# (PH-126) - Physics

## Course Outline:

**Theory:**

1. **Vectors:**
    1. Vectors & vector derivatives.
    2. Gradient of a scalar functions.
    3. Line and surface integrals.
    4. Curl & divergence.
2. **Mechanics:**
    1. Coordinate systems.
    2. Motion under constant acceleration.
    3. Uniform circular motion.
    4. Projectile motion.
    5. Frictional forces.
    6. Fluid friction.
    7. Work and energy principle.
    8. Angular momentum.
3. **Elasticity:**
    1. Stress and strain;
    2. Elastic properties of matter;
    3. physical basis of elasticity;
    4. tension;
    5. compression and sharing;
    6. modulus of rigidity;
    7. relation between three types of elasticity.
4. **Wave, Optics and Laser:**
    1. Standing waves and its analytical treatments;
    2. travelling waves;
    3. interference;
    4. diffraction and polarization phenomenon;
    5. laser;
    6. stimulated emission;
    7. population inversion;
    8. laser applications.
5. **Modern Physics:**
    1. Inadequacy of classical physics:
        1. Black body radiation;
        2. photoelectric effect;
        3. Compton scattering;
    2. De-Broglie wave particle duality hypothesis;
    3. Uncertainty principle;
    4. Quantum physics.
    5. Atomic spectrum:
        1. Atomic spectra;
        2. Bohr theory and hydrogen spectrum; Modification and generalization.
6. **Nuclear physics:**
    1. Properties of nuclear;
    2. nuclear stability;
    3. Alpha, Beta and Gamma decay.
    4. Radioactivity & radioactive equilibrium;
    5. secular equilibrium;
    6. radiation detectors;

7. GM tube;
8. counters and nuclear reactor.

7. **Thermodynamics:**
    1. Closed and open systems;
    2. specific heats;
    3. thermal expansion;
    4. internal energy;
    5. enthalpy and specific heat of ideal gasses;
    6. heat transfer;
    7. energy transfer by work;
    8. mechanism of heat transfer;
    9. Zeroth law, first law; (application for closed and open systems);
    10. second law and third law of thermodynamics; ### **Practical:**
8. Study of Hook's Law
9. Measuring stress, strain and Young's Modulus of different materials
10. Study of Surface Tension and Viscosity of liquids
11. Study of Boiling points of liquids
12. Study of Gas laws
13. Venturi effect of liquids in motion
14. Heat transfer and entropy
15. Study of light, Color addition, Refection and Prism
16. Measurement of Snell's Law
17. Convex and Concave Lens
18. Study of reversibility and Dispersion of Light
19. Focal point and Magnification of Thin lens
20. Focal point and Magnification of Concave Mirror
21. Telescope and Microscope
22. Calculation of speed of Sound

---

## Suggested Teaching Methodology:

- Lecturing
- Written Assignments Report Writing

## Suggested Assessment:

### Theory (100%)

- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm(30%)
- Final Term (50%)

### Laboratory (100%)

- Labs

## Text and Reference Books:


1. David Halliday, Robert Resnick and Jearl Walker, WIE Fundamentals of Physics, 7th ed. 2005, John Wiley & Sons, ISBN:0471465097
2. Arthur Beiser, " Schaum's Outline of Applied Physics, 4th ed. 2004, McGraw-Hill, ISBN:0071426116
3. Hobbie, Russell, Intermediate physics for medicine and biology-4th edition, 2007