SUBJECT NO-MS31007, SUBJECT NAME- MATERIAL SCIENCE

LTP- 3-0-0,CRD- 3

SYLLABUS :-

Introduction to materials : metals and alloys, ceramics, polymer, semiconducting materials (application and engineering materials). Crystal structure of materials, Miller indices, x-ray diffraction techniques : chemical bonding; ionic, covalent, metallic etc., and related aspects : state of aggregation, glass formation, crystallization. Hume-Rothary rules of alloying. Defects in solids : point, line, planer defects and their role in different properties of materials. Diffusion in solids. Phase diagrams : monocomponent and binary systems, noin-equilibrium phase diagrams : applications (examples of selected systems). Kinetics of phase transformation, heat treatment of materials. Mechanical properties of materials : elastic, visco-elastic and plastic behavior, stress-strain relationship, relaxation and creep, strengthening mechanisms and fracture. Thermal properties : specific het, expansion, conductivity and application of these properties in selection of materials. Electrical and electronic properties : good conductors, insulators and semiconductors. Free electron theory, band theory, Fermi-Dirac statistics. Dielectric polarization, dielectric constant and loss measurements. Magnetic properties : diamagnetic, materials, applications, Optical properties : absorption and emission lasers. Environmental effects on materials