Physics

Department of Physics

Course Specific outcomes: B. Sc.

Teaching activities:

1. Theoretical sessions.
2. Practical sessions.
3. Problem solving sessions.
4. Numerical simulation practices.
5. Presentations/group discussions/projects
6. Self study
7. Examinations.

PROGRAM SPECIFIC OUTCOMES

First Year (I & II Semester)

Students will be able to articulate and describe:

1. Knowledge about forces that help the students in their daily life.
2. The velocity and acceleration parameter give the knowledge about how the vehicles move and about the rolling concept.
3. Relative motion, Inertial and Non-inertial reference frame.
4. Parameters of defining the motion of mechanical systems and their degrees of freedom.
5. Study of the interaction of forces between solids in mechanical systems.
6. Centre of mass and inertia of mechanical system, Newton's laws of motion and conservation principles.
7. Introduction to analytical mechanics as a systematic tool for problem solving.
8. Basic concepts of special relativity and its applications to physical sciences.
9. How electric current can generate a magnetic field.
10. How to create electromagnet.
11. How electricity and magnetism work together in electric motors and generators.
12. How magnetic field can be generated and applications of magnetic field.
13. Various phenomena like ferromagnetism, paramagnetism, aniti ferromagnetism.
14. Concept of mechanics, acoustic and the properties of matter.

15. Physical characteristics of SHM and obtaining solution of the oscillator using differential equations.

16. Calculate logarithmic decrement relaxation factor and quality factor of a harmonic oscillator.

17. Solve wave equation and understand significance of longitudinal and transverse waves.

18. Solve wave equation of a longitudinal vibration inn bars free at one end and also fixed at both the ends.

Second Year (III & IV Semester)

On satisfying the requirements of this course, students will have knowledge and skill to:

1. Know the principles of structures determination by diffraction.

2. Understand the principles and techniques of X-rays diffraction.

3. Know the fundamental principles of semiconductors and be able to estimate the charge carrier mobility and density.

4. Give an extended knowledge about magnetic properties like diamagnetic, paramagnetic, ferromagnetic, ferrites and superconductors.

5. Study kinetic theory of Gases.

6. Study Maxwell Relations and Application.

7. Know the elementary concept of statistics.

8. Understand statistical distribution of system of particles.

9. Study statistical ensembles.

10. Study Quantum statistics.

11. Understand the physics behind various phenomena in wave and optics.

12. Gain knowledge on various theories of light.

13. Acquire skills to identify and apply formulas of optics and wave physics.

14. Understand the properties of light like reflection, refraction, interference, diffraction etc.

15. Understand the applications of diffraction and polarization.

16. Understand the applications of interference in design and working of interferometers.

17. Understand the working and applications of different optical instruments.

Third Year (V& VI Semester)

After completion of this course students are able to:

1. Know the Rutherford Experiment of atom.
2. Understand molecular spectra of atom.
3. Study the Raman spectra.
4. Study the Zeeman Effect.
5. Understand the Quantum Numbers.
6. Understand De-Broglie hypothesis and Uncertainty principle
7. Derive Schrodinger"s time dependent and independent equations
8. Solve the problems using Schrödinger"s steady state equation
9. Get knowledge of rigid rotator.
10. Understand different operators in Quantum Mechanics.
11. Know the properties of nucleus likes binding energy, magnetic dipole moment and electric quadruple moment.
12. Understand the concept of radioactivity and decays law.
13. Study achievement of Nuclear Models of Physics and its limitations.
14. Have an extended knowledge about nuclear reactions such as nuclear fission and fusion.
15. Understand the basic concept of Particle Physics
16. Know the special purpose Diode.
17. Study the Transistor Amplifier.
18. Understand the FET, JFET,MOSFET.
19. Study the Regulated Power supply.
20. Understand the Logic Circuits.
21. Know the history of LASERS and its basic concepts.
22. Understand the basic principle and working of different types of lasers. CO-23. Know the applications of lasers in various fields.
24. Understand the characteristics of LASERS.
25. Learn safety precautionsand measures while handling the lasers.

Course Specific outcomes: M. Sc.

Teaching activities:

1. Theoretical sessions.
2. Practical sessions.
3. Problem solving sessions.
4. Numerical simulation practices.
5. Presentations/group discussions/projects
6. Self study
7. Examinations.

M. Sc. I Year (I & II Semester)

PROGRAM SPECIFIC OUTCOMES

Thiscourse enables the students to understand:

1. TheLagrangian and Hamiltonian approaches in classical mechanics.

2. The classical background of Quantum mechanicsand get familiarized with Poisson brackets and Hamilton -Jacobi equation

3. Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion.

4. Theory of small oscillations in detail along with basis of Free vibrations.

5. Learn about Gradient, Divergence and Curl in orthogonal curvilinear and their typical applications in physics.

6. Special type of matrices that are relevant in physics and then learn about tensors.

7. Special functions like Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions and their recurrence relations

8. Different ways of solving second order differential equations and familiarized with singular points and Frobenius method.

9. Fundamentals and applications of Fourier series, Fourier and Laplace transforms,their inverse transforms etc.

10. The 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.

The idea of electromagnetic wave propagation through wave guides and transmission lines.

12. Special theory of relativity by including the relativistic electrodynamics.

13. The rather complex physical phenomena observed in plasma.

14.Postulates of statistical mechanics.

15. Statistical interpretation of thermodynamics micro canonical, canonical and grand canonical ensembles.

16. Methods of statistical mechanics are used to develop the statistics for Bose-Einstein and Fermi-Dirac.

17. The application of Time- independent Perturbation Theory.

18. The WKB approximation. [illegible]. Know the application and validity of Born Approximation.

19. Different atomic models and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields.

20. The techniques of microwave and infrared spectroscopy to elucidate the structure of molecules

21. The application of the principle of Raman spectroscopy and its applications in the different field of science & Technology.

22. Different resonance spectroscopic techniques and its applications

23. Solutions to problems related with different spectroscopic systems.

M.Sc. 2nd Year (IIIrd & IVth Semester)

After completion of this course students are able to:

1. Understand basic concepts via structural properties of materials.

2. Understand the basic transport properties of metals and semiconductors.

3. Understand the band structures for studying different materials.

4. Have basic knowledge of nuclear size ,shape , bindingenergy.etc and also the characteristics of nuclear force in detail.

5. Gain knowledge about various nuclear models.

6.Acquire knowledge about nuclear decay processes and their outcomes and have a wide understanding regarding Alpha, beta and gamma decay.

7. Understand the basic forces in nature and classification of particles and study in detail conservations laws and quark models in detail

. Have a basic knowledge of crystal systems and spatial symmetries,- be able to account for how crystalline materials are studied using diffraction, including concepts like reciprocal lattice and Brillouin zones.

9.Know what phonons are, and be able to perform estimates of their dispersive and thermal properties.

10. Know Bloch's theorem and what energy bands are and know the fundamental principles of semiconductors.

11. Know the fundamentals of dielectric and ferroelectric propertiesof materials.

12. Know basic models of dia, para and ferro magnetism. CO6 – be able to explain superconductivity using BCS theory

13. 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.

14. Have gained ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules.

15. Apply the principle of Raman spectroscopy and its applications in the different field of science & Technology.

16. Understand Field Effect Transistors, their principles and applications.

17. Understand basic operational amplifier characteristics, OPAMP parameters,applications as inverter, integrator, differentiator etc.

18. Understand digital electronics basics using logic gates and working of major digital devices like flip flops, CMOS, CCD etc.

19. Understand Karunagh's map, flip-flops,counters and working of Microprocessor in detail.

20. Understand signal and noise measurement considerations in electronics and communications.

21. Understand electromagnetic wave propagation in guided media and unguided media.

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