

<b>SEMESTER</b> <i>Fifth</i>	<b>DEPARTMENT</b> <i>Power Engineering</i>	<b>COURSE TITLE</b> <i>Electromagnetic Theory</i>
<b>COURSE CODE</b> <i>ET501</i>	<b>HOURS:</b> 3 <b>UNITS:</b> 3	<b>COURSE SPECIFICATIONS</b> <i>Theoretical Content</i>
<b>1. Vector Algebra:</b> <ul style="list-style-type: none"> <li>➤ Scalars and vectors.</li> <li>➤ Vector components and Unit vectors.</li> <li>➤ Position and distance vectors.</li> <li>➤ Vector addition, subtraction, and multiplication.</li> </ul>		
<b>2. Coordinate systems and transformation:</b> <ul style="list-style-type: none"> <li>➤ Cartesian Coordinates.</li> <li>➤ Circular Cylindrical Coordinates.</li> <li>➤ Spherical Coordinates.</li> <li>➤ Constant-Coordinate surfaces.</li> </ul>		
<b>3. Vector Calculus:</b> <ul style="list-style-type: none"> <li>➤ Differential length, area, and volume.</li> <li>➤ Line, surface, and volume integrals.</li> <li>➤ Del operator.</li> <li>➤ Gradient of a scalar.</li> <li>➤ Divergence of a vector and Divergence theorem.</li> <li>➤ Curl of a vector and Stokes's theorem.</li> <li>➤ Laplacian of a scalar.</li> </ul>		
<b>4. Electrostatic Fields:</b> <ul style="list-style-type: none"> <li>➤ Coulomb's law.</li> <li>➤ Electric field intensity and Electric flux density.</li> <li>➤ Field due to a line charge, surface charge, and volume charge distribution.</li> <li>➤ Gauss's law.</li> <li>➤ Electric potential.</li> </ul>		

**5. Magnetostatic Fields:**

- Biot-Savart's law.
- Ampere's law.
- Magnetic flux density.
- Magnetic scalar and vector potentials.

**6. Maxwell's Equations:**

- Maxwell's Equation from Faraday's law.
- Maxwell's Equations from Gauss' laws for Electric and Magnetic fields.
- Maxwell's Equation from Ampere's law.
- Displacement current.
- Maxwell's Equations in integral and differential forms.

**7. The Uniform Plane Waves:**

- The wave equation.
- Propagation of uniform plane waves in free space.
- Propagation of plane uniform waves in dielectrics.
- Propagation of plane uniform waves in lossy dielectrics.
- Propagation of plane uniform waves in good conductors and skin effect.
- Wave polarization.

**References:**

1. Matthew N. O. Sadiku, *Elements of Electromagnetics*, 4th Edition, Oxford University Press.
2. William H. Hayt, Jr & John A. Buck., *Engineering Electromagnetics*, 6th Edition, McGraw-Hill Book Company, Inc.
3. Paul, Clayton R., Whites, Keith W, & Nasar, S. A., *Introduction to Electromagnetic Fields*, 3rd Edition, McGraw-Hill Book Company, Inc.
4. John D. Kraus, *Electromagnetics*, 4th Edition, McGraw-Hill, Inc.