

**Major Based Elective II : Nuclear and Industrial Chemistry**

**UNIT 1: NUCLEAR CHEMISTRY I**

Introduction - composition of nucleus and nuclear forces (meson field theory)- nuclear stability - mass defect - binding energy - packing fraction - N/P ratio, magic numbers - nuclear models - liquid drop - shell and collective model - Isotopes - detection and separation - deviation of atomic weights from whole numbers - isobars isotones and isomers.

**UNIT 2: NUCLEAR CHEMISTRY II**

Radioactivity – discovery, detection and measurements, laws of radioactivity - rate of disintegration - half life and average life, group displacement law - radio active series - nuclear transformation - use of projectiles - nuclear reactions - fission and fusion - nuclear reactors, applications of nuclear science in agriculture and medicine- carbon dating - rock dating - radioactive waste disposal.

**UNIT 3: INORGANIC SOLID STATE CHEMISTRY**

Radius ratio rule its application in determination of structure of solids like Zones, Wurzite, fluorite, anti-fluorite,  $CdI_2$  and  $NiH_2$  - crystal defects - Schottky and Frenkel defects- group theories and its applications - symmetry elements - symmetry operations - mathematical group multiplication tables - point group of simple molecules ( $H_2$ ,  $HCl$ ,  $CO_2$ ,  $H_2O$ ,  $BF_3$ ,  $NH_3$ )

**UNIT 4: INDUSTRIAL INORGANIC CHEMISTRY**

Fossil fuels - varieties of coal and petroleum - petroleum refineries in India- fuel gases - calorific value - composition and preparation of water gas, semi water gas, carburetted water gas, producer gas, natural gas, LPG and biogas.  
Fertilizers - manufacture of N-P-K and mixed fertilizers - micronutrients and their role in plant life- safety matches, fire works and explosives - manufacturing details  
paints and varnishes - manufacture and uses.

**UNIT 5: ENVIRONMENTAL CHEMISTRY**

Soil, water and air pollution - control measures - ozone hole - green house effect - acid rain - global warming. effluents and their treatment from various industries like dyeing, cement, tannery and distillery units.

**Books for Reference :**

1. Soni P.L., Text book of Inorganic Chemistry, S.Chand & Co, New Delhi (2006)
2. Lee J.D., concise Inorganic Chemistry ELBS edition.
3. Puri B.R. and Sharma L.R., Principles of Inorganic Chemistry, soban Lal Nagin Chand & Co.
4. Satyaprakash, Tuli, G.D., Basu, S.K., and Madan, R.D,] Advanced Inorganic chemistry (vol I & II ), S. Chand, New Delhi (2006)