

The Maharaja Sayajirao University of Baroda Polytechnic Diploma in Electronics & Communication Engg. (HPP)			ACADEMIC YEAR 2022-23		
Year	II	CORE / ELECTIVE / FOUNDATION WAVEGUIDE AND ANTENNA (ELE3431)	Lecture /Tutorial Hrs per week	4/2	
Semester	II		Max marks	100	
Pre-Requisite: Basic Mathematics, Basic Electronics					
CO1	Explain Maxwell’s equations for time-varying fields and wave behavior in parallel-plane structures including TE, TM, and TEM modes.				
CO2	Analyze attenuation, wave impedance, and mode behavior in rectangular waveguides along with group/phase velocities and guide wavelength.				
CO3	Evaluate transmission line characteristics including propagation constants, impedance, distortion, reflections, VSWR, Smith chart usage, and stub matching.				
CO4	Describe fundamental antenna concepts including dipole radiation, radiation resistance, reciprocity, antenna parameters, and radiation patterns.				
CO5	Examine antenna arrays, measurement techniques, and power patterns of practical antennas including reflectors, horn, Yagi, helical, microstrip, and traveling-wave types.				
BT	1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation				
COURSE CONTENT/SYLLABUS					
Unit	Unit Name		Hrs	Weightage	CO
1	Maxwell’s equations for time varying fields and physical significance of Curl, Divergence and Gradient. Waves between parallel planes, TE, TM, & TEM and their characteristics		8	15	CO1
2	Attenuation in parallel plane guides wave impedances. TE, TM waves and impossibility of TEM mode in Rectangular waveguide. Different characteristics like group velocity, phase velocity, guide wavelength and wave impedances.		8	15	CO2
3	Transmission line equations. Transmission line parameters, Characteristic impedances, Propagation constant, Attenuation constant, Phase constant, Waveform distortion, Distortion less transmission lines, Loading of transmission lines, Reflection coefficient and VSWR. Equivalent circuits of transmission lines, Transmission lines at radio frequency. Open circuited and Short circuited lines, Smith Chart, Stub matching.		10	18	CO3
4	Field due to a current element, power radiated and radiation resistance for field due to a dipole, power radiated and radiated resistance. Reciprocity theorem applied to antennas. Antenna terminology: Gain, Aperture, Radiation intensity, Directivity, Directive gain, Beam width, Radiation patterns, FBR, Antenna bandwidth etc.		8	16	CO4
5	Concept of antenna arrays, Two element arrays and their directional characteristics, Introduction to antenna measurement methods: measurement of Gain, Radiation pattern, Time domain gating, Antenna noise temperature & G/T, Impedance & Bandwidth. Introduction to measurement of cellular radio handset antenna.		10	18	CO4
6	Power patterns of various antennas like Parabolic reflectors, Lens antenna, folded dipole, Turnstile antenna, Yagi antenna, Log-periodic antenna, Horn antenna & feeding, Traveling wave antenna, Printed antennas, Case grain antenna, Patch & Micro strip antennas, Superconducting antenna, Rhombic, Helical, Open ended waveguide radiator, Small design problems & applications. Introduction to measurement of cellular radio handset antenna.		10	18	CO5

REFERENCE BOOKS:			
1.	Antennas and Wave Propagation By K.D.Prasad Khanna or Satya Publications		
2.	Electromagnetizing waves and radiating systems By Jhordan & Balmin, Pearson Publications		