<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Name</th>
<th>L-T-P -Credits</th>
<th>Year of Introduction</th>
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</thead>
<tbody>
<tr>
<td>EE206</td>
<td>MATERIAL SCIENCE</td>
<td>3-0-0-3</td>
<td>2016</td>
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**Prerequisite : Nil**

**Course Objectives**
To impart knowledge in the field of material science and their applications in electrical engineering

**Syllabus:**
Conducting materials- properties-applications- Semi conductor materials- properties-applications-
Magnetic materials-classification-alloys of iron-ferrites-Dielectric materials-polarization-solid, liquid and gaseous insulators-Dielectric breakdown-superconductors-solar energy materials-
Spectroscopy-micropsopy-magnetic resonance-nanomaterials

**Expected Outcome:**
After the completion of the course student will be able to:
1. Describe the characteristics of conducting and semiconducting materials
2. Classify magnetic materials and describe different laws related to them
3. Classify and describe different insulators and to explain the behaviour of dielectrics in static and alternating fields
4. Describe the mechanisms of breakdown in solids, liquids and gases
5. Classify and describe Solar energy materials and superconducting materials
6. Gain knowledge in the modern techniques for material studies

**Text Book:**

**References:**
1. Tareev, Electrical Engineerin Materials, Mir Publications
5. Indulkar O.S &Thiruvegadam S., An Introduction to electrical Engineering Materials, S. Chand
7. Seth. S.P and Gupta P. V, A Course in Electrical Engineering Materials, Dhanpathrai

**Course Plan**

<table>
<thead>
<tr>
<th>Module</th>
<th>Contents</th>
<th>Hours</th>
<th>Sem.ExamMarks</th>
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<tbody>
<tr>
<td>I</td>
<td>Conducting Materials: Conductivity- dependence on temperature and composition – Materials for electrical applications such as resistance, machines, solders etc.</td>
<td>8</td>
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<tr>
<td>II</td>
<td>Semiconductor Materials: Concept, materials and properties- – Basic ideas of Compound semiconductors, amorphous and organic semiconductors- applications.</td>
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<td>Dielectrics: Introduction to Dielectric polarization and classification –Clausius Mosotti relation- Behavior of dielectric in static and alternating fields</td>
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<tr>
<td>II</td>
<td>Insulating materials and classification- properties- Common insulating materials used in electrical apparatus-Inorganic,</td>
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**FIRST INTERNAL EXAMINATION**

**III**


**IV**

Magnetic Materials: Origin of permanent magnetic dipoles- Classification of magnetic materials -Curie-Weiss law- Properties and application of iron, alloys of iron- Hard and soft magnetic materials– Ferrites- Magnetic materials used in electrical machines, instruments and relays-

**SECOND INTERNAL EXAMINATION**

**V**

Superconductor Materials:-Basic Concept- types-characteristics-applications

**VI**

Modern Techniques for materials studies: Optical microscopy – Electron microscopy – Photo electron spectroscopy – Atomic absorption spectroscopy – Introduction to Biomaterials and Nanomaterials

**END SEMESTER EXAM**

**QUESTION PAPER PATTERN (End semester exam)**

**Part A:** 8 questions.
One question from each module of Module I - IV; and two each from Module V & VI. Student has to answer all questions. (8 x5)=40

**Part B:** 3 questions uniformly covering modules I&II.
Student has to answer any 2 questions: (2 x 10) =20

**Part C:** 3 questions uniformly covering modules III&IV.
Student has to answer any 2 questions: (2 x 10) =20

**Part D:** 3 questions uniformly covering modules V&VI.
Student has to answer any 2 questions: (2 x 10) =20

**Note:** Each question can have maximum of 4 sub questions, if needed.

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