Shri Swami Vivekanand Shikshan Sanstha

Dattajirao Kadam Arts, Science & Commerce , Ichalkaranji

Physics Mechanics-1

B.Sc.-1 paper-1 Outcomes

1) Vectors

1) Student should understand the triangle law and parallelogram law of vector addition and subtraction.

2) Student should understand the analogy between vector product and scalar product and characteristic of each.

3) Student should develop skill in computing vector product, work done, unit vector area of parallelogram.

4) Student should understand the concept of vector, scalar, unit vector, types of vector.

2) Ordinary Differential Equations

1) Student should understand the basic concept equations of differential equations, types of differential equations, different methods of solving differential equations.

2) **)** Student should understand the different methods of solving differential equations, so that they can solve the differential equations and get the solution of differential equation.

3) Student should develop the skill solving different differential equations.

4) Student should develop the skill to apply differential equation solution to finding physical problems like instantaneous current equations, radioactive decay problems etc.

3) Laws of motion

1) Student should understand the basic principles in mechanics and motion so they can find out the exact relation between forces applied on the body and motion of body.

2) Student should understand the concept of frame of references, so that they can imagine what types of forces acting on body correctly and calculate the relations.

3) Student should understand concepts of force and momentum and its unit so that they can understand the Newton's first and second laws and its mathematical statements.

4) Student should develop the skills to solve the problems on force and momentum and also give the application of laws of motion like Rockets, Sports, Ball games, Seat belts etc.

4) Momentum and Energy

1) Student should understand the concepts and units related to momentum and energy, and analyze with the aid of vector diagrams and linear momentum of objects.

2) Student should analyze situations involving concepts of energy and momentum and laws of conservation of momentum and energy. Explain common situations involving work and energy using work energy theorem.

3) Student should investigate motion in a plane through experiments. Solve the problems involving the forces acting on object in linear, projectile and circular motion with aid of vectors, graphs, free body diagrams and angular momentum related to formulas.

4) Student should demonstrate an understanding in qualitative and quantitative terms of concepts of work, energy, momentum etc.

5) Rotational Motion

1) Student should understand the analogy between translational and rotational kinematics so they can write and apply relations among the angular displacements, angular velocity, and angular acceleration of an object that rotates about a fixed axis with constant angular acceleration.

2) Student should understand the motion of rigid object along the surface, so that they can calculate moment of inertia, velocity, acceleration, total kinetic energy of an object that undergoing both translational and rotational motion and apply energy conservation in analyzing such motion.

3) Student should develop skills in computing rotational inertia so they can find the rotational inertia of solid cylinder, spherical shell.

4) Student should understand the concept of torque so they can calculate the magnitude and direction of the torque associated with a given force.

Shree Swami Vivekanand Shikshan Sanstha Kolhapur,

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Class: B.Sc I

Paper: Mechanics II

Course Outcomes:

Topic No.1 Gravitation

1. *Student should* understand the basic laws of gravitation such as Newton's law of motion, Keplar*'s laws of planetary motion*
2. *Student* understand the geosynchronous orbit, *weightlessness, also* the motion of satellite in circular orbit and *expression for velocity and time period satellite*
3. *Student Should* understand the various applications of GPS and to know various applications of GPS in industrial, navigation and military areas
4. Student should acquire a skill to utilize the GPS system in everyday life problems

Topic No.*2 Oscillations*

1. Student should know the basic concepts of SHM, free oscillations, damped oscillations and forced oscillations and also about energy of SHM
2. Student should understand the differential equation and solution of SHM, damped and forced oscillations
3. Student should recognize the applications of SHM, damped and forced oscillations in real life
4. Student should solve for the solutions and describe the behavior of a damped and forced oscillations

Topic No.*3 Elasticity*:

1. Student should know about the basic concepts of elasticity, bending moment, torsional oscillations, and modulus of rigidity
2. Student should understand the elastic properties of matter and expression for bending of beam with applications as a cantilever
3. Student should understand torsional oscillations and the expression for torsional couple per unit twist
4. Student should determine the modulus of rigidity(η), Young's modulus(Y) and Poission's ratio(σ) by Searle's

Topic No.*4 Surface Tension*

1. Student should understand the concept of surface tension and its relation with the excess of pressure and radius of curvature
2. Student should understand the concept of angle of contact, wettability
3. Student should know about different applications of surface tensioin in everyday life
4. Student should solve the examples based on surface tension

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Course Outcomes

ELECTRICITY AND MAGNETISM - I (PAPER- III)

B.Sc. I, Semester: I (PHYSICS)

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This course gives quick introduction to Electricity and magnetism. This course gives an overview and understanding of basic physics. It provides a basis for further study of vectors, electricity and magnetism. Content will include: Gradient of scalar field, divergence of vector field, curl of vector field, Line, Surface and volume integral of vector field, Gauss' diversion theorem and their physical significance, Electric flux, electric dipole, capacitance of isolated spherical conductor, capacitance of parallel plate condenser, polarization, parallel plate capacitor with completely filled dielectric.

Course Outcomes:-

1. Show an understanding of principles of vector analysis and concepts of electrostatics
2. Understand the ideas regarding to electric field as containing energy and capacitance of a parallel plate capacitor, capacitance of spherical and cylindrical condensers
3. Apply methodologies vector analysis while solving problems
4. Use mathematical and vectorial operations to quantify and analyse the nature of electric forces and field
5. Solve problems involving combinations of electric force, electric field and electric potential quantities

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Course Outcomes

ELECTRICITY AND MAGNETISM-II (PAPER-IV)

B.Sc. I, SEMISER-II (PHYSICS)

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This course develops concepts in electricity and magnetism such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of current electricity. Content will include:- Complex number, Admittance and susceptance of A.C Circuit, Owen's Bridge ,Biot - Savart's law, Ampere's Circuital law ,magnetic properties of the material ,faraday's law of electromagnetic induction ,Lenz's law ,energy stored in magnetic field, Equation of continuity of current ,Maxwell's equations, Electromagnetic wave propagation through vacuum , Electromagnetic wave propagation in isotropic dielectric medium

Course Outcomes: -

1. Student should understand the A.C series L.C.R. circuit and resonance in series L.C.R. circuit

2. Student should develop skill in computing Maxwell's equation problems and A.C circuit.

3. Apply law such as Bio t - Savart's and Lenz's law for selected problems in electricity and magnetism.

4. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.

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Course Outcomes

Thermal Physics & Statistical Mechanics-I (Paper-V)

B.Sc. II (PHYSICS)

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Thermodynamics is a course that explores the concepts of heat and how it can be converted to power, and covers all aspects of energy and energy transfer including power production, refrigeration and property relation of substances. This course has a history of being labeled as one of tough courses. Therefore, it is a challenge for any lecturer who teaches thermodynamics to convince and make students understand the basics concepts of thermodynamics especially the concepts of entropy and Second Law of Thermodynamics which seems to student as abstract things.

Course Outcomes:-

1) Ability to understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
2) Ability to conduct experiments regarding the measurement and calibration of temperatures and pressures in groups.
3) Ability to identify the properties of substances on property diagrams and obtain the data from property tables.
4) Ability to define energy transfer through mass, heat and work for closed and control volume systems.
5) Ability to apply the first Law of Thermodynamics on closed and control volume systems.
6) Ability to apply Second Law of Thermodynamics and entropy concepts in analysing the thermal efficiencies of heat engines such as Carnot and Rankine cycles and the coefficients of performance for refrigerators.

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Course Outcomes

Wave and Optics I (Paper-VI)

B. Sc. II, Semester-II (CBCS)

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Waves & optics I paper has S.H.M of waves at different frequencies, coupled oscillator, normal modes of oscillator, wave motion & ultrasonic waves are useful in research students can understand briefly by knowing piezoelectric effect. To know the acoustic of buildings for problem solving in applied physics. For gaining material structure to know viscosity & pressure at low physics.

Deep discipline knowledge

- informed and infused by cutting edge research, scaffold throughout their program of studies
- acquired from personal interaction with research active educators, from year 1
- accredited or validated against national or international standards (for relevant programs)

Critical thinking and problem solving

- steeped in research methods and rigor in optics & low pressure physics
- based on empirical evidence and the scientific approach to knowledge development
- demonstrated through appropriate and relevant assessment

Teamwork and communication skills

- developed from, with, and via this syllabus
- honed through assessment and practice throughout the program of studies
- encouraged and valued in all aspects of learning

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Course Outcomes

Thermal Physics & Statistical Mechanics-II (Paper-VII)

B.Sc. II, Sem: IV (PHYSICS)

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This course develops concepts in classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, micro canonical, canonical and grant canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; selected topics from low temperature physics and electrical and thermal properties of matter are discussed.

Course Outcomes:-

1. Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.
2. Be able to use thermal and statistical principles in a wide range of applications.
3. Learn a variety of mathematical and computer techniques.
4. statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics
5. Apply the principles of statistical mechanics to selected problems.
6. apply techniques from statistical mechanics to a range of situations
7. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.
8. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanation.

"Dissemination of Education for Knowledge, Science and Culture"

-Shikshan Maharshi Dr. Bapuji Salunkhe

Dattajirao kadam Art's Science & Commerce College Ichalkaranji.

Department of Physics

B. Sc. II Semester-III (CBCS)

Wave and Optics II Paper No.-VIII

Course outcome

After successful completion of the course, the student is expected to:

1. The students will introduce about the cardinal points in optical instrument, and knowledge about the graphical representation of points.
2. The course will give knowledge about the resolving power of instruments.
3. Understand the physics behind various phenomenon in wave and optics.
4. Understand various phenomenon and the cause or origin of them.
5. Explain the relationship in between various optical phenomenon with the Fourier series and matrix.
6. Students have understood the concept of polarization of light.
7. Be able to apply the principle of optics and its applications in the different field of science & Technology

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B.Sc. Part III, SEMISER-V

PHYSICS (PAPER-IX)

DSE-E1 MATHEMATICAL PHYSICS

Course Outcomes

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After successful completion of the course, the student is expected to:

1) To know the orthogonal curvilinear Co-ordinate system from three different co-ordinate systems, have gained ability to apply for solving selected problem on it
2) Be able to apply differential equations of variations to diverse problems in physics including isoperimetric problems. Another interesting aspect is the use of Laplace equation and wave equation in solving physics problems.
3) To become familiar with the method of separation of variables to solve linear differential equations with inhomogeneous term.
4) To find solutions to integral equations using different methods. The students should be able to explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics.
5) Apply the principles of statistical mechanics to selected problems and also basic concepts apply for research area.
6) Grasp the basis of ensemble approach in statistical mechanics to a range of situations
7) To learn the fundamental differences between classical and quantum statistics and learn about quantum statistical distribution laws

After successful completion of the course, the student is expected to:

C01: have gained a clear understanding of Maxwell's equations and electromagnetic boundary conditions.
C02: know that laws of reflection, refraction are outcomes of electromagnetic boundary conditions. They will also be able design dielectric coatings which act like antireflection coatings. They will be able to distinguish between a good metal and a good dielectric.
C03: have grasped the idea of electromagnetic wave propagation through wave guides and transmission lines.
C04: extend their understanding of special theory of relativity by including the relativistic electrodynamics.
C05: understand the rather complex physical phenomena observed in plasma.

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B.Sc. Part III, SEMISER-V

PHYSICS (PAPER-X)

DSE-E2 QUANTUM MECHANICS

Course Outcomes

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After successful completion of the course, the student is expected to:

1) This course develops concepts in quantum mechanics such that the behavior of the physical universe can be understood from a fundamental point of view.
2) Understand historical background and development of the quantum mechanics.
3) Understand and explain the major differences between classical and quantum mechanics.
4) Understand the central concepts and principles in quantum mechanics, such as the Schrodinger equation, the wave function and its statistical interpretation, the uncertainty principle, stationary and non-stationary states.
5) It provides a basis for further study of quantum mechanics. Content will include: Review of the Schrodinger equation, operators, Eigen functions, compatible observables, infinite well in one and three dimensions, degeneracy, scalar products of wave functions, completeness relations, matrix mechanics; harmonic oscillator in one and three dimensions; sudden approximation; central potentials, quantization of angular momentum, separation of radial and angular variables, spherical harmonics, hydrogen atom, spin.

After successful completion of the course, the student is expected to:

CO1: Show an understanding of wave mechanics in three dimensions.

CO2: Describe the structure of the hydrogen atom and show an understanding of quantization of angular momentum.

CO3: Apply techniques such as differential methods and ladder operators for selected problems in quantum mechanics.

CO4: Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.

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B.Sc. Part III, SEMISER-V

PHYSICS (PAPER-XI)

DSE-E3 CLASSICAL MECHANICS AND CLASSICAL ELECTRODYNAMICS

Course Outcomes

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After successful completion of the course, the student is expected to:

This course develops concepts in Classical mechanics such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of Classical mechanics. Content will include: Motion in central force field, Degrees of freedom, Moving co-ordinate system, generalized Co-ordinates, D' Alembert's principle, Coupled oscillation, Coriolise force, Motion of rigid body, Lagrange's and Hamilton's equation, symmetries and laws of conservation.

After successful completion of the course, the student is expected to:

CO1: Student should understand Motion in central force field and D' Alembert's principle.
CO2:Student should develop skill in computing Degrees of freedom and generalized coordinate.
C03: Student should develop a qualitative understanding of Coupled oscillation.
CO4: Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.

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B.Sc. Part III, SEMISER-V

PHYSICS (PAPER-XII)

DSE-E4 DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION

Course Outcomes

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After successful completion of the course, the student is expected to:

1) To illustrate the students different electronic circuit and their application in practice.
2) To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
3) To evaluate the use of computer-based analysis tools to review performance of semiconductor device circuit.

After successful completion of the course, the student is expected to:

CO1: Identify relevant information to supplement to the Analog Electronic Circuit EC (EE) 301 course.
CO2: Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.
CO3: Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions.
CO4: Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.
CO5: Practice different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.
CO6: Prepare professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data a

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B.Sc. Part III, SEMISER-VI

PHYSICS (PAPER-XIII)

DSE-F1 NUCLEAR AND PARTICLE PHYSICS

Course Outcomes

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After successful completion of the course, the student is expected to:

Graduate students will have knowledge of how modern science tries to answer the big questions about the universe. In addition to this, students will have learned about how new ideas go from fundamental research to actual utilization in everyday life, in the way that nuclear physics is used in medicine. In elementary particle physics we research the smallest building blocks of the universe to understand unanswered questions about dark matter, antimatter and the origin and evolution of the universe. Within astro-particle physics there is the study of elementary particles in the universe by use of telescopes, to understand and explain unsolved phenomena. In high energy nuclear physics we research the behavior of nuclei under extreme conditions, especially the quark-gluon plasma that existed for about one microsecond after the Big Bang.

Course Outcomes:-

CO1: Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly assessed on the physics exams like NET, SET, GATE, JEST, TIFR etc.

CO2: Develop and communicate analytical skills in subatomic physics.

CO3: Develop familiarity with nuclear and particle physics, facilitating informed decisions as students pursue research projects, internships, careers, and graduate study.

CO4: Learn about topics of interest independently, and subsequently organize and present information to each other and to a group, at an appropriate level for their target audience

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B.Sc. Part III, SEMISER-VI

PHYSICS (PAPER-XIV)

DSE-F2 SOLID STATE PHYSICS

Course Outcomes

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After successful completion of the course, the student is expected to:

1) Students will be able to analyze different types of matter depending on nature of chemical bonds and their properties.
2) Students will be able to analyze crystal structures by applying crystallographic parameters.
3) Students will be able to determine the crystal structure by analysis of XRD data.
4) Students will be able to evaluate and analyze the chemical and optical properties of solids.
5) Students will be able to analyze electron transport and energy related problems by applying quantum mechanical principles.
6) Students will be able to analyze the lattice vibration phenomenon in solids.
7) Students will be able to outline the importance of solid state physics in the modern society.

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B.Sc. Part III, SEMISER-VI

PHYSICS (PAPER-XV)

DSE-F3 ATOMIC AND MOLECULAR PHYSICS AND ASTROPHYSICS

Course Outcomes

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After successful completion of the course, the student is expected to:

1) Know about different atom model and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields.
2) Have gained ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules
3) Be able to apply the principle of Raman spectroscopy and its applications in the different field of science & Technology.
4) To become familiar with different resonance spectroscopic techniques and its applications.
5) To find solutions to problems related different spectroscopic systems.
6) Describe theories explaining the structure of atoms and the origin of the observed spectra.
7) Identify atomic effect such as Zeeman Effect and Anamolus Zeeman effect
8) Explain the observed dependence of atomic spectral lines on externally applied electric and magnetic fields.

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B.Sc. Part III, SEMISER-VI

PHYSICS (PAPER-XVI)

DSE-F4 ENERGY STUDIES AND MATERIALS SCIENCE

Course Outcomes

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After successful completion of the course, the student is expected to:

1) Describe theories explaining the structure of atoms and the origin of the atomic disorder in material.
2) Students are able to understand resources of renewable energy, solar energy.
3) Able to gain the research methods of nanotechnology in material science. Also to known what is the phenomenon of nanotechnology.
4) To know the conductivity of material & superconductivity of material this is useful in research area.
5) Be able to apply the principle of nanotechnology and its applications in the different field of science & Technology
6) Be able to apply the principle of renewable energy sources and its applications in the different field of science & Technology.