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| Course No | | Course Name | L-T-P-Credits | |
| **EE 214** | | **Electrical Engineering Materials** | **3-0-0: 3** | |
| Prerequisite: nil; Co requisite: nil | | | | |
| **Course Objectives**:  1. To understand the characteristics and electrical properties of various materials.  2. To design and select suitable material for application in electrical system. | | | | |
| **SYLLABUS** | | | | |
| **Module** | **Contents** | | | **Hours** |
| I | **Conducting and Magnetic Materials**  Conducting Materials: Free electron theory, electrical and thermal conductivity, Wiedemann-Franz law, drawback of classical theory, quantum free electron theory, Fermi-Dirac distribution; Electron emission; Thermal properties; Thermo-electric effects; Applications.  Magnetic materials: Classification of magnetic materials, Ferro, Ferri & antiferro-magnetism; Hysterisis curve; Magnetostriction; Magnetic resonance; Hard and soft magnetic materials- Applications. | | | 12 |
| II | **Dielectric and Insulating Materials**  Dielectric polarization under static fields - electronic, ionic and dipolar polarizations; Behavior of dielectrics in alternating fields; Factors influencing dielectric strength; Capacitor materials – Ferro and piezo materials, Complex dielectric permittivity; dipolar relaxation; dielectric loss; Applications. | | | 10 |
| III | **Semiconducting Materials**  Concept of energy band in solids; Mechanism of conduction in semiconductors; Types of semiconductors; Thermal and Electrical properties; Compound semiconductors; Hall Effect; Basic ideas of amorphous and organic semiconductors, Applications. | | | 08 |
| IV | **Special purpose Materials**  Application based materials - Thermo couple, soldering, fuse, and fluorescent; Super conducting materials; Materials for electronic components; Nano materials and Smart Materials. | | | 06 |

**Essential Readings:**

1. Indulkar C.S. and Thiruvengadam S, “An Introduction to Electrical Engineering Materials”, S. Chand & Co Pvt Ltd, 6th Edition, 2011.
2. A.J. Dekker, “Electrical Engineering Materials”, Prentice Hall of India, 1st Edition, 1963.
3. T. K. Basak, Electrical Engineering Materials, New age Science, Ist Edition, 2009

**Supplementary Readings:**

1. P.L. Kapoor, “Electrical and Electronics Engineering Materials”, PHI, 1st Edition, 2014.
2. L. Solymar and D. Walsh, “Electrical Properties of Materials”, Oxford University Press, 9th Edition, 2014
3. TTTI Madras, “Electrical Engineering materials”, Tata McGraw Hill, 1st Edition, 2004.