



Master of Science – Materials Science
(M.Sc.)(Materials Science) Semester –I

Course Code	PS01CMTS51	Title of the Course	Basic Concepts in Materials Science
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	1. To provide fundamental knowledge of materials 2. To share basic information on materials science terminology
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Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to Materials and Materials Science, Type of Materials, Functional classification of materials, Smart materials, Properties of materials, Processing of materials, Structure-property-processing relationship, Environmental effect of Materials behavior, Materials selection	25
2.	Destructive and non-destructive testing, Concept of Engineering stress and strain, Elastic Deformation, Elastic properties, Anelasticity, Viscoelastic behaviour of Materials, Plastic deformation, Polycrystalline materials, Creep in materials, Fracture, Griffith theory, Hardness, Hardness testing of different materials (Metallic, Polymer and Ceramic Materials), Tensile testing, Failure modes, Bend testing, Impact testing, Fracture toughness, Fatigue testing, creep testing	25
3.	Heat capacity, Temperature dependence of heat capacity, Specific heats of solids, Latent heat, Melting point, Thermal expansion and kinetic theory, Thermal conductivity and Thermal diffusivity, Thermal stresses	25
4.	Laws of thermodynamics, Thermodynamics functions, Heat capacity, Enthalpy, Internal Energy, Gibbs potential, Heat content, Entropy, Free energy, Adiabatic process, Carnot cycle, Gibbs Helmholtz equations and its limitation, Nernst heat theorem, Consequences of third law, Microstates and macrostates, Thermodynamics probability, Bose-Einstein statistics	25

Teaching-Learning Methodology	Group discussion/ Panel/Presentation
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the terminology and basic fundamental information of Materials Science.
2.	This can be very helpful for their future understanding on subject.
3.	This subject can provide a strong base to learn upcoming topics in syllabus.

Suggested References:	
Sr. No.	References
1.	Glasstone, S. (1947). <i>Thermodynamics for chemists</i> . D. Van Nostrand Company, Incorporated. New York, USA.
2.	Sears, F., & Salinger, G. L. (1998). <i>Thermodynamics Kinetic Theory & Statistical</i> .
3.	Woodward, L. A. (1975). <i>Molecular statistics for students of chemistry</i> . Clarendon Press.
4.	Callister, W. D., & Rethwisch, D. G. (2018). <i>Materials science and engineering: an introduction</i> (Vol. 9). New York: Wiley.
5.	Askeland, D.R., Fulay P. R. & Wright W. J. (2010). <i>The Science and Engineering of Materials</i> . Cengage Learning, Stamford, CT, USA.

On-line resources to be used if available as reference material
On-line Resources





<http://www.matweb.com/>

<https://www.nde-ed.org/EducationResources/CommunityCollege/Materials/Mechanical/Tensile.htm>

<http://www.istl.org/02-spring/internet.html>

<http://www.learncheme.com/screencasts/materials-science>

<https://nptel.ac.in/courses/112/108/112108148/>

