IMSE : Introduction to Materials Science and Engineering

Programme :**MSc** Year : **2nd** Semester : **3rd**
Course : **Program Core (Module A)** Credits : **4** Hours : **60**

Course Context and Overview (100 words):

Materials are probably more deep-seated in our culture than most of us realize. Transportation, housing, clothing, communication, recreation, food production--------virtually every segment of our everyday lives is influenced to one degree or another by materials. This course will provide the aspiring post-graduate students with the different aspects of materials science and engineering. Materials science involves investigating the relationships that exist between the structures and properties of materials. In contrast, materials engineering is, on the basis of these structure – property correlations, designing or engineering the structure of a material to produce a predetermined set of properties.

Prerequisites :Nil

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 understand the essentials of materials science and engineering.
C02 The students will acquire knowledge on the latest developments in the field of materials science and engineering.
C03 The students will acquire knowledge on the relationships between diverse types of material, and their importance and usage in engineering.
C04 The course will develop a detailed understanding of the fundamental properties of engineering materials, how they are controlled by processing, formed, joined and finished, and how all of these factors influence the selection and design of materials in real-world.

Course Topics:

Topics	**Contact hours**
UNIT - I Introduction to materials science and engineering, Mathematics for materials scientists and engineers	5
UNIT - II Basic concepts : Atomic bonding, Crystalline structure-perfection, Crystal defects and noncrystalline structure-imperfection, Phase diagrams-equilibrium microstructural development, Thermodynamics and kinetics of materials,	35

Diffusion, Mechanical behavior, Thermal behavior, Failure analysis and prevention	
UNIT – III Structural materials : metals, alloys, ceramics, glasses, polymers, and composites	10
UNIT – IV Electronic, optical and magnetic materials	10

Text Books :

(i) Callister's Materials Science and Engineering----Callister and Rethwisch
(ii) Introduction to Materials Science for Engineers----Shackelford

Reference books :

(i) Materials Science for Electrical and Electronic Engineers----Jones
(ii) The Science and Engineering of Materials----Askeland and Webster

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.) : will be provided as and when required.

Evaluation Methods:

Item	Weightage
Quizzes and Home assignments	15%
Midterm	20%
Final Examination	50%
Project	15%

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