** - Demonstrate comprehensive knowledge of the periodic properties and behaviors of 3d and 4f series elements, including their magnetic, spectral, and chemical characteristics.
- CO3** - Apply theoretical and practical knowledge of organic chemistry to explain the synthesis, properties, and reactivity of carboxylic acids, amines, diazonium salts, aldehydes, ketones, and their role in qualitative analysis.
- CO4** - Analyze the stereochemical aspects and structural features of organic molecules, including the classification and conformational analysis of carbohydrates and selected organic compounds.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	1	2	2	1	2	1
C02	2	1	1	1	1	1	1
C03	2	1	1	1	1	1	1
C04	2	1	1	1	1	1	1
Average	2.00	1.00	1.25	1.25	1.00	1.25	1.00

 Subject: 96143 - Fundamentals of Immunology and Nanodiagnostics

 Course Outcome (CO):

- CO1** - Understand basics of Immunology terms and concepts- Immunity, Immune system, cells and organs of the immune system, Antigen, Antibody, etc.
- CO2** - Can deal with T- lymphocytes and B-lymphocytes immune response, Antibody MHC complexes, Autoimmune & Immunodeficiency diseases, Vaccines, Vaccination, ELIZA, RIA, etc.
- CO3** - Can understand different techniques and applications of nanoparticles, nanochips, nanobiosensor, nanoprobes, etc in nanodiagnostics of different diseases.
- CO4** - Can understand applications of nanotechnology in immunology.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	3	2	2	2	3	2
CO3	3	2	3	3	2	3	2
CO4	3	2	3	3	2	3	2
Average	3.00	2.25	2.50	2.50	1.75	3.00	2.00

 Subject: 96144 - Introduction to Data Science,AI and ML

 Course Outcome (CO):

- CO1** - Explain the concepts of data science, Big Data, and its key components (statistics, programming, domain knowledge).Define and apply classical & axiomatic probability, conditional probability, and Bayes’ theorem.
- CO2** - Identify and analyze random variables & probability distributions (Bernoulli, Binomial, Exponential, Weibull, Normal) including their properties and applications.
- CO3** - Describe sampling methods (SRS, stratified, cluster) and perform Exploratory Data Analysis (EDA) with variable treatment and outlier handling. Differentiate Artificial Intelligence (AI) from Machine Learning (ML), and understand supervised & unsupervised learning techniques.
- CO4** - Evaluate machine-learning models and apply algorithms such as Decision Trees, CART, ANN, and SVM for classification & regression.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	0	0	0
CO2	2	2	1	0	0	0	0
CO3	2	1	1	0	1	0	0
CO4	2	1	1	0	1	0	0
Average	2.00	1.50	1.00	0.25	0.50	0.00	0.00

 Subject: 96145 - Analytical Instrumentation

 Course Outcome (CO):

- CO1** - Understand the operating principles and techniques of analytical instrumentation
- CO2** - Understand how light interacts with matter and how it can be used for quantitative analysis
- CO3** - Apply problem-solving skills to various scientific domains
- CO4** - Apply a working knowledge of UV-Vis spectroscopy, Fluorescence Spectroscopy, Phosphorescence Spectroscopy, IR spectroscopy, RAMAN spectroscopy, XRD, AAS, AES, SEM, AFM, etc

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	3	2	3	3
CO2	3	2	1	2	1	2	1
CO3	2	3	3	2	3	3	3
CO4	2	3	2	1	2	1	2
Average	2.50	2.50	2.00	2.00	2.00	2.25	2.25

 Subject: 96146 - Environmental Studies

 Course Outcome (CO):

- CO1** - Rendering about the environment's importance & our role for conservation and understanding the background of concept, structure and function of ecosystem
- CO2** - Learning pollution problems its sources and impacts and traditional mitigation techniques in air, water and soil pollution
- CO3** - Understanding Natural Resources and Associated Problems for water , forest , food and mineral resources , also gain knowledge about non-renewable resources and their benefits
- CO4** - learning about global and local Biodiversity its importance and way of conservation and understanding about Social Issues related to the environment with legal aspects to it.
- CO5** - learning about Social Issues and the Environment connection and its mitigation with Knowledge of sustainable techniques and eco-friendly solutions for environmental problems.
- CO6** - Understanding global Environmental issues, their impact and possible solutions, also providing practical and field experience in Water, Air and Soil Quality monitoring, social and flora fauna survey and possible solutions through Project.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	3	2	2	2
CO2	2	2	2	3	2	2	1
CO3	2	2	2	3	2	2	2
CO4	2	2	2	3	2	2	2
CO5	2	2	2	3	3	2	1
CO6	2	2	2	3	2	2	1
Average	2.00	2.00	2.00	3.00	2.17	2.00	1.50

 Subject: 96877 - Classical Mechanics, Classical Electrodynamics and Quantum Mechanics

 Course Outcome (CO):

- CO1** - Understand fundamental laws and principles of classical mechanics and their applications in appropriate physical problems.
- CO2** - Apply basic techniques of calculus of variations and Charged Particles Dynamics.
- CO3** - Understand the basics of matter waves and Schrodinger’s wave equation with the help of different concepts and experiments.
- CO4** - Understand the definition of different operators and Schrodinger’s equation to solve problems of Quantum Mechanics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	1	1	0	2	1
CO2	3	3	2	2	1	3	1
CO3	3	2	1	1	1	3	1
CO4	3	2	1	1	1	2	1
Average	3.00	2.25	1.25	1.25	0.75	2.50	1.00

 Subject: 96878 - Inorganic and Organic Chemistry

 Course Outcome (CO):

- CO1** - Increased understanding about Acids, Bases and Non aqueous Solvents and Chemistry of f- Block Elements
- CO2** - Advanced knowledge about Metal Ligand bonding in Transition Metal Complexes and Co-ordination Chemistry
- CO3** - Conceptual knowledge about Reagents and Reactions in Organic Synthesis and Retrosynthesis
- CO4** - Concepts and increased knowledge about Electrophilic addition to >C=C< and -C=C- bonds and Natural products

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	1	1	2	1
CO2	2	3	1	1	1	1	1
CO3	2	2	2	1	1	1	1
CO4	1	3	1	1	1	2	1
Average	1.75	2.50	1.50	1.00	1.00	1.50	1.00

 Subject: 96879 - Fundamentals Of Enzymology and Nanonzymology

 Course Outcome (CO):

- CO1** - Understanding the fundamentals of enzymes as biocatalysts, their importance in living system, their industrial applications
- CO2** - Understanding the techniques of enzymes purification and characterization
- CO3** - Understanding the kinetics of enzymes catalyzed reaction and its application
- CO4** - Concept of nanoenzymes, understanding the activity of nanomaterials as enzymes and their applications

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	2	1	1
CO2	2	2	1	1	2	1	1
CO3	2	2	1	1	2	1	1
CO4	2	2	1	1	2	1	1
Average	2.00	2.00	1.00	1.00	2.00	1.00	1.00

 Subject: 96880 - Phys and Chem at Nanoscale

 Course Outcome (CO):

- CO1** - Introduction to the fundamental principles of nanotechnology, the history of nanoscience and technology followed by recent nanotechnology based products.
- CO2** - Comprehensive understanding of state-of-the-art nano-fabrication methods with Top down and Bottom up approach.
- CO3** - Detailed knowledge of nanoscience and nanotechnology, including natural and manmade nanomaterials.
- CO4** - In-depth understanding of virtualization techniques like STM, AFM etc.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	1	1	1	3	3	2
CO2	3	2	3	3	2	3	2
CO3	3	2	1	1	3	3	2
CO4	3	3	3	3	2	3	2
Average	3.00	2.00	2.00	2.00	2.50	3.00	2.00

 Subject: 96881 - Active Inorganic, Organic Compounds and Industries

 Course Outcome (CO):

- CO1** - Understanding the uses of natural products & synthetic pharmaceuticals
- CO2** - Knowledge about Iron and Steel industry and related advancements
- CO3** - Knowledge about Sugar industry and related useful byproducts
- CO4** - Understanding of significance of industries in production of useful chemicals

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	2	2	1	2	2
CO2	1	2	1	1	2	2	2
CO3	1	1	2	2	1	2	1
CO4	2	2	1	2	1	2	2
Average	1.25	1.75	1.50	1.75	1.25	2.00	1.75

 Subject: 96882 - Env. Nanotech Green Chemistry

 Course Outcome (CO):

- CO1** - Learn the environmental pollution problems and traditional mitigation techniques in water and soil pollution, as well as present and future nanotechnology techniques for solving these problems in a better way with legal aspects.
- CO2** - Understanding the background of traditional Methods of detecting, Environmental Contaminants in air, nanotoxicology and possible control measures by using sustainable nanotechnology.
- CO3** - Understanding the basic concepts of Chemical and Biological Sensors, Detector and energy and learning the Simple traditional Nanotechnology.
- CO4** - Knowledge of green and eco-friendly nanotechnology to solve environmental problems. Also implementing green chemistry principles.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	3	2	3	2
CO2	3	3	2	3	2	3	2
CO3	3	3	3	3	2	2	2
CO4	2	3	2	3	3	2	2
Average	2.75	2.75	2.25	3.00	2.25	2.50	2.00

 Subject: 96886 - Solid State Physics and Nuclear and Particle Physics

 Course Outcome (CO):

- CO1** - Understand the fundamentals of the crystal structure of the material with the help of X-ray diffraction.
- CO2** - Understand the magnetic properties of matter and superconductors.
- CO3** - Understand the concept of band theory of solids.
- CO4** - Understand the general properties of Nuclei and Nuclear model and explain the concept of particle accelerators

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	1	2	3	2
CO2	2	1	2	2	2	2	0
CO3	3	2	1	0	1	1	1
CO4	1	1	0	0	1	1	0
Average	2.25	1.50	1.25	0.75	1.50	1.75	0.75

 Subject: 96887 - Physical Chemistry

 Course Outcome (CO):

- CO1** - Understanding of elementary quantum mechanics, thermodynamics and chemical kinetics principles.
- CO2** - Knowledge about Solid State Chemistry, Solutions, Phase Equilibria and Distribution Law.
- CO3** - Increased Knowledge about Electrochemistry, Spectroscopy and Photochemistry.
- CO4** - Application of basic and applied physical chemistry principles to qualitative and quantitative analysis.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	2	2	2
CO2	2	1	1	1	2	2	2
CO3	2	1	2	1	1	2	2
CO4	2	2	1	1	1	2	2
Average	2.25	1.50	1.50	1.25	1.50	2.00	2.00

 Subject: 96888 - Molecular Bio. & Genetic Engg.

 Course Outcome (CO):

- CO1 - Understanding the fundamentals of central dogma of molecular biology and mechanisms
- CO2 - Understanding the mechanisms of DNA replication, transcription and translation
- CO3 - Understanding of Nucleic Acids and Allied Techniques
- CO4 - Understanding the possible application of nanomaterials for nucleic acid delivery

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	2	1	1
CO2	2	2	1	1	2	1	1
CO3	2	2	1	1	2	1	1
CO4	2	2	1	1	2	1	1
Average	2.00	2.00	1.00	1.00	2.00	1.00	1.00

 Subject: 96889 - Physical & Chemical Prop. of Nanomaterial

 Course Outcome (CO):

- CO1 - Explore the new phenomenon that originated at nanoscales like LSPR, Quantum tunnelling, superparamagnetic state of materials, Single electron field effect transistors, GMR effect etc.
- CO2 - Have a working knowledge of how the properties of materials change once entered into the nanoscale, including theory and experiment.
- CO3 - Evaluate and analyse the structural, morphological, optical and magnetic properties of bulk nanostructured materials and nanocomposites.
- CO4 - Apply in depth understanding of the Size and Shape dependent properties of nanomaterials for practical applications.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	3	1	1	3	3
CO2	3	3	3	2	1	3	3
CO3	3	3	3	1	2	3	3
CO4	3	2	3	2	2	3	3
Average	3.00	2.50	3.00	1.50	1.50	3.00	3.00

 Subject: 96891 - Nano Medicine

 Course Outcome (CO):

- CO3 - Study of Nanomedicine and applications
- CO1 - Study of biological self-assembly and biological nanoparticles
- CO2 - Study of characterization techniques and drug dosage administration

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	
	-
Average	-

 Subject: 96895 - LAB - I

 Course Outcome (CO):

- CO1** - Calculate the lattice constant using XRD pattern, band gap of the material, e/m of electron
- CO2** - Draw I-V characteristics and a polar graph using a solar cell.
- CO3** - 3. Understand the use of a ballistic galvanometer.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	1	0	1	1	1
CO2	2	2	1	1	2	2	1
CO3	1	2	1	0	1	1	0
Average	1.33	2.00	1.00	0.33	1.33	1.33	0.67

 Subject: 96896 - LAB - II

 Course Outcome (CO):

- CO1** - Increased understanding of qualitative analysis in chemistry
- CO2** - Increased understanding of quantitative analysis in chemistry
- CO3** - Knowledge about instrumental methods of titration such as potentionmetry and conductometry
- CO4** - Knowledge about instrumental methods of titration such as pH metery

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	2	2	1	3	3
CO2	2	2	2	1	1	3	2
CO3	2	2	2	1	1	3	2
CO4	2	2	2	1	1	2	2
Average	2.25	2.25	2.00	1.25	1.00	2.75	2.25

 Subject: 96897 - LAB - III

 Course Outcome (CO):

- CO1** - Demonstration and learning the techniques of nucleic acid purification, analysis and amplification
- CO2** - Demonstration and learning the techniques of protein purification and analysis
- CO3** - Learning the techniques of isolation of plamids and preparation of competent cells
- CO4** - Learning the protein separation of techniques by SDS and Native PAGE

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	3	1	2	2	1
CO2	1	2	3	1	2	2	1
CO3	1	2	3	1	2	2	1
CO4	1	2	3	1	2	2	1
Average	1.00	2.00	3.00	1.00	2.00	2.00	1.00

 Subject: 96898 - LAB - IV

 Course Outcome (CO):

- CO1** - Calculation of crystallite size and band gap of nanomaterials having difference size.
- CO2** - Calculation of Size dependent magnetic parameters using M-H hysteresis loops
- CO3** - Size and Shape dependent calculation of surface area to volume ratio using TEM images.
- CO4** - To learn synthesis of nanomaterials using colloidal and sol-gel methods.
- CO5** - To learn Synthesis of thin films using electrodeposition and hydrothermal technique.
- CO6** - To learn about synthesis method by co- precipitation method

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	1	3	2	2
C02	2	1	3	2	2	2	2
C03	2	2	2	3	2	2	2
C04	3	2	3	3	2	2	2
C05	3	3	3	3	2	2	2
C06	3	3	2	3	2	2	2
Average	2.67	2.17	2.50	2.50	2.17	2.00	2.00

 Subject: 111076 - LAB-I

 Course Outcome (CO):

- CO1** - Extend the skills to perform experiments related to black body and thermal Physics, viz., determinations of Stefan’s constant, coefficient of thermal conductivity, temperature coefficient of resistance.
- CO2** - Understand thermo-emf of a thermocouple.
- CO3** - Understand various optical phenomena, principles, working and applications of optical instruments.
- CO4** - Analyze wave motion and its properties.
- CO5** - Broaden the expertise to perform experiments related to diffraction, interference and radiation.
- CO6** - Hands-on experience of using various optical instruments.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	2	2	3	2	2	2
C02	2	2	2	3	2	2	1
C03	2	2	2	2	2	2	2
C04	3	2	1	2	1	2	1
C05	3	1	1	1	1	1	1
C06	2	2	1	1	1	1	1
Average	2.33	1.83	1.50	2.00	1.50	1.67	1.33

 Subject: 111077 - LAB-II

 Course Outcome (CO):

- CO1** - Qualitative and Quantitative analysis of organic and inorganic compounds.
- CO2** - Prepare organic and inorganic compounds.
- CO3** - Measures and determines the concentrations of the solution using a Conductometer.
- CO4** - Solve and measure the order of reaction, rate constant, and energy of activation for the chemical reactions.
- CO5** - Understand the quantitative analysis of the inorganic compounds by gravimetric analysis.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	1	1	2	1
CO2	2	1	1	1	1	1	1
CO3	2	1	1	1	1	1	1
CO4	2	2	1	1	1	1	1
CO5	2	1	1	1	1	1	1
Average	2.00	1.40	1.20	1.00	1.00	1.20	1.00

 Subject: 111078 - LAB-III

 Course Outcome (CO):

- CO1** - Perform core microbiological techniques including isolation, cultivation, staining, enumeration, micrometry, and characterization of microorganisms, including studies on metal tolerance and antimicrobial nanomaterials.
- CO2** - Apply biochemical and analytical techniques such as buffer preparation, chromatography, qualitative and quantitative estimation of biomolecules, and colorimetric methods for biochemical analysis.
- CO3** - Demonstrate immunological laboratory techniques including hematological tests, antigen–antibody interaction assays, immunodiffusion methods, haemagglutination, immunofluorescence, and ELISA-based diagnostics.
- CO4** - Prepare and evaluate nanoformulations and understand the design principles and applications of nanodiagnostic devices in biomedical and clinical diagnostics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	2	2	2	3	2
CO2	3	2	3	2	2	3	2
CO3	3	3	3	2	2	3	2
CO4	3	2	3	3	2	3	2
Average	3.00	2.50	2.75	2.25	2.00	3.00	2.00

 Subject: 111079 - LAB-IV

 Course Outcome (CO):

- C01 - Apply knowledge of electronic instrumentation
- C02 - Design experiments in the laboratory on real components
- C03 - Apply knowledge of analytical instrumentation
- C04 - Evaluate various spectroscopic and microscopic methods

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	1	1	3	2
C02	3	2	3	2	2	3	3
C03	2	2	3	2	3	2	1
C04	3	2	3	2	3	3	2
Average	2.75	2.00	2.75	1.75	2.25	2.75	2.00

 Subject: 112871 - Semiconductor Physics

 Course Outcome (CO):

- C01 - Identify and describe the fundamental properties of semiconductors materials and Physics behind them through solving problems.
- C02 - Apply the quantitative and qualitative understanding of semiconductors for designing the electronic devices under various fields.
- C03 - Apply in depth understanding of the basic physics behind the semiconducting P-N junctions and their applications
- C04 - Understand the basic physics behind implementation of various types of contacts and heterojunctions for designing and fabrication of electronic devices.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	0	0	1	0
C02	2	2	2	0	0	1	0
C03	2	2	2	0	0	1	0
C04	2	2	2	1	1	1	1
Average	2.25	2.00	2.00	0.25	0.25	1.00	0.25

 Subject: 112872 - Carbaneous Materials

 Course Outcome (CO):

- CO1 - Understand the basic structures and applications of carbonaceous materials mainly Graphene and Carbon nanotubes.
- CO2 - Apply the structure property relationship concept to understand the applications of Graphene and Carbon nanotubes.
- CO3 - In depth understanding of synthesis of Graphene and Carbon nanotubes
- CO4 - Understanding of applications of Graphene and Carbon nanotubes in important technological fields

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	2	2	3	3
CO2	2	1	2	1	1	3	3
CO3	2	1	2	1	1	3	3
CO4	1	2	2	2	2	3	3
Average	1.75	1.50	2.00	1.50	1.50	3.00	3.00

 Subject: 112875 - Fundamental of Nanobiotechnology

 Course Outcome (CO):

- CO1 - Study of Biological synthesis of nanomaterials and their Applications Introduction to biological nanoparticles and their applications
- CO2 - Study of Nanomaterial- Biomolecule interactions and Biosensors
- CO3 - Fundamentals of Animal tissue culture
- CO4 - Nanotechnology and its application in food industry and agriculture

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	1	1	1	1	1	1
CO2	1	2	2	2	1	1	1
CO3	3	1	2	2	1	1	1
CO4	3	2	1	1	1	1	1
Average	2.50	1.50	1.50	1.50	1.00	1.00	1.00

 Subject: 112877 - Laboratory Course - I

 Course Outcome (CO):

- CO1 - Identify and understand the concepts of Semiconductor materials.
- CO2 - Design, apply and analyse the physics of semiconducting materials with calculations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	1	1	0	1
CO2	2	2	2	1	1	1	1
Average	2.00	2.00	2.00	1.00	1.00	0.50	1.00

 Subject: 112878 - Laboratory Course - II

 Course Outcome (CO):

- CO1** - Demonstrate hands-on skills in the synthesis and processing of advanced carbon nanomaterials such as graphene oxide, reduced graphene oxide, carbon nanotubes, and carbonaceous materials derived from organic waste.
- CO2** - Apply spectroscopic characterization techniques (Raman and IR spectroscopy) to analyze the structural, vibrational, and functional properties of graphene and carbon nanotubes.
- CO3** - Perform computational simulations to study the structure, properties, and behavior of graphene, carbon nanotubes, and other carbonaceous materials, and correlate simulation results with experimental observations.
- CO4** - Design and develop functional devices and applications based on carbon materials, such as paper batteries, and evaluate their performance, sustainability, and practical relevance.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	3	3	3	2	3	3
C02	2	3	2	2	2	3	3
C03	3	3	2	2	2	3	3
C04	2	2	2	3	2	3	3
Average	2.50	2.75	2.25	2.50	2.00	3.00	3.00

 Subject: 112880 - Laboratory Course - IV

 Course Outcome (CO):

- CO1** - Synthesis of metal nanoparticles from biological sources
- CO2** - Preparation of various metal nanoparticles for the study of their biological activity
- CO3** - Estimation of antibacterial/antifungal activity of metal nanoparticles
- CO4** - Synthesis of gold nanoparticles and its assembly/Conjugation with biomolecules i.e. BSA

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	3	3	1	1	2	2
C02	2	3	3	1	1	2	2
C03	1	3	2	2	1	2	2
C04	1	3	2	2	1	2	2
Average	1.50	3.00	2.50	1.50	1.00	2.00	2.00

 Subject: 112881 - Classical Mechanics, Classical Electrodynamics and Quantum Mechanics

 Course Outcome (CO):

- CO1** - Understand fundamental laws and principles of classical mechanics and their applications in appropriate physical problems.
- CO2** - Apply basic techniques of calculus of variations and Charged Particles Dynamics.
- CO3** - Understand the basics of matter waves and Schrodinger’s wave equation with the help of different concepts and experiments.
- CO4** - Understand the definition of different operators and Schrodinger’s equation to solve problems of Quantum Mechanics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	1	1	0	2	1
CO2	3	3	2	2	1	3	1
CO3	3	2	1	1	1	3	1
CO4	3	2	1	1	1	2	1
Average	3.00	2.25	1.25	1.25	0.75	2.50	1.00

 Subject: 112882 - Inorganic and Organic Chemistry

 Course Outcome (CO):

- CO1** - Understanding of the concepts of acids, bases and different solvents and chemistry of f- Block Elements
- CO2** - Increased knowledge about metal-ligand bonding in transition metal complexes and co-ordination chemistry
- CO3** - Conceptual knowledge about reagents and reactions in organic synthesis reactions
- CO4** - Conceptual knowledge about electrophilic addition reactions to C-C multiple bonds and their practical significance

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	2	1	2	2	1
CO2	3	2	2	2	2	2	2
CO3	2	2	2	2	2	3	2
CO4	2	2	2	2	2	3	2
Average	2.00	2.00	2.00	1.75	2.00	2.50	1.75

 Subject: 112883 - Fundamentals Of Enzymology and Nanoenzymology

 Course Outcome (CO):

- CO1** - Understanding the fundamentals of enzymes as biocatalysts, their importance in living system, their industrial applications
- CO2** - Understanding the techniques of enzymes purification and characterization
- CO3** - Understanding the kinetics of enzymes catalyzed reaction and its application
- CO4** - Concept of nanoenzymes, understanding the activity of nanomaterials as enzymes and their applications

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	2	1	1
CO2	2	2	1	1	2	1	1
CO3	2	2	1	1	2	1	1
CO4	2	2	1	1	2	1	1
Average	2.00	2.00	1.00	1.00	2.00	1.00	1.00

 Subject: 112884 - Phys and Chem at Nanoscale

 Course Outcome (CO):

- CO1** - Introduction to the fundamental principles of nanotechnology, the history of nanoscience & tech
- CO2** - Comprehensive understanding of state-of-the-art nano-fabrication methods with Top down and Bottom up approach technology followed by recent nanotechnology based products.
- CO3** - Detailed knowledge of nanoscience and nanotechnology, including natural and manmade nanomaterials.
- CO4** - In-depth understanding of virtualization techniques like STM, AFM etc.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	1	1	1	3	3	2
CO2	3	2	3	3	2	3	2
CO3	3	2	1	1	3	3	2
CO4	3	3	3	3	2	3	2
Average	3.00	2.00	2.00	2.00	2.50	3.00	2.00

 Subject: 112885 - Active Inorganic, Organic Compounds and Industries

 Course Outcome (CO):

- CO1 - Understanding the uses of natural products & synthetic pharmaceuticals
- CO2 - Knowledge about Iron and Steel industry and related advancements
- CO3 - Knowledge about Sugar industry and related useful byproducts
- CO4 - Understanding of significance of industries in production of useful chemicals

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	2	3	1	1	3
CO2	2	2	2	1	1	2	1
CO3	1	1	3	2	2	2	1
CO4	2	2	1	2	2	2	2
Average	1.75	1.75	2.00	2.00	1.50	1.75	1.75

 Subject: 112886 - Laboratory I

 Course Outcome (CO):

- CO1 - Understand the concept of resonance.
- CO2 - Calculate and draw the diffraction pattern, aberration and cardinal points of the optics.
- CO3 - Determine the value of Plank’s constant.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	1	0	1	1	1
CO2	2	2	1	1	2	2	1
CO3	1	2	1	0	1	1	0
Average	1.33	2.00	1.00	0.33	1.33	1.33	0.67

 Subject: 112887 - Laboratory II

 Course Outcome (CO):

- CO1 - Knowledge regarding gravimetric estimation of organic/inorganic compounds
- CO2 - Practical knowledge regarding inorganic synthesis/preparations
- CO3 - Quantitative chemical analysis of commercial samples
- CO4 - Knowledge about instrumental titration analysis and its practical uses

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	3	2	2	2	3
CO2	2	2	2	2	2	3	2
CO3	2	3	2	3	3	2	1
CO4	3	3	2	2	2	2	3
Average	2.25	2.50	2.25	2.25	2.25	2.25	2.25

 Subject: 112888 - Laboratory III

 Course Outcome (CO):

- CO1** - Performing the basic qualitative test for enzyme activity
- CO2** - Demonstrating the effect of various physical parameters on enzyme activity
- CO3** - Determining the kinetic parameters for enzyme activity
- CO4** - Introducing the basic, hands on training of bioinformatics tools

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	2	3	1	2	2	1
CO2	1	2	3	1	2	2	1
CO3	1	2	3	1	2	2	1
CO4	1	2	3	1	2	2	1
Average	1.00	2.00	3.00	1.00	2.00	2.00	1.00

 Subject: 112889 - Laboratory IV

 Course Outcome (CO):

- CO1** - Synthesis of Ag Nano particles, also study the morphology and synthesis technique
- CO2** - Synthesis of CuO by hydrothermal synthesis technique
- CO3** - Synthesis of ZnO by reduction method
- CO4** - Synthesis of Zno nanorods by CBD technique
- CO5** - Study the absorption spectra from the given sample

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	3	3	2	1	3	3
CO2	2	3	3	2	1	3	3
CO3	2	3	3	2	1	3	3
CO4	2	3	3	2	1	3	3
CO5	3	3	3	2	1	2	2
Average	2.20	3.00	3.00	2.00	1.00	2.80	2.80

 Subject: 115460 - Mechanics

 Course Outcome (CO):

- CO1** - Understand basic concepts of vectors, laws of motion and how fictitious forces arise in a frame.
- CO2** - Recall and relate basic knowledge of mechanics behind momentum and energy. Understand the analogy between translational and rotational dynamics and application of both motions.
- CO3** - Apply Kepler’s law to describe the motion of planets and satellites through the law of gravitation. Explain the phenomena of simple harmonic motion and the concept of frequency of nanoscale matters.
- CO4** - Understand basic concepts of elasticity in nanoscale matters, surface tension, nanostructured surfaces, simple principles of fluid flow and fluid dynamics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	1	1	1	1	1
CO2	2	2	2	2	1	1	1
CO3	2	1	2	1	1	1	1
CO4	2	2	2	2	1	1	1
Average	2.00	1.75	1.75	1.50	1.00	1.00	1.00

 Subject: 115461 - Atomic Structure, Bonding, Gen, Organic Chem.& Aliphatic Hydrocarbons

 Course Outcome (CO):

- CO1** - Explain the atomic structure, Quantum mechanics and their important concepts.
- CO2** - Define the Chemical bonding and Molecular structure with some important theories.
- CO3** - Demonstrate the fundamentals of Organic Chemistry and Stereochemistry.
- CO4** - How Aliphatic Hydrocarbons are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	0	1	1	1
CO2	1	0	0	0	1	1	1
CO3	1	0	1	1	1	1	1
CO4	1	1	1	0	1	1	1
Average	1.00	0.25	0.50	0.25	1.00	1.00	1.00

 Subject: 115462 - Cellular Foundation of Life

 Course Outcome (CO):

- CO1** - Understand basic architecture of cells, structures, functions and mechanisms involved in livingness of the cells.
- CO2** - Know the cellular assemblies present in micro and nanoscale structures.
- CO3** - Demonstrate the fundamentals of vascular systems of the cells as well as extracellular matrices with their regulations.
- CO4** - Understand the role of nanotechnology in the cancer, carcinogenesis and characteristics of cancer cells as well as the stem cells.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	1	1	1	1	2	3
CO2	2	1	1	1	1	2	3
CO3	1	1	1	1	1	1	3
CO4	1	1	1	2	2	2	3
Average	1.50	1.00	1.00	1.25	1.25	1.75	3.00

 Subject: 115463 - Differential Calculus

 Course Outcome (CO):

- CO1** - Learn some theoretical aspects of continuity and differentiability of the functions
- CO2** - To be able use the theory of complex numbers to find the roots of certain polynomials.
- CO3** - To learn the numerical techniques to study the rate of change of the discrete functions that arise in the experimental set up.
- CO4** - To be able to study the surfaces in the three dimensional space and study the extreme values of such surfaces.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 115472 - English

 Course Outcome (CO):

- CO1** - Enhance narration skills. To know what is first person narration, second person narration and third person narration. Learn poetry.
- CO2** - To learn descriptive functions of language. Learn how to describe image, object, things, instrument, place, birds, animals, habits, routine and description of a person

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	0	1	1	0	2	2	0
CO2	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 115473 - Fundamental of Mathamatics Computing and Calculus I

 Course Outcome (CO):

- CO1 - To revise basic concepts in Mathematical computations
- CO2 - To understand important real valued Functions and their properties related to Derivatives

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 115474 - Fundamental Understanding of Life Science I

 Course Outcome (CO):

- CO1 - Explain the fundamental concepts and characteristics that define life and the origin theories related to it.
- CO2 - Classify living organisms based on cell structures and domain/kingdom-level taxonomies.
- CO3 - Describe the role and diversity of microbes and viruses in the biosphere.
- CO4 - Analyze the mechanisms of cell cycle, cell division, and reproductive processes in plants.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	2	2	1	3	2
CO3	2	3	2	2	1	3	2
CO4	3	3	2	2	2	3	2
Average	2.75	2.50	2.00	2.00	1.25	3.00	2.00

 Subject: 115632 - Laboratory Course - I

 Course Outcome (CO):

- CO1 - Understand basic kinematics and dynamics of linear and rotational motion.
- CO2 - Extend the skills and practical use of different types of pendulum, micrometer screw gauge, vernier calliper and travelling microscope
- CO3 - Learn the concepts related to elasticity of materials and viscosity of fluids.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	3	1	1	2	1
CO2	3	2	2	1	1	1	1
CO3	1	1	1	1	1	1	1
Average	2.33	1.67	2.00	1.00	1.00	1.33	1.00

 Subject: 115633 - Laboratory Course - II

 Course Outcome (CO):

- CO1** - Experiment with given inorganic samples to determine different characteristics such as Normality , Concentration, Strength.
- CO2** - Experiments with Vinegar solution to determine the amount of acetic acid.
- CO3** - Identification of various cations from a given mixture by chromatography technique.
- CO4** - Estimation of amount of Aspirin from Aspirin tablets.
- CO5** - tification of Organic compounds qualitatively.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	0	1	1	1
CO2	1	0	0	0	1	1	1
CO3	1	0	0	1	1	1	1
CO4	1	0	1	0	1	1	1
CO5	1	1	1	0	1	1	1
Average	1.00	0.20	0.40	0.20	1.00	1.00	1.00

 Subject: 115634 - Laboratory Course - III

 Course Outcome (CO):

- CO1** - Study the effect of temperature and organic solvents on semi permeability of cellular membranes, dialysis mechanisms as well as plasmolysis and deplasmolysis mechanisms.
- CO2** - Study the prokaryotic and eukaryotic cellular structures, their fractionations and bioactivities in different organelles.
- CO3** - Understand the microtome techniques using different tissue samples.
- CO4** - Understand cellular division mechanisms.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	1	1	1	1	2	3
CO2	2	1	1	1	1	2	3
CO3	1	1	1	1	1	1	3
CO4	2	1	1	1	1	2	3
Average	1.50	1.00	1.00	1.00	1.00	1.75	3.00

 Subject: 115635 - Laboratory Course - IV

 Course Outcome (CO):

- CO1** - To find the derivatives of the discrete functions by using various Numerical methods.
- CO2** - To find the derivatives of the discrete functions by using various Numerical methods.
- CO3** - Choose the appropriate equipment and measuring instruments to supply and measure electrical quantities. Verify the network theorems and operation of electronic circuits.
- CO4** - Perform experiments for better understanding the behaviour of semiconductor devices and examine the I-V characteristics of them to calculate various device parameters’ values. Also Design & construct the oscillator.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	3	1	1	1	2	1
C02	3	3	1	1	1	2	1
C03	3	3	1	1	1	2	1
C04	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 117080 - Electricity and Magnetism

 Course Outcome (CO):

- CO1** - Understand line, surface and volume integrals of vector fields, Gauss-divergence and Stoke’s theorem
- CO2** - Learn basic laws and theorems of electrostatic at nanoscale.
- CO3** - Verify various concepts related to A. C. LCR series and parallel circuits. Understand the basic concept of memristor. Classify the laws of electromagnetic induction. Learn various concepts related to ballistic galvanometer.
- CO4** - Learn different types of magnetic materials alongwith their properties. Understand the basic concepts of spintronics.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	2	2	1	1	1	1	1
C02	3	2	1	2	1	1	1
C03	2	1	2	2	1	1	1
C04	2	1	2	2	1	1	1
Average	2.25	1.50	1.50	1.75	1.00	1.00	1.00

 Subject: 117081 - Chemical Energetics Equilibria & Functional Organic Chemistry

 Course Outcome (CO):

- CO1** - Explain the concepts of Thermodynamics, Thermochemistry and Chemical Equilibrium.
- CO2** - Define the Ionic Equilibria with some important concepts.
- CO3** - How Aromatic Hydrocarbons, Alkyl and Aryl Halide are prepared and their reactions.
- CO4** - How Alcohol, Phenol and Ether are prepared and their reactions.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	1	0	0	1	1	0
CO2	1	1	0	1	1	0	0
CO3	1	0	1	0	1	0	0
CO4	1	0	1	0	1	0	1
Average	1.00	0.50	0.50	0.25	1.00	0.25	0.25

 Subject: 117082 - Differential Equations

 Course Outcome (CO):

- CO1** - Solve the differential equations arising in the study of Physics and Chemistry.
- CO2** - Learn various applications of the differential equations naturally arising in the study of fundamental sciences.
- CO3** - Solve Higher ordered differential equations
- CO4** - Find the numerical solutions of the differential equations

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 117084 - English

 Course Outcome (CO):

- CO1** - To learn what is advertising, different media for advertisement, structure of the advertisement and its techniques
- CO2** - To understand the importance of English for Special Purposes

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	0	1	1	0	2	2	0
CO2	0	1	1	0	2	2	0
Average	0.00	1.00	1.00	0.00	2.00	2.00	0.00

 Subject: 117085 - Chemical Foundation of Life Sciences

 Course Outcome (CO):

- CO1** - Explain the chemical basis of life by understanding atoms, molecules, water, biomolecules, and the transformation of energy and matter in living systems.
- CO2** - Describe the structure, classification, and biological significance of major biomolecules such as carbohydrates and proteins, including their structural organization and functional roles.
- CO3** - Understand the classification, structure, and functions of lipids, nucleic acids, vitamins, and minerals, and analyze their roles in cellular organization and nanotechnological applications.
- CO4** - Explain enzyme structure, catalytic mechanisms, and classification, and understand the properties and applications of biopolymers and bioplastics in biological and sustainable systems.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	2	2	2	1	3	2
C02	3	2	2	2	1	3	2
C03	3	2	3	2	2	3	2
C04	3	3	2	3	2	3	2
Average	3.00	2.25	2.25	2.25	1.50	3.00	2.00

 Subject: 117086 - Fundamental of Mathamatics Computing and Calculus II

 Course Outcome (CO):

- CO1** - To be able to compute Integration of standard Real valued functions
- CO2** - To understand basics of Differential Equations and applications of integral towards solving the Differential Equations.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
C01	3	3	1	1	1	2	1
C02	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 117087 - Fundamental Understanding of Life Science II

 Course Outcome (CO):

- CO1** - Describe the components and functions of the immune system and differentiate between innate and adaptive immunity.
- CO2** - Explain the role of antigens, antibodies, and immunogenicity in human health and disease.
- CO3** - Identify and classify the building blocks of life, including amino acids, proteins, carbohydrates, and lipids.
- CO4** - Interpret the structural organization and biological significance of proteins, carbohydrates, and lipids in living organisms.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	2	3	2	2	2	3	2
CO3	3	2	2	2	1	3	2
CO4	3	2	3	2	2	3	2
Average	2.75	2.25	2.25	2.00	1.50	3.00	2.00

 Subject: 117088 - Laboratory Course - I

 Course Outcome (CO):

- CO1** - Understand basic concepts of electricity and magnetism and their applications.
- CO2** - Learn the use of multimeters for measuring resistances, AC and DC Voltages and checking electrical fuses
- CO3** - Equip the student with the required prerequisites to understand electromagnetic phenomena
- CO4** - Extend the skills and practical use of sonometer, ballistic galvanometer and different types of LCR circuits

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	1	2	1	1	1	1
CO2	3	1	2	2	1	1	1
CO3	2	1	1	1	1	1	1
CO4	1	2	2	2	1	1	1
Average	2.00	1.25	1.75	1.50	1.00	1.00	1.00

 Subject: 117089 - Laboratory Course - II

 Course Outcome (CO):

- CO1** - Preparation of standard and required pH buffer solutions.
- CO2** - Measurement of pH of different solutions like fruit juices, shampoos and soaps.
- CO3** - Determination of melting and boiling points of given samples
- CO4** - Preparation of organic compounds.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	1	0	0	0	1	1	0
CO2	1	0	0	1	1	0	0
CO3	1	0	1	0	1	0	0
CO4	1	1	1	0	1	0	1
Average	1.00	0.25	0.50	0.25	1.00	0.25	0.25

 Subject: 117090 - Laboratory Course - III

 Course Outcome (CO):

- CO1** - Prepare and use laboratory buffers and apply basic laboratory techniques for handling and analysis of biochemical samples.
- CO2** - Separate and qualitatively analyze biomolecules such as amino acids, carbohydrates, lipids, and proteins using chromatographic and chemical test methods.
- CO3** - Apply principles of colorimetry and spectrophotometry, including verification of Beer–Lambert’s law, for quantitative estimation of biomolecules.
- CO4** - Perform quantitative biochemical assays for estimation of amino acids, proteins, and sugars using standard biochemical methods and interpret the experimental results.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	2	2	1	3	2
CO2	3	2	3	2	2	3	2
CO3	3	3	3	2	2	3	2
CO4	3	2	3	2	2	3	2
Average	3.00	2.25	2.75	2.00	1.75	3.00	2.00

 Subject: 117091 - Laboratory Course - IV

 Course Outcome (CO):

- CO1** - To formulate the differential equations associated with certain experiments.
- CO2** - Interpret the solutions of the differential equations to get back some information of the original experiment.
- CO3** - Design and construct the circuits using Op-Amp for basic linear and non-linear applications.
- CO4** - Design and test the different types of combinational and sequential logic circuits. Compose the application oriented digital circuits and test it.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	1	1	1	2	1
CO2	3	3	1	1	1	2	1
CO3	3	3	1	1	1	2	1
CO4	3	3	1	1	1	2	1
Average	3.00	3.00	1.00	1.00	1.00	2.00	1.00

 Subject: 118567 - Physical Chemistry

 Course Outcome (CO):

- CO1** - Understanding of elementary quantum mechanics, thermodynamics and chemical kinetics principles.
- CO2** - Knowledge about Solid State Chemistry, Solutions, Phase Equilibria and Distribution Law.
- CO3** - Increased Knowledge about Electrochemistry, Spectroscopy and Photochemistry.
- CO4** - Application of basic and applied physical chemistry principles to qualitative and quantitative analysis.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	2	2	3	2	2	2	2
CO2	2	2	2	2	3	3	3
CO3	3	3	2	2	2	2	2
CO4	2	2	3	3	1	3	3
Average	2.25	2.25	2.50	2.25	2.00	2.50	2.50

 Subject: 118569 - Physical and Chemical Properties of Nanomaterials

 Course Outcome (CO):

- CO1** - Explore the new phenomenon that originated at nanoscales like LSPR, Quantum tunnelling, superparamagnetic state of materials, Single electron field effect transistors, GMR effect etc.
- CO2** - Have a working knowledge of how the properties of materials change once entered into the nanoscale, including theory and experiment.
- CO3** - Evaluate and analyse the structural, morphological, optical and magnetic properties of bulk nanostructured materials and nanocomposites.
- CO4** - Apply in depth understanding of the Size and Shape dependent properties of nanomaterials for practical applications.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	3	1	1	3	3
CO2	3	3	3	2	1	3	3
CO3	3	3	3	1	2	3	3
CO4	3	2	3	2	2	3	3
Average	3.00	2.50	3.00	1.50	1.50	3.00	3.00

 Subject: 118570 - Polymer Chemistry

 Course Outcome (CO):

- CO1** - Understanding the fundamentals of polymers, polymerization processes, and chemical bonding in polymers
- CO2** - Understanding the fundamentals of kinetics of polymerization process and morphology of polymers
- CO3** - Understanding the concepts of determination of molecular weight of polymers and glass transition temperature
- CO4** - Understanding physical, thermal, flow & mechanical properties of polymers

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	3	3	3	3	3	3
CO2	2	2	3	3	3	3	3
CO3	3	1	2	2	2	2	3
CO4	2	1	2	2	3	2	2
Average	2.50	1.75	2.50	2.50	2.75	2.50	2.75

 Subject: 118579 - Laboratory II

 Course Outcome (CO):

- CO1 - The understanding of qualitative analysis in chemistry
- CO2 - The understanding of quantitative analysis in chemistry
- CO3 - Knowledge about instrumental methods of titration such as conductometry
- CO4 - Knowledge about instrumental methods of titration such as pH metery

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	P01	P02	P03	P04	P05	PS01	PS02
CO1	3	2	3	2	3	3	2
CO2	2	3	3	2	3	3	2
CO3	3	2	2	3	2	3	3
CO4	1	3	3	3	2	2	3
Average	2.25	2.50	2.75	2.50	2.50	2.75	2.50

 Subject: 118581 - Laboratory IV

 Course Outcome (CO):

- CO3 - Size and Shape dependent calculation of surface area to volume ratio using TEM images.
- CO2 - Calculation of Size dependent magnetic parameters using M-H hysteresis loops
- CO1 - Calculation of crystallite size and band gap of nanomaterials having difference size.

 CO-PO/PSO Mapping:

Course Articulation Matrix

COTYPE \ POTYPE	
	-
Average	-

Programme Articulation Matrix

SUBJECT / POTYPE	P01	P02	P03	P04	P05	PS01	PS02
88785	2	1.75	1.75	1.50	1	1	1
88786	1	0.25	0.50	0.25	1	1	1
88787	3	2.25	2.50	2.25	2	3	2
88788	-	-	-	-	-	-	-
88789	1.50	0.50	0.50	1	0.75	1	1.75
88790	0	1	1	0	2	2	0
88795	2.25	1.50	1.50	1.75	1	1	1
88796	1	0.50	0.50	0.25	1	0.25	0.25
88797	3	2.25	2.50	2.50	2	3	2
88798	-	-	-	-	-	-	-
88799	1	0.50	0.50	1	0.50	1.25	1.50
88800	-	-	-	-	-	-	-
88801	2.33	1.33	2	1.17	1	1.17	1
88802	1	0.25	0.50	0.25	1	0.25	0.25
88803	3	2.40	2.40	2	1.80	3	2
88804	3	3	1	1	1	2	1
89444	3	3	1	1	1	2	1
89445	2.75	2.50	2	2	1.25	3	2
89446	3	3	1	1	1	2	1
89447	2.75	2.25	2.25	2	1.50	3	2
91129	2.20	2	1.80	1	1	1	1
91130	2	1.25	1	1	1	1	1
91131	3	2.25	2.25	2.25	1.50	3	2
91132	2	1.50	1.25	1	0	0	0
91133	2.25	2	1.75	2	2	2.75	2.25
91138	2.43	1.86	1.14	1.57	1	1.43	1
91139	2	1	1.25	1.25	1	1.25	1
91140	3	2.25	2.50	2.50	1.75	3	2
91141	2	2	1	1	0	0	0
91142	2.50	2.50	2	2	2	2.25	2.25
91143	2.50	1.17	1.50	1.50	1.33	2	1
91144	2	1.40	1.20	1	1	1.20	1
91145	3	2.50	2.75	2.25	2	3	2
91146	2.75	2	2.75	1.75	2.25	2.75	2
91147	2	2	2	3	2.17	2	1.50
93682	2	1.75	1.75	1.50	1	1	1
93683	1	0.25	0.50	0.25	1	1	1
93684	1.50	1	1	1.25	1.25	1.75	3
93685	3	3	1	1	1	2	1
93686	1.50	0.50	0.50	1	1	0.75	1.75
93687	-	-	-	-	-	-	-
93688	3	3	1	1	1	2	1
93689	2.75	2.50	2	2	1.25	3	2
94954	2.25	1.50	1.50	1.75	1	1	1
94955	1	0.50	0.50	0.25	1	0.25	0.25
94956	3	2.25	2.25	2.25	1.50	3	2

SUBJECT / POTYPE	P01	P02	P03	P04	P05	PS01	PS02
94957	3	3	1	1	1	2	1
94958	1.25	0.50	0.75	1	0.75	1.25	1.75
94959	-	-	-	-	-	-	-
94960	3	3	1	1	1	2	1
94961	2.75	2.25	2.25	2	1.50	3	2
94962	2.33	1.50	2	1.33	1	1.17	1
94963	1	0.25	0.50	0.25	1	0.25	0.25
94964	3	2.25	2.75	2	1.75	3	2
94965	-	-	-	-	-	-	-
96134	2.17	2	1.83	1	1	1	1
96135	2	1.25	1	1	1	1	1
96136	3	2.25	2.25	2.25	1.50	3	2
96137	2	1.50	1	1.25	0	0	0
96138	2.25	2	1.75	2	2	2.75	2.25
96140	1	1.50	1.50	2	1.50	2	2
96141	2.29	1.86	1.14	1.29	1	1.29	1
96142	2	1	1.25	1.25	1	1.25	1
96143	3	2.25	2.50	2.50	1.75	3	2
96144	2	1.50	1	0.25	0.50	0	0
96145	2.50	2.50	2	2	2	2.25	2.25
96146	2	2	2	3	2.17	2	1.50
96877	3	2.25	1.25	1.25	0.75	2.50	1
96878	1.75	2.50	1.50	1	1	1.50	1
96879	2	2	1	1	2	1	1
96880	-	-	-	-	-	-	-
96881	1.25	1.75	1.50	1.75	1.25	2	1.75
96882	2.75	2.75	2.25	3	2.25	2.50	2
96886	2.25	1.50	1.25	0.75	1.50	1.75	0.75
96887	2.25	1.50	1.50	1.25	1.50	2	2
96888	2	2	1	1	2	1	1
96889	-	-	-	-	-	-	-
96891	-	-	-	-	-	-	-
96895	1.33	2	1	0.33	1.33	1.33	0.67
96896	2.25	2.25	2	1.25	1	2.75	2.25
96897	1	2	3	1	2	2	1
96898	2.67	2.17	2.50	2.50	2.17	2	2
111076	2.33	1.83	1.50	2	1.50	1.67	1.33
111077	2	1.40	1.20	1	1	1.20	1
111078	3	2.50	2.75	2.25	2	3	2
111079	2.75	2	2.75	1.75	2.25	2.75	2
112871	2.25	2	2	0.25	0.25	1	0.25
112872	1.75	1.50	2	1.50	1.50	3	3
112875	2.50	1.50	1.50	1.50	1	1	1
112877	2	2	2	1	1	0.50	1
112878	2.50	2.75	2.25	2.50	2	3	3
112880	1.50	3	2.50	1.50	1	2	2
112881	3	2.25	1.25	1.25	0.75	2.50	1
112882	2	2	2	1.75	2	2.50	1.75
112883	2	2	1	1	2	1	1
112884	3	2	2	2	2.50	3	2

SUBJECT / POTYPE	P01	P02	P03	P04	P05	PS01	PS02
112885	1.75	1.75	2	2	1.50	1.75	1.75
112886	1.33	2	1	0.33	1.33	1.33	0.67
112887	2.25	2.50	2.25	2.25	2.25	2.25	2.25
112888	1	2	3	1	2	2	1
112889	2.20	3	3	2	1	2.80	2.80
115460	2	1.75	1.75	1.50	1	1	1
115461	1	0.25	0.50	0.25	1	1	1
115462	-	-	-	-	-	-	-
115463	-	-	-	-	-	-	-
115472	-	-	-	-	-	-	-
115473	-	-	-	-	-	-	-
115474	-	-	-	-	-	-	-
115632	2.33	1.67	2	1	1	1.33	1
115633	1	0.20	0.40	0.20	1	1	1
115634	1.50	1	1	1	1	1.75	3
115635	3	3	1	1	1	2	1
117080	2.25	1.50	1.50	1.75	1	1	1
117081	1	0.50	0.50	0.25	1	0.25	0.25
117082	-	-	-	-	-	-	-
117084	-	-	-	-	-	-	-
117085	-	-	-	-	-	-	-
117086	-	-	-	-	-	-	-
117087	-	-	-	-	-	-	-
117088	2	1.25	1.75	1.50	1	1	1
117089	1	0.25	0.50	0.25	1	0.25	0.25
117090	-	-	-	-	-	-	-
117091	-	-	-	-	-	-	-
118567	2.25	2.25	2.50	2.25	2	2.50	2.50
118569	3	2.50	3	1.50	1.50	3	3
118570	2.50	1.75	2.50	2.50	2.75	2.50	2.75
118579	2.25	2.50	2.75	2.50	2.50	2.75	2.50
118581	-	-	-	-	-	-	-

Attainment Of CO'S

Prog. Part	Course Code	Course Name	Students	CO Attainment	CO Level	Remark
1	115460	Mechanics (mach1)	73	2.2	Very Good	Fully attained
1	115461	Atomic Structure, Bonding, Gen, Organic Chem.& Aliphatic Hydrocarbons (ASBC&AH)	73	2.2	Very Good	Fully attained
1	115462	Cellular Foundation of Life (CFL)	73	2	Very Good	Fully attained
1	115463	Differential Calculus (DIFFCAL)	73	2	Very Good	Fully attained
1	115464	Analog Electronics (ANEI)	73	3	Excellent	Fully attained
1	115472	English (Eng)	73	2.8	Excellent	Fully attained
1	115473	Fundamental of Mathamatics Computing and Calculus I (FMCCI)	49	2.8	Excellent	Fully attained
1	115474	Fundamental Understanding of Life Science I (FULSi)	24	3	Excellent	Fully attained
1	115632	Laboratory Course - I (LAB I)	73	2	Very Good	Fully attained
1	115633	Laboratory Course - II (LAB II)	73	3	Excellent	Fully attained
1	115634	Laboratory Course - III (LAB III)	73	2	Very Good	Fully attained
1	115635	Laboratory Course - IV (LAB IV)	73	2	Very Good	Fully attained
1	117080	Electricity and Magnetism (EM)	69	2.2	Very Good	Fully attained
1	117081	Chemical Energetics Equilibria & Functional Organic Chemistry (CEEFOC)	69	2.2	Very Good	Fully attained
1	117082	Differential Equations (DE)	69	2	Very Good	Fully attained
1	117083	Linear and Digital Integrated Circuits (LDIC)	69	2.8	Excellent	Fully attained
1	117084	English (ENG)	69	3	Excellent	Fully attained
1	117085	Chemical Foundation of Life Sciences (CFL)	69	3	Excellent	Fully attained
1	117086	Fundamental of Mathamatics Computing and Calculus II (FMCII)	49	3	Excellent	Fully attained
1	117087	Fundamental Understanding of Life Science II (FULSi)	20	3	Excellent	Fully attained
1	117088	Laboratory Course - I (LAB I)	69	3	Excellent	Fully attained
1	117089	Laboratory Course - II (LAB II)	69	3	Excellent	Fully attained
1	117090	Laboratory Course - III (LAB III)	69	3	Excellent	Fully attained
1	117091	Laboratory Course - IV (LAB IV)	69	2	Very Good	Fully attained
1	88785	Mechanics (mach1)	1	3	Excellent	Fully attained
1	88787	Cell Biology (Cellbio)	1	3	Excellent	Fully attained

Prog. Part	Course Code	Course Name	Students	CO Attainment	CO Level	Remark
1	88788	Differential Calculus (DIFFCAL)	2	2	Very Good	Fully attained
1	88789	Network Analysis and Analog Electronics (NETANAL)	2	3	Excellent	Fully attained
1	88795	Electricity And Magnetism (EM)	3	1	Average	Partially attained
1	88797	Mammalian Physiology (MP)	1	3	Excellent	Fully attained
1	88798	Differential Equations (DE)	4	3	Excellent	Fully attained
1	93682	Mechanics (mach1)	8	2	Very Good	Fully attained
1	93683	Atomic Structure,Bonding,Gen.Organic Chem.& Aliphatic Hydrocarbons (ASBC&AH)	4	2	Very Good	Fully attained
1	93684	Cellular Foundation of Life (CFL)	8	3	Excellent	Fully attained
1	93685	Differential Calculus (DIFFCAL)	9	3	Excellent	Fully attained
1	93686	Analog Electronics (ANEI)	12	2	Very Good	Fully attained
1	93687	English (Eng.)	1	3	Excellent	Fully attained
1	93688	Fundamental of Mathamatics Computing and Calculus I (FMCCI)	1	3	Excellent	Fully attained
1	94954	Electricity And Magnetism (EM)	14	1	Average	Partially attained
1	94955	Chemical Energetics Equilibria & Functional Organic Chemistry (CEEFOC)	11	2.6	Excellent	Fully attained
1	94956	Chemical Foundation of Life Sciences (CFL)	10	0	Poor	Partially attained
1	94957	Differential Equations (DE)	19	1.6	Good	Partially attained
1	94958	Linear And Digital Integrated Circuits (LDIC)	11	2	Very Good	Fully attained
1	94959	English (ENG)	1	3	Excellent	Fully attained
1	94960	Fundamental of Mathamatics Computing and Calculus II (FMCII)	4	0	Poor	Partially attained
1	94961	Fundamental Understanding of Life Science II (FULSi)	2	2	Very Good	Fully attained
1	94962	Laboratory Course - I (LAB I)	1	3	Excellent	Fully attained
1	94963	Laboratory Course - II (LAB II)	5	1	Average	Partially attained
2	111076	LAB-I (LAB-I)	45	3	Excellent	Fully attained
2	111077	LAB-II (LAB-II)	45	3	Excellent	Fully attained
2	111078	LAB-III (LAB-III)	45	3	Excellent	Fully attained
2	111079	LAB-IV (LAB-IV)	45	3	Excellent	Fully attained
2	91129	Thermal Physics And Statistical Mechanics (THPSM)	6	0	Poor	Partially attained
2	91130	Conductane Corrosion, Electroplating, Electrochemistry, Thermodynamics .. (CCEET)	4	1.6	Good	Partially attained

Prog. Part	Course Code	Course Name	Students	CO Attainment	CO Level	Remark
2	91131	Fundamentals of Microbiology and Biochemistry (FMB)	2	2.8	Excellent	Fully attained
2	91132	Statistical Methods For Physical Sciences -I (SMPSI)	2	2	Very Good	Fully attained
2	91133	Electronic Instrumentation (ELEIN)	1	3	Excellent	Fully attained
2	91138	Waves and Optics (WAOP)	5	0.8	Poor	Partially attained
2	91139	Coordination Chemistry, Semi Micro Qualtitative Analysis, Carbohydrates, Sterochemistry (CCSQAC)	5	0.8	Poor	Partially attained
2	91140	Fundamentals of Immunology And Nanodiagnostics (FUIMA)	1	3	Excellent	Fully attained
2	91141	Statistical Methods For Physical Sciences - II (SMPSII)	3	2.6	Excellent	Fully attained
2	91142	Analytical instrumentation (ANINS)	2	2.8	Excellent	Fully attained
2	91143	LAB - I (LAB -I)	1	3	Excellent	Fully attained
2	91144	LAB - II (LAB II)	1	3	Excellent	Fully attained
2	91145	LAB - III (LABIII)	1	3	Excellent	Fully attained
2	91146	LAB - IV (LabIV)	1	3	Excellent	Fully attained
2	91147	Enviroment Studies (Env_S)	1	3	Excellent	Fully attained
2	96134	Thermal Physics and Statistical Mechanics (TPSM)	50	1.4	Average	Partially attained
2	96135	Solutions,Phase Equilibrium,Conductance,Electrochemistry & Functional Group Organic Chemistry-II (OC-2)	47	2	Very Good	Fully attained
2	96136	Fundamentals of Microbiology and Biochemistry (FMB)	48	2.2	Very Good	Fully attained
2	96137	Statistical Techniques for Nanotechnology (STN)	48	3	Excellent	Fully attained
2	96138	Electronic Instrumentation (EI)	48	2.2	Very Good	Fully attained
2	96140	Indian Knowledge System-IKS in Nanoscience (IKS)	47	2.2	Very Good	Fully attained
2	96141	Waves and Optics (WAO)	54	2.2	Very Good	Fully attained
2	96142	Coordination Chemistry,Semi-Micro Qualtitative Analysis,Transition Elements,Chelation,Carboxylic acids,Carbonyl Compounds,Amines,Diazonium Salts,Carbohydrates,Stereochemistry (COCH)	52	2	Very Good	Fully attained
2	96143	Fundamentals of Immunology and Nanodiagnostics (FIN)	45	2.8	Excellent	Fully attained
2	96144	Introduction to Data Science,AI and ML (IDSAM)	48	2.2	Very Good	Fully attained
2	96145	Analytical Instrumentation (ANIN)	48	3	Excellent	Fully attained
2	96146	Environmental Studies (ES)	48	2.2	Very Good	Fully attained
3	112881	Classical Mechanics, Classical Electrodynamics and Quantum Mechanics (CMCEQM)	26	3	Excellent	Fully attained
3	112882	Inorganic and Organic Chemistry (IOC)	26	1.2	Average	Partially attained
3	112883	Fundamentals Of Enzymology and Nanoenzymology (FOEN)	26	1.4	Average	Partially attained

Prog. Part	Course Code	Course Name	Students	CO Attainment	CO Level	Remark
3	112884	Phys and Chem at Nanoscale (PCN)	26	1.2	Average	Partially attained
3	112885	Active Inorganic, Organic Compounds and Industries (AIOCI)	26	1.2	Average	Partially attained
3	112886	Laboratory I (Lab I)	26	2	Very Good	Fully attained
3	112887	Laboratory II (Lab II)	26	2	Very Good	Fully attained
3	112888	Laboratory III (LabIII)	26	2	Very Good	Fully attained
3	112889	Laboratory IV (LAB IV)	25	1	Average	Partially attained
3	118566	Solid State Physics and Nuclear and Particle Physics (SPNPP)	24	2.6	Excellent	Fully attained
3	118567	Physical Chemistry (PC)	24	1.2	Average	Partially attained
3	118568	Molecular Biology and Genetic Engineering (MBGE)	24	2.2	Very Good	Fully attained
3	118569	Physical and Chemical Properties of Nanomaterials (PCPN)	24	2.2	Very Good	Fully attained
3	118570	Polymer Chemistry (PC)	24	1.8	Good	Partially attained
3	118578	Laboratory I (Lab I)	24	3	Excellent	Fully attained
3	118579	Laboratory II (Lab II)	24	1	Average	Partially attained
3	118580	Laboratory III (Lab III)	24	2	Very Good	Fully attained
3	118581	Laboratory IV (LAB IV)	24	3	Excellent	Fully attained
3	96877	Classical Mechanics, Classical Electrodynamics and Quantum Mechanics (CMCEQM)	3	3	Excellent	Fully attained
3	96878	Inorganic and Organic Chemistry (IOC)	2	3	Excellent	Fully attained
3	96879	Fundamentals Of Enzymology and Nanonzymology (FOEN)	2	2	Very Good	Fully attained
3	96880	Phys and Chem at Nanoscale (PCN)	2	2	Very Good	Fully attained
3	96881	Active Inorganic, Organic Compounds and Industries (AIOCI)	2	2.8	Excellent	Fully attained
3	96882	Env. Nanotech Green Chemistry (EN)	2	2.8	Excellent	Fully attained
3	96886	Solid State Physics and Nuclear and Particle Physics (phy1)	3	3	Excellent	Fully attained
3	96887	Physical Chemistry (PhyCh)	2	2.2	Very Good	Fully attained
3	96888	Molecular Bio. & Genetic Engg. (MBGE)	3	3	Excellent	Fully attained
3	96889	Physical & Chemical Prop. of Nanomaterial (PCPN)	4	0.4	Poor	Partially attained
3	96890	Polymer Chemistry (PChe)	2	2.2	Very Good	Fully attained
3	96891	Nano Medicine (N&EN-II)	2	2.2	Very Good	Fully attained
3	96895	LAB - I (LAB - I)	2	3	Excellent	Fully attained

Prog. Part	Course Code	Course Name	Students	CO Attainment	CO Level	Remark
3	96896	LAB - II (LAB - II)	2	3	Excellent	Fully attained
3	96897	LAB - III (LAB - III)	2	2	Very Good	Fully attained
3	96898	LAB - IV (LAB - IV)	2	2	Very Good	Fully attained
4	112871	Semiconductor Physics (semico)	13	3	Excellent	Fully attained
4	112872	Carbaneous Materials (CARBON)	13	2.2	Very Good	Fully attained
4	112873	Functional Nanomaterials (FUNCT)	13	2.2	Very Good	Fully attained
4	112874	Coating Technology Nanocoating and Applications (CTNAA)	13	2.2	Very Good	Fully attained
4	112875	Fundamental of Nanobiotechnology (FUNAB)	13	3	Excellent	Fully attained
4	112876	Quantum Mechanics at Nanoscale (QMANS)	13	3	Excellent	Fully attained
4	112877	Laboratory Course - I (LAB I)	13	3	Excellent	Fully attained
4	112878	Laboratory Course - II (LAB II)	13	3	Excellent	Fully attained
4	112879	Laboratory Course - III (LAB III)	13	1	Average	Partially attained
4	112880	Laboratory Course - IV (LAB IV)	13	3	Excellent	Fully attained
4	118582	Solid State Electronic Devices (SSED)	13	2.2	Very Good	Fully attained
4	118583	Fundamentals of Nanocatalysis and Applications (FNA)	13	3	Excellent	Fully attained
4	118584	Biomedical Applications of Nanobiotechnology (BANB)	13	3	Excellent	Fully attained
4	118585	Energy Conversion and Storage Devices (ECSD)	13	3	Excellent	Fully attained
4	118586	Nanomagnetism and Spintronics (NMS)	13	3	Excellent	Fully attained
4	118587	Statistical Mechanics and Nanothermodynamics (SMN)	13	2.8	Excellent	Fully attained
4	118588	Laboratory I (Lab I)	13	3	Excellent	Fully attained
4	118589	Laboratory II (Lab II)	13	3	Excellent	Fully attained
4	118590	Laboratory III (Lab III)	13	3	Excellent	Fully attained
4	118591	Laboratory IV (LAB IV)	13	3	Excellent	Fully attained

Attainment Of PO'S/PSO'S						
PO/PSO	Direct Attainment	In-Direct Attainment	OverAll Attainment	Attainment Level	Target Level	Remark
PO1	2.28	2.02	2.23	Level 4	Level 4	Very Good
PO2	2.27	2.02	2.22	Level 4	Level 4	Very Good
PO3	2.27	2.02	2.22	Level 4	Level 4	Very Good
PO4	2.27	2.02	2.22	Level 4	Level 4	Very Good
PO5	2.27	2.02	2.22	Level 4	Level 4	Very Good
PSO1	2.29	2.02	2.24	Level 4	Level 4	Very Good
PSO2	2.27	2.02	2.22	Level 4	Level 4	Very Good
Target Level	0	0	0	Level 4	Level 4	Target Level

Radar Diagram

