B. P. Poddar Institute of Management & Technology

Department of Electronics & Communication Engineering

Lesson Plan for Electromagnetic Waves (EC 501)

Academic Year: 2022-23, Semester: Odd

Lecture No.	Topics to be Covered	References	Teaching Aid	Teaching Methodology
L1	Introduction on CO, PO, Basics of Vector calculus.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L2	Orthogonal Coordinate Systems- Transformations of coordinate systems.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L3	Del operator; Gradient, Divergence & Curl – their physical interpretations, Laplacian operator.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L4	Coulomb's law, electric field intensity, charge distribution, Poisson's & Laplace's equations	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L5	Gauss' law & its applications, flux density.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L6	Uniqueness theorem, continuity eq. current density	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L7	Biot-Savart law, Ampere's law and its applications	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L8	Relation between J & H, Vector magnetic Potential, Stokes' theorem.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L9	Faraday's law & Lenz's law, Displacement Current, J C – J D Relation.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L10	Maxwell's equations, Time-harmonic fields.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L11	Electric Boundary Conditions between media interface.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L12	Magnetic Boundary Conditions between media interface.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L13	Uniform plane wave, Wave Equation	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L14	Wave Propagation in Lossy Dielectric medium	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L15	Wave Propagation in Loss-less Dielectric, free space	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L16	Wave Propagation in Good Conductor, Skin Depth	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L17	Poynting Theorem, Power flow, Poynting vector	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L18	Reflection and Transmission coefficient for normal incidence.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper

L19	Transmission Lines: Concept of Lump parameters and Distributed parameters, Line Parameters.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L20	Transmission line voltage and current equations and solutions	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L21	Propagation constant, Characteristic Impedance, velocity, Loss-less line & Distortion-less Line	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L22	Reflection and Transmission coefficients, Standing Waves, VSWR.	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L23	Derivation of input impedance	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L24	Applications of Smith Chart	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L25	Load Matching Techniques-Quarter wave Matching, Stub matching	Te 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L26	Waveguide and its characteristics	Te 1, Re 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L27	Modal propagation in rectangular waveguide	Te 1, Re 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L28	Modal propagation in rectangular waveguide ,Surface currents on the waveguide walls	Te 1, Re 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L29	Field visualization, Attenuation in waveguide.	Te 1, Re 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L30	Antenna Concepts, Antenna Characteristics, Radiation patterns, Directive Gain.	Te 1, Te 2	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L31	Hertzian dipole (Radiation Fields, Radiation Resistance)	Te 1, Te 2	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L32	Radiation from the Hertz dipole	Te 1, Te 2	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L33	Power radiated by hertz dipole	Te2, Re 2	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper
L34	Monopole and Dipole antenna	Re 1	GGB, Chalk & Duster, Moodle	Lecture, Discussion, Problem Sheet, Quiz, Term Paper

L= Lecture GGB= Green Glass Board

Text Book:

Te 1. Matthew N O Sadiku - Elements of Electromagnetics

Te 2. J D Krauss - Antennas

Reference Book:

Re 1. Samuel Y. Liao - Microwave Devices and Circuits

Re 2. A. Das and S. Das - Microwave Engineering