

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

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.