

**GN/724< Electromagnetic waves and
Transmission Lines**

**Core Paper
Total Period**

Unit-1 (P-11)

Maxwell's Equations: Faraday's laws, Transformer and motional E.M.F, displacement current, Maxwell Equation in differential and integral form, constitutive relations and Boundary Conditions.

Electromagnetic Wave Propagation: the wave equation, Uniform Plane Wave, Wave Polarisation, Wave propagation in Dielectrics, Poynting's theorem, Propagation in Good Conductors, Skin Effect, Reflection of uniform Plane Waves at normal incidence, Plane Wave reflection at Oblique Incidence, Wave propagation in dispersive media, concept of phase velocity and group velocity.

Unit-2 (P-12)

Transmission Lines: Typical Transmission lines- Co-axial, Two Wire, Microstrip, Coplanar and Slot Lines, Transmission Line Parameters, Transmission Line Equations, Wave propagation in Transmission lines, low loss, lossless line, Distortionless line, Input Impedance, Standing Wave Ratio, Power and lossy lines, Shorted Line, Open-Circuited Line, Matched Line, Smith Chart, Transmission Line Applications.

Unit-3 (P-11)

Wave guides: Parallel plate waveguides-TM and TE modes, Rectangular wave guides -TM and TE mode, Wave propagation in guide, Power transmission and attenuation, Rectangular cavity resonators, directional couplers, isolator, circulator.

Unit-4 (P-11)

Radiation of electromagnetic waves and retarded potentials, Antenna patterns and antenna parameters, Types of antennas- Hertzian dipole, half wave dipole, quarter-wave dipole, Yagi-Uda, microstrip, parabolic antenna, helical antenna, Antenna array.

Essential Texts

UNIT 1

CHAPTERS 3, 4, 5, 6, 7- M. N. O. Sadiku, Principles of Electromagnetics, Oxford University Press (2001)

UNIT 2

CHAPTER 8,9-M. N. O. Sadiku, Principles of Electromagnetics, Oxford University Press (2001)

UNIT 3

CHAPTER 10-M. N. O. Sadiku, Principles of Electromagnetics, Oxford University Press (2001)

UNIT 4

CHAPTERS 11,12-M. N. O. Sadiku, Principles of Electromagnetics, Oxford University Press (2001)

Suggested Books:

1. Karl E. Longren, Sava V. Savov, Randy J. Jost., Fundamentals of Electromagnetics with MATLAB, PHI (For MATLAB experiments)
2. W. H. Hayt and J.A. Buck, Engineering Electromagnetics, Tata McGraw Hill (2006)
3. D. C. Cheng, Field and Wave Electromagnetics, Pearson Education (2001)
4. J. A. Edminster, Electromagnetics, Schaum Series, Tata McGraw Hill (2006)
5. N. Narayanrao, Elements of Engineering Electromagnetics, Pearson Education (2006)
6. G. S. N. Raju, Antennas and Propagation, Pearson Education (2001)

PRACTICALS- Electromagnetic waves and transmission Lines

Experiments using MATLAB, PSICE and other freeware/ simulation softwares