MATERIALS SCIENCE	(For students admitted from June 2008)	
Semester: V	Hours/Week: 6	Credits:4

UNIT 1: INTRODUCTION:

Review of atomic structure - Classification of materials and their properties - Structure property relationship. (Ch.1p.1-7)*

UNIT 2: ELEMENTS OF SOLID STATE SCIENCE

Crystalline and amorphous solids - crystal lattice - Seven crystal systems and fourteen Bravais lattices - Miller indices - X ray crystallography (comparison of electron, neutron and X- ray diffraction – broad outline) - Laue, rotating crystal and powder methods - Structure determination - Defects in solids - Point, line, surface and volume defects. (Introductory ideas). (Ch.3 p.21 – 47; ch.6 full).

UNIT 3: ELECTRONIC STRUCTURE OF SOLIDS:

Types of crystal structure - Ionic, Covalent. Metallic and Molecular structures - Binding energy - Crystal of compounds - AX,AX_2 A_2X_3 types of compound (ch.4 full;ch upto p.97).

UNIT 4: DIELECTRICS AND RELATED PROPERTIES:

Free electron theory of metals - Bands and zones in solids - Classification of solids into insulators, semiconductors and metals - Super conducting materials and super ionic conducting materials (qualitative) - Electric dipoles in constant and alternating fields - Methods - Dielectric strength - Breakdown of dielectric materials - Thermal and discharge breakdown - Chemical deterioration - Ceramic and ferroelectric materials (ch.14 & 17 full).

UNIT 5: MAGNETIC MATERIALS:

Fundamentals of magnetism and related equations - classification into Dia, Para, Ferro, Anti-Ferro and Ferromagnetic materials - Classical theories of dia and paramagnetism - ferromagnetism and related phenomena - Domain theory - Soft and hard magnetic materials - Ferrites and their uses (ch.16 full).

UNIT 6: POLYMERS:

Polymer molecules - Molecular length of polymers - Molecular weight of polymers - Osmotic pressure, viscosity and light scattering methods - Types of polymers - Thermoplastic and thermosetting materials - Polymerization process - Polymer classification on basis of structural shapes of polymer molecules - Thermal transitions in polymers - Conducting Polymers - polymer application (ch.5 p.101 - 109).

Book for Study:

1. V.Raghavan, *Materials Science and Engineering First Course* 5th edition, prentice Hall (India) Ltd., (2004).
2. *Science of Engineering Materials Vol.1&2,* LCUE edn. Manas Chanda:(Low cost university Edition1979).
3. R.S.Khurmi, R.S Sedha , *Materials Science* 2nd Edition , S.Chand & Co. ltd.,(1989).

Book for References:

1. R.P. Feynman, R.B. Leighton and M.Sands, *The Feynman Lectures on Physics* (1989) Narosa Publishing House Addison, Wesley Publishing Company (1969).
2. Robert Resnick and David Halliday – *Physics Part I and II,* Wiley Eastern Private Limited, New Delhi (1969).
3. Charles D.Hodgman, Robert C.Weast and Samuel M.Selby, *Hand Book of Chemistry and Physics* 85th edition (2005), The Chemical Rubber Publishing Co, Cleveland(1960).