**MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI**

**UG COURSES – AFFILIATED COLLEGES B.Sc. PHYSICS**

**(Choice Based Credit System)**

**(With effect from the academic year 2017-2018 onwards)**

**B.Sc. PHYSICS-SKILL MATRIX**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Semester** | | |  | | --- | | **PART-**  **I/ II/III IV/V** | | |  | | --- | | **Subject Status** | | | | |  | | --- | | **Subject title** | | |  | | --- | | C**ourse /paper** | | |  | | --- | | **Contact Hrs./ Week** | | |  | | --- | | **Credits** | | |
| **I** | **I** | |  | | --- | | Language | | | | |  | | --- | | Tamil/Other Language | | 1 | 6 | 4 | |
| **II** | |  | | --- | | Language | | | | |  | | --- | | English | | 1 | 6 | 4 | |
| **III** | |  | | --- | | Core 1 | | | | |  | | --- | |  |   Mechanics and Relativity | 1 | 4 | 4 | |
| **III** | |  | | --- | | Core 2 | | | | Properties of matter  and acoustics | 1 | 4 | 4 | |
| **III** | |  | | --- | | ]Major Practical-I | | | | Practical-I | 1 | 2 | 2 | |
| **III** | |  | | --- | | Allied Paper-1 | | | | Allied Physics Paper-1 | 1 | 4 | 4 | |
| **III** | |  |  | | --- | --- | | |  | | --- | | Allied Practical-1 | | | | | AlliedPractical-1 | 1 | 2 | 2 | |
| **IV** | Common | | | Environmental Studies | 1 | 2 | 2 | |
|  |  | | | |  | | --- | | **Sub total** | | **8** | **30** | **26** | |
| **II** | **I** | |  | | --- | | Language | | | | |  | | --- | | Tamil/Other Language | | 1 | 6 | 4 | |
| **II** | |  | | --- | | Language | | | | |  | | --- | | English | | 1 | 6 | 4 | |
| **III** | Core-3 | | | |  | | --- | |  |   Thermal Physics and Relativity | 1 | 4 | 4 | |
| **III** | |  | | --- | |  | | Core-4 | | | | |  | | --- | |  |   Optics | 1 | 4 | 4 | |
| **III** | |  | | --- | | Major Practical-2 | | | | |  | | --- | |  |   Practical-2 | 1 | 2 | 2 | |
| **III** | Allied Paper-2 | | | Allied Physics Paper-2 | 1 | 4 | 4 | |
| **III** | |  |  | | --- | --- | | |  | | --- | | Allied Practical-2 | | | | | |  | | --- | |  |   Practical-2 | 1 | 2 | 2 | |
| **IV** | Common | | | |  | | --- | | Value based education | | 1 | 2 | 2 | |
|  | | | | **Sub total** | **8** | **30** | **26** | |
| **III** | **I** | | Language | | |  | | --- | | Tamil/Other Language | | 1 | 6 | 4 | |
| **II** | | Language | | |  | | --- | | English | | 1 | 6 | 4 | |
| **III** | | Core-5 | | |  | | --- | | Electricity | | 1 | 4 | 4 | |
| **III** | | |  | | --- | | Major Practical-III | | | Practical-3 | 1 | 2 | 1 | |
| **III** | | |  | | --- | | Allied Subject-II | | | |  | | --- | | Allied Theory Paper 1 | | 1 | 4 | 3 | |
| **III** | | |  | | --- | | Allied Practical-III | | | |  | | --- | | Allied Practical-1 | | 1 | 2 | 1 | |
| **III** | | |  | | --- | | Skilled based-core | | | |  | | --- | | Maintenance of  Electrical appliances | | 1 | 4 | 4 | |
| **IV** | | |  | | --- | | Non-Major Elective | | | |  | | --- | | Paper1 | | 1 | 2 | 2 | |
|  | | Common | | YOGA\* |  |  | 2 | |
|  | | | | **Sub-total** | **8** | **30** | **23** | |  |
| **IV** | **I** | | Language | | |  | | --- | | Tamil/Other Language | | 1 | 6 | 4 | |
| **II** | | Language | | |  | | --- | | English | | 1 | 6 | 4 | |
| **III** | | Core-6 | | Electromagnetism | 1 | 4 | 4 | |
| **III** | | |  | | --- | | Major Practical-III | | | **Practical-3** | 1 | 2 | 1 | |
| **III** | | |  | | --- | | Allied subject II | | | Allied Theory Paper-2 | 1 | 4 | 3 | |
| **III** | | |  | | --- | | Allied Practical-III | | | Allied Practical Paper-2 | 1 | 2 | 1 | |
| **III** | | |  | | --- | | Skilled based-core | | | Maintanance of Electronic appliances | 1 | 4 | 4 | |
| **IV** | | |  | | --- | | Non-Major Elective | | | Paper-2 | 1 | 2 | 2 | |
| **V** | | Extension Activity | | NCC/NSS/YRC/YW/PE |  | | **1** | |
|  | | Common | | \*\*Computer for Digital Era |  | **2** | **2** | |
|  | | | | **Sub-total** | **8** | **30** | 24 |
| **V** | **III** | | | Core-7 | Basic Electronics | 1 | 4 | 4 | |
| **III** | | | Core-8 | Programming in C++ | 1 | 4 | 4 | |
| **III** | | | Core-9 | Atomic Physics | 1 | 4 | 4 | |
| **III** | | | Elective-1 | Spectroscopy | 1 | 4 | 4 | |
| **III** | | | Elective-1I | Communication Electronics | 1 | 4 | 4  2  2 | |
| **III** | | | Major Practical- V | Practical-V-Electronics | 1 | 4 |
| **IV** | | | Major Practical- VI | Practical-VI-Electronics | 1 | 4 |
|  | | | Skill based common | Personality Development | 1 | 2 | 2 | |
|  | | | | **Sub-total** | **8** | **30** | **26** | |
| **VI** | **III** | | Core-10 | | Digital Electronics | 1 | 5 | 4 | |
| **III** | | Core-11 | | Nuclear Physics | 1 | 5 | 4 | |
| **III** | | Core-12 | | Quantum Mechanics | 1 | 4 | 4 | |
| **III** | | Core-13 | | Solid state Physics | 1 | 4 | 4 | |
| **III** | | Major Elective | | Energy Physics | 1 | 4 | 4 | |
| **III** | | Major Practical- VI I | | Practical-VII- | 1 | 4 | 2 | |
| **III** | | Major Practical- VIII | | Computer Programming with C++ | 1 | 4 | 2 | |
|  | | | | **Sub-total** | **7** | **30** | **24** | |
|  | |  | |  |  |  |  | |

All practical examinations are at end of each semester

\*Extra credit for extra hours

Total number of hours : 180

Total number of Credits: 142

**Physics Program Outcomes, Program Specific Outcomes and Course Outcomes**

**Physics Program Outcomes**

|  |  |
| --- | --- |
| **PO** | **Upon completion of B.Sc. Degree Programme , the graduate will be able to:** |
| PO-1 | Apply the acquired scientific knowledge to face day to day needs. |
| PO-2 | Create innovative ideas through laboratory experiments. |
| PO-3 | Carry out field works and projects independently and in collaboration with other institution. |
| PO-4 | Reflect upon green initiatives and take responsible steps to build a sustainable environment. |
| PO-5 | Face challenging competitive examinations that offer rewarding careers in science and education. |
| PO-6 | Impart communicative skills and ethical values. |
| PO-7 | Equip students with hands on training through various courses to enhance entrepreneurship skills |

**B.Sc. Physics Programme Specific Outcomes (PSOs)**

|  |  |  |
| --- | --- | --- |
| **PSO** | **Upon completion of B.Sc. Degree Programme , the graduate of physics will be able to:** | **PO** |
| PSO-1 | Apply the scientific knowledge in daily life and to develop scientific temper | PO-1 |
| PSO-2 | Develop extensive comprehension of fundamental and diverse applications of physics. | PO-2 |
| PSO-3 | Apply knowledge of principles, concepts in Physics and analyze their local, national and global impact. | PO-3 |
| PSO-4 | Apply the critical reasoning and computing skills to analyze and solve problems in physics. | PO-5 |
| PSO-5 | Analyze the observed experimental data and relate the results with theoretical expectations. | PO-3 |
| PSO-6 | Communicate appropriately and effectively, in a scientific context using present technology. | PO-1 |
| PSO-7 | Develop entrepreneurial skills, empowered according to the professional requirement and become self- dependent**.** | PO-7 |
| PSO-8 | Understand the professional, ethical legal security, social issues and responsibilities. | PO-6 |

**COURSE OUTCOMES (COs)**

**Semester : I Major Core-1**

**Name of the Course : Mechanics And Relativity**

**Course code : SMPH11**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Understand the fundamentals of vector Analysis. | PSO - 1 | U |
| CO - 2 | Explain the conservation laws. | PSO - 2 | U |
| CO - 3 | Understand the fundamentals of Dynamics | PSO - 4 | U |
| CO - 4 | Apply the concept of moment of inertia to objects of different shapes. | PSO - 2 | A |
| CO - 5 | Analyze the various properties of liquids. Understand the concept of Pressure and Thrust | PSO - 1 | An |
| CO - 6 | Explain the theory of Relativity | PSO - 4 | U |

**Semester : I Major -2**

**Name of the Course:** **Properties Of Matter And Acoustics**

**Course code : SMPH12**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Explain the different moduli of elasticity. | PSO - 1 | U |
| CO - 2 | Explain the concept of bending of beams. | PSO - 2 | U |
| CO - 3 | Analyze the various properties of liquids. | PSO - 3 | A |
| CO - 4 | Explain Simple Harmonic motion, Musical notes and musical scale. | PSO - 2 | An |
| CO - 5 | Analyze the concept of Ultrasonic’s | PSO - 1 | U |
| CO - 6 | Explain acoustics-intensity level and loudness | PSO - 4 | An |

**Semester : I Major Practical-I**

**Name of the Course : Major Practical-I**

**Course code : SMPHP1**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Apply the theory of elasticity in determining the Young’s Modulus of the given material by non-bending experiments using Pin and microscope. | PSO - 3 | Ap |
| CO - 2 | Apply the theory of elasticity in determining the Young’s Modulus of the given material by bending experiments using Optic lever and Telescope | PSO - 2 | Ap |
| CO - 3 | Apply the theory of elasticity in determining the Young’s Modulus of the given material by bending experiments using cantilever depression | PSO - 1,4 | Ap |
| CO - 4 | Evaluate the rigidity modulus of torsion pendulum through a simple experiment. | PSO - 2 | E |
| CO - 5 | Apply the laws of transverse vibration and estimate the frequency of A.C mains using sonometer | PSO - 7 | C |
| CO - 6 | Demonstrate the phenomena of Coefficient of viscosity by Stoke Properties of matter  and acoustics’ method | PSO-3 | Ap |
| CO - 7 | Evaluate the acceleration due to gravity and Moment of Inertia of compound pendulum through a simple experiment | PSO-2 | An |
| CO - 8 | Verify the laws of transverse | PSO-4 | An |
| CO - 9 | Design a record of an experiment in written form with required figures and graphs | PSO-1 | C |

**Semester :I Allied Physics I**

**Name of the Course : Allied Physics I**

**Course code : SAPHII**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO - 1 | Define Hooke’s law, experimental determination of Young’s modulus, rigidity modulus, deriving expression for couple per unit twist. | PSO - 1 | U |
| CO -2 | Explain the properties and behavior of fluids under various conditions. | PSO - 2 | C |
| CO - 3 | Discuss the various types of vibrations in SHM of sound waves, determine the frequency of tunning fork. | PSO – 3 | E |
| CO - 4 | Discuss the conduction, convection and radiation phenomenon in heat transfer process. | PSO - 4 | E |
| CO - 5 | Analyse and study the application of Interference, diffraction. | PSO - 3 | An |

**Semester :I Allied Practical-I**

**Name of the Course : Allied Physics Practical-I**

**Course code : SAPHPI**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO - 1 | Apply the theory of elasticity in determining the  Young’s Modulus of the given material by bending  experiments | PSO - 3 | Ap |
| CO - 2 | Illustrate the principle of fluid dynamics by  Demonstration of experiments.  (Poiseuille’s method and Stoke’s method) | PSO - 1,4 | Ap |
| CO - 3 | Evaluate the rigidity modulus of torsion pendulum  through a simple experiment. | PSO - 2 | E |
| CO - 4 | Design a record of an experiment in written form with  required figures and graphs. | PSO - 7 | C |
| CO - 5 | Demonstrate the phenomena of thermal conductivity in  good and bad conductor. (Forbe’s method, Lee’s disc  method) | PSO - 1 | U |
| CO - 6 | Analyse the diffraction and dispersion phenomena in optical elements (grating or prism) using spectrometer. | PSO - 4 | An |
| CO - 7 | Demonstrate an understanding of the scientific method and apply it in practice. (a familiarity with optics). | PSO - 3 | U/An |

**Semester :I Common- Environmental studies**

**Name of the Course : Environmental Studies**

**Course code :SEVS11**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Illustrate various types of natural resources and associated problems | PSO - 1 | E |
| CO - 2 | Describe the various ecosystem, energy flow in the ecosystem, food chain, food webs and Ecological pyramids | PSO - 2 | C |
| CO - 3 | Explain Biodiversity at global, National and local levels, threats to biodiversity, endangered and endemic species of India | PSO - 3 | U |
| CO - 4 | Describe and discuss the definition, causes, effects and control measures for pollution and disaster management. | PSO - 4 | C |
| CO - 5 | Analyze social issues and the environment. | PSO - 5 | An |

**Semester : II Major Core -3**

**Name of the Course : Thermal Physics and Statistical Mechanics**

**Course code : SMPH21**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Explain the applications of low temperature physics | PSO - 1 | E |
| CO - 2 | Recall the concept of kinetic theory of gases. | PSO - 3 | R |
| CO - 3 | Apply the laws of thermodynamics on heat phenomena. | PSO - 5 | Ap |
| CO - 4 | Correlate the concept of maxwell’sthermodynamical relations | PSO - 2 | An |
| CO - 5 | Discuss the concept of BE,MB and FD statistics | PSO - 6 | U |

**Semester : II Major Core- 4**

**Name of the Course : Optics**

**Course code : SMPH22**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Explain the fundamental principle of optics. | PSO - 1 | U |
| CO - 2 | Determine the behavior of a ray at any optical surface (lenses, Prisms). | PSO - 6 | E |
| CO - 3 | Explain the types of waves and its characteristics. | PSO - 2 | U |
| CO - 4 | Analyze the intensity variation of light due to polarization, interference and diffraction. | PSO - 3 | An |
| CO - 5 | Distinguish Interference, diffraction and polarization. | PSO - 2 | An |
| CO - 6 | Test the optical plainness of any optical surface. | PSO - 6 | C |
| CO - 7 | Measure the various optical parameters. (Focal length, power, refractive index, radius of curvature, dispersive power etc) using optical components (prism, lenses, glass plate, grating). | PSO - 4 | E |
| CO - 8 | Understand the interference and diffraction from wave optics concepts and know its applications. Understand polarization of light and its applications. | PSO - 1 | U |

**Semester : II Major practical-II**

**Name of the Course : Major Practical-II**

**Course code : SMPHP2**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Demonstrate the experimental techniques and develop competence in handling optical instruments. | PSO - 1 | U |
| CO - 2 | Demonstrate an understanding of the scientific method and apply it in practice. (a familiarity with optics). | PSO - 3 | U/An |
| CO - 3 | Analyse the diffraction and dispersion phenomena in optical elements (grating or prism) using spectrometer. | PSO - 4 | An |
| CO - 4 | Measure the various optical parameters (, dispersive power, refractive index, radius of curvature, minimum deviation etc) using optical elements. ( prism and grating). | PSO – 5,7 | E |
| CO - 5 | Develop practical hands-on experience applying widely used techniques to investigate optical phenomena. (oblique incidence, Normal Incidence) | PSO - 2 | Ap |
| CO - 6 | Demonstrate the phenomena of thermal conductivity in bad conductor. (, Lee’s disc method) | PSO - 6 | C |
| CO-7 | Demonstrate the phenomena of specific heat capacity of a liquid (, Newton’s law of cooling method) | PSO-8 | C |

**Semester :II Allied Physics -II**

**Name of the Course : Allied Physics II**

**Course code :SAPH21**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO -1 | Define; discuss the Ohms law, Kirchhoff’s laws, Wheatstone’s bridge. | PSO - 1 | C |
| CO - 2 | Explain the fundamental concepts of electromagnetism and apply it to determine the mutual inductance | PSO - 2 | R |
| CO - 3 | Understand the basic ideas in diodes and transistors | PSO - 3 | E |
| CO - 4 | Apply Kirchhoff’s laws to simple electrical circuits | PSO - 2 | U,Ap |
| CO - 5 | Understand the basics about the Nucleus | PSO - 4 | C |
| CO - 6 | Describe and discuss the frame of reference, transformation equations | PSO - 5 | E |

**Semester :II Allied Physics Practical-II**

**Name of the Course : Allied Physics Practical-II**

**Course code :SMPHP2**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO - 1 | Understand the basic principles of Physics through  experiments | PSO - 1 | U |
| CO - 2 | Understand the practical knowledge of various bridges  (Desauty’s and Owen’s bridge) by demonstration of  experiments | PSO - 1 | U |
| CO - 3 | Determine the resonant frequency and Q value of a  series and parallel LCR circuit | PSO - 2 | Ev |
| CO - 4 | Understand the principle and working of analog electronic  circuits (Zener diode, Bridge rectifier) through some basic  experiments | PSO - 1 | U |
| CO - 5 | Develop the basic experiments; improve basic skills and  attitude which help them to apply these skills in their field  of physics. | PSO - 2 | U |
| CO - 6 | Analyze the characteristics and various  applications of the Transistor | PSO - 2 | An |

**Semester :II Common- Value based education**

**Name of the Course :** **Value Based Education**

**Course code :SVBE21**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Defining, explaining the need, factors responsible for social injustice discuss the contributions of social reformers. | PSO - 1 | E |
| CO - 2 | Discuss the Rights of women, children, Dalit’s, minorities, physically challenged | PSO - 1 | C |
| CO - 3 | Understand the social issues, separation of religion from politics. | PSO - 2 | U |
| CO - 4 | Know about the media, globalization, new media | PSO - 4 | C |
| CO - 5 | Analyze personal, family,social, cultural, professional values. And thereby knowing duties and responsibilities | PSO - 5 | An |

**Semester :III Major Core- 5**

**Name of the Course : Electricity**

**Course code :SMPH31**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Explain the concepts and features of the electrostatic force(Coulomb force), the electric force field, Gauss’s Law and its application(charged sphere , cylinder, plane sheet) | PSO-3 | U |
| CO-2 | Analyze the presence of electric potential and potential difference, within a frame work of distributed symmetric charge distributions. | PSO-3 | C |
| CO-3 | Describe the various effects of thermo electricity and explain the thermo electric diagram | PSO-4 | U |
| CO-4 | Explain the theories and Experiments related to chemical effects of electrolysis. Apply Kirchhoff’s laws and network theorems to electrical circuits. | PSO-2 | c |
| CO-5 | Analyze AC circuit behavior (LR, CR LCR).Discuss AC bridges and BG to do electrical measurements. | PSO-4 | U |

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Demonstrate the experimental techniques and develop competence in handling instruments. | PSO-1 | U |
| CO-2 | Demonstrate an understanding of the scientific method and apply it in practice. (a familiarity with Electricity and magnetism). | PSO-3 | Ap |
| CO-3 | Organize and present the performed experiments in graphical format( calibration of voltmeter using Potentiometer) | PSO-7 | C |
| CO-4 | Analyze AC circuit behavior. ( LCR series and De sauty’s bridge ) | PSO-5 | An |
| CO-5 | Determine magnetic dipole moment using Vibration magnetometers and AC bridges, and Ballistic galvanometer to do electrical measurements. | PSO-5 | E |

Semester : III Major practical-III

Name of the Course : Practical-3

Course code : SMPHP3

**Semester : III Skilled based-core**

**Name of the Course: Maintenance of Electrical Appliances.**

**Course code : SMPH3A**

|  |  |  |  |
| --- | --- | --- | --- |
| CO-1 | Understand the basic principles involved in electric appliances. (transducer ,electric bulb, multimeter, transformer) | PSO-1 | U |
| CO-2 | Examine the working of electric fan ,pixie, grinder, refrigerator ) | PSO-2 | An |
| CO-3 | Explain the consumption of electrical power by various electrical appliances | PSO--3 | E |
| CO-4 | Analyze the different types of switches and transformers- | PSO-5 | An |
| CO-5 | Design simple electrical circuits using different types of switches | PSO-7 | C |
| CO-6 | Analyze the characteristics of various house wiring , Inverter, UPS) | PSO-2. | An |

**Semester : IV Major Core- 6**

**Name of the Course: Electromagnetism**

**Course code : SMPH41**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Understand laws of electromagnetic induction as applied to self and mutual induction | **PSO-3** | U |
| CO-2 | Explain the concepts of Ampere’s circuital law and analyze the effect of uniform magnetic fields on moving charges and current- carrying wires, loops and magnetic dipoles | **PSO-3** | C |
| CO-3 | Analyze Maxwell’s equation. Explain B-H curve and pointing vector. Explain Hertz experiment for production and detection of EM wave | **PSO-4** | U,E |
| CO-4 | Develop wave equations for electric field and magnetic field. Explain impedance and velocity of E M wave | **PSO-4** | C |
| CO-5 | Explain the operation and various uses of Earth inductor. Discuss the practical application of Electromagnetism(induction coil) | **PSO-2** | U |

**Semester : IV Skilled based-core**

**Name of the Course : Skill Based Elective**

**(Maintenance of Electronic Appliances)**

**Course code : SMPH4A**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Understand the basic scientific principles and fundamental concepts of electronic components and measuring instruments….. | PSO-2 | U |
| CO-2 | Recall various laws in Physics (Ohms law, Law in Optics, Lens law of mutual Inductance , Simple theorems in Electricity, Basic ideas about Communication Systems.) | PSO-1 | R |
| CO-3 | Identify and apply the basic principles behind different electronic instruments(Thermistor ,Photo Voltaic cells, TV modem,) and other devices (different types of Cameras) | PSO-3 | Ap |
| CO-4 | Explain safety measures while handling electric instruments, explain the importance of Communication system, working of camera. | PSO-6 | E |
| CO-5 | Elaborate the different types of antennas and explain how images are formed in a camera. | PSO-1 | C |

**Semester : V Major Core -7**

**Name of the Course : Basic Electronics**

**Course code : SMPH51**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Analyze the circuit elements and their connections | PSO - 1 | R |
| CO - 2 | Explain the concept of voltage source and current source | PSO - 2 | An |
| CO - 3 | Understand the characteristics of semiconductor diodes and devices | PSO - 2 | U |
| CO - 4 | Explain classification of power amplifiers, transistor connections | PSO - 4 | Ap |
| CO - 5 | Analyze the characteristics of FET | PSO - 5 | Ev |
| CO - 6 | Demonstrate uses of Oscillators and wave shaping circuits | PSO - 6 | U |
| CO - 7 | Analyze the different characteristics of OP-Amp | PSO - 5 | An |

**Semester : V Major Core -8**

**Name of the Course : Computer Programming In C++**

**Course code : SMPH52**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Describe the principles of object oriented program. Apply object oriented programming techniques to solve computing problems. | PSO-6 | Ap |
| CO-2 | Develop programs using functions and classes. (objects, array of objects, friend functions, passing and returning objects) | PSO-4 | C |
| CO-3 | Develop programs using constructor, destructor, operator overloading and inheritance | PSO-4 | C |
| CO-4 | Formulate the applications of pointers and virtual functions. Distinguish formatted and unformatted I/O operations. | PSO-4 | An |
| CO-5 | Explain Working with File , File opening modes, File pointers and their manipulations | PSO-7 | C |

**Semester : V Major Core- 9**

**Name of the Course : Atomic Physics**

**Course code : SMPH53**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Explain the theories and experiment related to band theory of solids , electrical and thermal conductivity of a conducting material. | PSO-1 | U |
| CO-2 | Identify wave nature experiments (Thomson’s parabolic method , Rutherford experiment) and particle nature experiment (photo electric effect, planks law ,Compton effect , photo electric effect | PSO-2 | AP |
| CO-3 | Define Braggs law of X-ray diffraction | PSO-5 | An |
| CO-4 | Analyze various Atom models and various atomic spectra./ | PSO-5 | An |
| CO-5 | Solve the mathematical expression for electrical and thermal conductivity of different conducting materials. | PSO-4 | C |
| CO-6 | Explain the principle , construction and operation of different particle detectors. | PSO-5. | E |

**Semester : V Major Elective-1**

**Name of the course : Spectroscopy**

**Course code : SEPH5B**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO - 1 | Explain the classification of molecules, rigid & non-rigid rotators, chemical analysis by microwave spectroscopy. | PSO - 1 | U |
| CO - 2 | Discuss simple harmonic, unharmonic oscillators, Diatomic rotator, analysis by IR spectroscopy | PSO - 2 | C |
| CO - 3 | Describe and discuss the Classical, Quant am theories of Raman effect, polarization of light, Structure determination from IR and Raman spectroscopy | PSO – 3 | E |
| CO - 4 | Illustrate Oppenheimer approximation, Frank-condonprinciple,dissociation, predissociation in electronic vibration transitions | PSO - 4 | E |
| CO - 5 | Describe IR instrumentation and techniques. | PSO - 5 | U |

**Semester : V Major Elective-2**

**Name of the Course : Communication Electronics**

**Course code : SEPH5C**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Understand the basic ideas regarding amplitude modulation and transmission in communication system. | PSO - 1 | R, U |
| CO - 2 | Understand the Reception in amplitude modulation and explain its detection. | PSO - 4 | U, E |
| CO - 3 | Understand the frequency and pulse modulation and explain its detection | PSO - 7 | Ap |
| CO - 4 | Develop the ideas in Frequency modulation Reception. | PSO - 6 | C |
| CO - 5 | Apply the technical skills and modern tools in Digital modulation techniques in communication systems. | PSO - 3 | Ap |

**Semester : V Skill based common**

**Name of the Course : Personality Development**

**Course code : SCSB5A**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Understand the importance of personality development, and try to achieve effective goal setting in life . | PSO - | R, U |
| CO - 2 | Explain the advantages and disadvantages of self monitoring, and job performance. | PSO - | U, E |
| CO - 3 | Apply assertiveness in communication and attitude change | PSO - | Ap |
| CO - 4 | Define leadership skills and negotiation skills. Compare types of negotiations. | PSO - | C |
| CO - 5 | Illustrate how to develop emotional quotient and attain stress management. | PSO - | Ap |

**Semester : V Major practical-V**

**Name of the Course : Non-Electronics Practical**

**Course code : SMPHP5**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Demonstrate the experimental techniques and develop competence in handling optical instruments. | PSO - 1 | U |
| CO - 2 | Demonstrate an understanding of the scientific method and apply it in practice. (a familiarity with optics). | PSO - 3 | U/An |
| CO - 3 | Analyze the diffraction and dispersion phenomena in optical elements (grating or prism) using spectrometer. | PSO - 4 | An |
| CO - 4 | Develop practical hands-on experience applying widely used techniques to investigate optical phenomena. (i – d curve) | PSO – 5,7 | E |
| CO - 5 | Understand the theory of Ballistic galvanometer by doing experiments | PSO - 2 | Ap |
| CO - 6 | verify the Thevinins and Norton theorem | PSO - 6 | C |
| CO - 7 | Compile a record of an experiment in a clear and logical written form (e.g., lab manual report, Record) augmented with figures and graphs where appropriate. | PSO - 5 | C |

**Semester : V Major practical-VI**

**Name of the Course: Electronics Practical**

**Course code : SMPHP5, SMPHP7**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Develop knowledge and skills relating to electronics through hands –on learning experiences | PSO-4 | AP |
| CO-2 | Understand the fundamental concepts and mechanisms used in Digital electronics (logic gates and flip- flops) | PSO-2 | U |
| CO-3 | Design and analyze digital systems/ logical circuits | PSO-5 | An/E |
| CO-4 | Analyze and design various combinational and sequential circuits | PSO-3 | An/U |
| CO-5 | Infer the operation of basic logic gates ,understand Boolean algebra and simplify simple function by using basic Boolean properties | PSO-6 | Ap |

**Semester : V Major Core- 10**

**Name of the course : Digital Electronics**

**Course code : SMPH61**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO-1 | Understand the fundamental concepts and techniques used in Digital Electronics. Perform conversions among different number systems. | PSO-2,4 | U, Ap |
| CO-2 | Infer the basic logic gates, understand Boolean algebra and simplify simple Boolean functions by using basic Boolean properties. | PSO-1 | U |
| CO-3 | Explain arithmetic circuits (Half and Full adders), Flip-Flops(RS,JK, JK MASTER-SLAVE, D,T) and Multivibrators. | PSO-4 | C |
| CO-4 | Identify and apply appropriate techniques and to solve problems in Karnaugh Map. | PSO-7 | Ap |
| CO-5 | Understand, analyse and design various combinational and sequential circuits. (Registers, Counters, MUX, DEMUX, Encoder, Decoder etc.) A/D and D/A, Conversion. | PSO-5 | Ap |

**Semester : VI Major Core -11**

**ame of the Course : Quantum Mechanics**

**Course code : SMPH62**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Explain the development of Quantum mechanics. | PSO - 4 | U |
| CO - 2 | Analyze the wave properties of matter. | PSO - 4 | E |
| CO - 3 | Illustrate Heisenberg’s uncertainty Principle. | PSO - 2 | C |
| CO - 4 | Explain physical interpretation of wave function and Schrodinger wave equation | PSO - 5 | C |
| CO - 5 | Understand the applications of Quantum mechanics | PSO - 6 | U |

**Semester :VI Major Core - 12**

**Name of the Cours : Nuclear Physics**

**Course code :SMPH63**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Define the fundamentals of nuclear matter (properties of nucleus and nuclear forces) | PSO-2 | R |
| CO-2 | Apply the principles of physics in the measurement of Nuclear size ,nuclear spin, nuclear energy levels and nuclear magnetic moment. | PSO-2 | Ap |
| CO-3 | Assess radioactivity and various nuclear reactions(nuclear fission and fusion) | PSO-3 | E |
| CO-4 | Explain the decay modes, Radiation detectors and particle accelerators(Ionization chamber, GM conter,Linear accelerators, Cyclotron, Synchro cyclotron ,Betatron) | PSO-5 | U |
| CO-5 | Discuss the classification of elementary particles and their fundamental interaction. | PSO-5 | An |
| CO-6 | Analyze the characteristics and behavior of elementary particles and their fundamental interactions. | PSO-7 | U |
| CO-7 | Develop a deeper understanding of some important applications of Nuclear Reactor and source of Stellar energy. | PSO-4 | C |

**Semester : VI Major Core -13**

**Name of the course : Solid State Physics**

**Course code : SMPH64**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO addressed** | **CL** |
| CO - 1 | Illustrate various crystal structures | PSO - 1 | U |
| CO - 1 | Understand the basic ideas of constructing reciprocal lattices to SC, BCC & FCC lattices | PSO - 1 | C |
| CO - 2 | Discuss the various theories involved in magnetic materials (dia,para,ferro,ferri and antiferro magnetism) | PSO – 2 | E |
| CO - 2 | Describe polarization process and Dielectric loss of dielectric medium | PSO - 2 | E |
| CO - 3 | Illustrate various types of bonding present in solids with example | PSO - 3 | U |
| CO - 4 | Describe and discuss the theory of superconductivity and superconducting materials | PSO - 4 | R |
| CO - 5 | Understand the basic ideas of nanomaterial, their properties, applications . | PSO - 5 | U |

**Semester : VI Major Elective-I (b)**

**Name of the Course : Energy Physics**

**Course code : SCPH6B**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of this course, students will be able to:** | **PSO**  **addressed** | **CL** |
| CO - 1 | Understand the utilization of solar energy for generating the power. | PSO - 8 | Ap |
| CO - 2 | Apply the solar energy in various sectors. ( industry, agriculture and domestic purposes) | PSO - 3 | Ap |
| CO - 3 | Explain the basic principles of wind energy conversion, its components and its classification. | PSO - 1 | U |
| CO - 4 | Explain the various Biomass conversion Processes. | PSO - 7 | U |

**Semester : V and VI Major practical-VII**

**Name of the Course : Non Electronics Practical (V Sem)**

**And General Practical (Vi Sem)**

**Course code : SMPHP7**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Demonstrate the experiment techniques and develop competence in handling optical instruments. | PSO-1 | U |
| CO-2 | Demonstrate an understanding of the scientific method and apply it in practice. | PSO-3 | U/An |
| CO-3 | Analyze the diffraction and dispersion phenomena in optical elements (grating and prism) using spectrometer. | PSO-4 | An |
| CO-4 | Measure the various optical parameters using optical instruments( prism and grating) | PSO-5,7 | E |
| CO-5 | Develop practical hands –on experience applying widely used techniques to investigate optical phenomena (i-d curve ,hyperbolic fringes, elliptical fringes ) | PSO-2 | AP |
| CO-6 | Record analyze, interpret and critically evaluate Cauchy’s constant and Hartmann interpolation formula experimentally | PSO-6 | C |

**Semester : VI Major practical-VIII**

**Name of the Course : Computer Practical Programming In C++ Course code : SMPHP8**

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| --- | --- | --- | --- |
| **CO** | **Upon completion of the course ,students will be able to:** | **PSO**  **addressed** | **CL** |
| CO-1 | Understand the principles of OOP to construct computer programs and modeling experimental data for the solution of problems in physics (period of a pendulum and young’s modulus of a material) | PSO-1 | U |
| CO-2 | Apply OOP techniques to solve computing problems (+, - ,\* , /) | PSO-3 | AP |
| CO-3 | Develop programs using function and classes. | PSO-2 | Ap/C |
| CO-4 | Formulate the applications of pointers and virtual functions. Distinguish formatted and unformatted I/Applications. | PSO-6 | E |
| CO-5 | Develop programs using constructor, destructor, operator overloading and inheritance. | PSO-4 | C |
| CO-6 | Analyze the concepts trained in the computer lad=b activities and provide an understanding of data acquisition and analysis. | PSO-5 | An |

**\*\*\*\*\*\***

**U- Understand**

**R- Remember**

**E- Evaluate**

**Ap- Apply**

**An- Analyse**

**C- Create**