

## Vocational Skills Course

**CCS 517 - Commercial and Green Synthesis**

**(Credit-2)**

### **UNIT I: Disconnection Approach**

Introduction to synthons and synthetic equivalents, disconnection approach (basic concept only), functional group inter-conversions and importance of the order of events in organic synthesis. One group C-X and C-C along with two group C-X disconnections (case studies of representative molecules are required). Reactivity umpolung and importance of functional group protection in organic synthesis. Principle of protection of alcohol, amine, carbonyl and carboxyl groups.

### **UNIT II Green Chemistry**

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry, Twelve principles of Green Chemistry, solvent-free organic reactions. Green solvents– water, super critical fluids as a solvent for organic reactions, ionic liquids. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.

**CCS 518: Nanoscience**

**Credit-2**

### **UNIT I:**

***Properties of Nanomaterials :Introduction:*** Properties of materials & nanomaterials, role of size and shape in nanomaterials.

***Electronic Properties:*** Classification of materials: Metal, Semiconductor, Insulator, Band structures, Brillouin zones, Mobility, Resistivity.

***Magnetic Properties:*** Superparamagnetism, blocking. Important properties in relation to nanomagnetism.

***Optical Properties:*** Photoconductivity, Optical absorption & transmission, Photoluminescence, Fluorescence, Phosphorescence, Electroluminescence. Thermal Properties and Mechanical Properties;

### **UNIT II:**

***Synthesis of Nanomaterials :***

***Chemical Methods:*** Metal nanocrystals by reduction, Solvothermal synthesis, Photochemical synthesis, Electrochemical synthesis, Nanocrystals of semiconductors and other materials by arrested precipitation, Thermolysis routes, Sonochemical routes, Post-synthetic size-selective processing. Sol-gel, Micelles and microemulsions.

***Biological Methods of Synthesis:*** Use of bacteria, fungi, Actinomycetes for nanoparticles synthesis, Magnetotactic bacteria for natural synthesis of magnetic nanoparticles; Mechanism of formation; Viruses as components for the formation of nanostructured materials; Synthesis process and application, Role of plants in nanoparticle synthesis.