

## **Department of Mathematics**

### **Modern Physics- BS-IV**

#### **Course Contents: (Mid Term)**

**Nuclear physics:** Basic properties of a nucleus, Mass and Atomic Numbers, Isotopes, Mass and size of a nucleus, Nuclear Force (Basic Idea), Nuclear Radii, Nuclear Masses, Binding Energy, Mass Defect, Nuclear Spin and Magnetism and Nuclear Force.

**Natural Radioactivity:** Laws of radioactive decay, Half Life, Mean Life, Chain Disintegration: Alpha, Beta and Gamma decays (Basic Idea), Measuring ionizing radiation (units i.e. curie, Rad, etc.)

**Nuclear Reactions:** Basic nuclear reactions, Q value, Exothermic, Endothermic, Nuclear Model, Nuclear reactors (Basic), Nuclear Fusion, Thermonuclear Nuclear Fusion, Stars.

#### **Course Contents: (Final Term)**

**Quantum Mechanics:** Postulates of Quantum Mechanics, Quantum Operators, Linear Operators & Their properties e.g. momentum operator, energy operator, eigen value equation, eigen values and eigen functions, Schrodinger equation (time dependent and time independent without derivation) and its applications to step potential, free particle, barrier, tunneling (Basic Idea), particle in a well, probability density using wave functions of states.

**Introduction to Quantum Optics (Laser) and Plasma Physics:** Basic concepts of plasma and its applications, controlled thermonuclear fusion and its basic concept of plasma and its requirement for a T.N. reactor, Basic concepts of characteristics of Laser, Different types of lasers, working of He-Ne Laser, semiconductor diode laser.

### **Physics Lab. III**

#### **Experiments: (Mid Term)**

1. To setup transistor oscillator circuit and measure its frequency by an Oscilloscope
2. To setup and study various logic gates (AND, OR, NAND etc. using diode and to develop their truth table.
3. To set up an electronic switching circuit using transistor LDR and demonstrate to use as a NOT Gate.

#### **Experiments: (Final Term)**

1. Determination of  $e/m$  of an electron.
2. To study the characteristics curves of a G.M counter and use it to determine the absorption co-efficient of  $\beta$ -particle in Aluminum.
3. Mass absorption coefficient of lead for  $\gamma$ -rays using G.M counter.