MME103: Engineering Physical Metallurgy

Programme: B. Tech. (ME) Year:1st Semester: II,
Course: Core Credits: 3 Hours: 40

Course Context and Overview (100 words):

The objective of this course is to describe the basic elements of material science and its application to engineering fields and explain the concept of phase diagrams, solidification principles and engineering of ferrous, non-ferrous and ceramics.

Prerequisite Courses: Nil

Course outcomes (COs):

On completion of this course, the students will have the ability to:	Unit
CO1 Understand crystal structure, phase diagrams and their applications, principles of solidification of metal.	Topic 1 & 2
CO2 Understand about plastic deformation and recrystallization of metals.	Topic 3 to 5
CO3 Understand the mechanical properties of materials.	Topic 6 to 8
CO4 Understand the heat treatment and surface hardening of steel.	Topic 9 to 11
CO5 Understand the Raw material for steel production and their correlation with mechanical and metallurgical properties.	Topic 12 to 14

Course Topics:

Topics	Lecture Hours		Student Development
1. Crystal structure of metals	2	2	Employability and Skill Development
2. Raw material and steel production	3	3	Employability and Skill Development
3. Solidification and metal ingot structure	2	2	Employability and Skill Development
4. Plastic deformation and recrystallization of metals	3	3	Employability and Skill Development

5. Methods of studying metal structures	3	3	Employability and Skill Development
6. The mechanical properties of Metals	3	3	Employability and Skill Development
7. Iron Carbon equilibrium diagram	2	2	Employability and Skill Development
8. Phase transformation in iron carbon system	3	3	Employability and Skill Development
9. Heat treatment of steel	3	3	Employability and Skill Development
10. Surface hardening of steel	3	3	Employability and Skill Development
11. Chemical treatment of steel	3	3	Employability and Skill Development
12. Minor constituent and alloying element of steel	3	3	Employability and Skill Development
13. Steel	4	4	Employability and Skill Development
14. Cast iron and their heat treatment	3	3	Employability and Skill Development

Textbook references (IEEE format):

Text Book:

1. Y. Lakhting, *Engineering Physical Metallurgy*, 6th ed., CBS Publishes.
2. V. Raghavan, *Materials science and Engineering*, 5th Edition, PHI.

Reference books:

1. ASM metal handbook.
2. Sidney Avner, *Introduction to Physical Metallurgy*, McGraw-Hill, 1964

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

Evaluation Methods:

Items	Weightage

Quiz	20
Midterm	30
Final Examination	50

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