MANGALORE UNIVERSITY

Department of Materials Science

MSc Materials Science

MSE 457: **SCIENCE OF MATERIALS IN DAILY LIFE** (open elctive-1)(3 Credits)

Objectives: Objective of the present course is to give a fundamental knowledge about technologically important materials such as metals, semiconductors, polymers, composite materials, ceramic materials and basic semiconductor devices to the non-materials science students.

Expected course outcomes: This course imparts basic knowledge on the topics studied to the students who are not studying materials science..

Unit I

Conductors: Metals, Alloys, Semiconductors- Definition, elementary ideas of electrical properties, optical properties, mechanical properties, thermal properties. Specific examples of metals- Copper, Aluminium, Iron, Gold, Silver. Uses of metals. Drawbacks of metals. Alloys- advantages of alloying. Examples-Brass, Bronze, Steel, Stainless steel, Gold alloys, silver alloys and their uses.

Semiconductors: Elemental semiconductors- Silicon, Germanium. Doping- n-type and p-type semiconductors, p-n junctions. Qualitative ideas of devices- diodes to ICs. Compound Semiconductors. 14 hours

Unit II

Polymers and composites: Plastics- Introduction. Types of plastics. Rubber- Types of rubber. Vulcanization of rubber. Fibres- Different types of natural and synthetic fibres. Resins, Adhesives and polymer coatings. Physical, chemical, mechanical properties and applications of polymers. Recycling of polymers.

Composites- Introduction, types. Wood, Concrete, FRP and some advanced composites. Properties and applications. 14 hours

Unit III

Ceramics and Glasses: Ceramics- Introduction, classification, raw materials, fabrication methods, properties and applications. Types of ceramics- oxide and non-oxide ceramics. Allotropes of carbon- graphite, diamond and fullerene. Primary refractory materials.

Glasses- Introduction, raw materials, manufacture of glass, properties and applications. Types of glasses, properties and Applications. Photochromic and photosensitive glasses.
14 hours

References

1. The Physics of Materials: How Science Improves Our Lives, Solid State Sciences

Committee, (National Research Council, 1997)
2. The Science of the World Around Us , Solid State Sciences Committee, (National Research Council, 2007)
3. Materials Science and Engineering – V Raghavan (Prentice Hall India,1993)
4. Introduction to Solids – A J Dekker (McMillan India, 1981)
5. Plastics-How Structure determines properties- G Gruenwald (Hanser)
6. Understanding Materials Science- R E Hummel (II Ed) (Springer)
7. Materials Science- Nagpal (Khanna, Delhi)
8. Polymer Science –V R Gowarikar, N V Viswanath, Jayadev Sridhar (Wiley Eastern, 1987)
9. Composite Materials-Engineering & Science – F L Mathews & R D Rawlings (Chapman & Hall, 1990)
10. Introduction to Ceramics – W D Kingery, H K Bower and U R Uhlman (John Wiley, 1960)
11. Glasses and vitreous state – J Zarzycki (Cambridge University Press, 1982)