S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Total
3	ECE-503	Microwave Devices and Systems	PCC	4	3	1	0	50	100	150

Course Outcomes:

At the end of the course the student will be able to:	
CO1	Describe the concept of transmission line and propagation of low frequency signals.
CO2	Classify various parameters of waveguides and compute dominant modes.
CO3	Model various parameters of microwave passive components.
CO4	Explain various microwave solid state devices, amplifiers and tubes.
CO5	Design microwave solid state devices and evaluation of various parameters

Detailed Syllabus

Section-A

Unit I: Transmission lines: Circuit model for transmission lines, loss less and lossy lines, field analysis, impedance matching, characteristics impendence (Zo), propagation constant, attenuation constant, phase constant, open and short circuits transmission line, distortion in line, reflection and its coefficient.

(8 Hrs)

Unit 2: Introduction to Microwaves: Transmission lines v/s waveguides, applications of Microwaves Waveguides. Mathematical analysis of rectangular and circular waveguides, Waveguide Resonators-Rectangular and Cylindrical, Resonant frequencies.

(10 Hrs)

Unit 3: Microwave Passive Components: Low frequency parameters- Impedance, Admittance, Hybrid and ABCD parameters; High Frequency parameters-S parameters, Formulation and Properties of S (Scattering matrix) parameters, Reciprocal and lossless Network E-plane, H-plane Tees, Magic Tee, Hybrid ring, Directional couplers, Power dividers, Attenuators, Phase shifter, propagation in ferrites, Faraday rotation: Circulators and Isolators.

(10 Hrs)

Section-B

Unit 4: Microwave Tubes: Limitations of conventional tubes in microwaves; Multi cavity Klystron, Reflex Klystron; Magnetron; Travelling Wave Tube; Backward Wave Oscillator- working principles and characteristics.

(8 Hrs)

Unit 5: Microwave Solid State Devices: PIN diode, Tunnel diode, Gunn diode, Avalanche transit time devices: IMPATT, TRAPATT, BARITT diodes, and parametric amplifiers. Varactor diode, Schottky diode, Microwave Measurements: Measurement of frequency, impedance, SWR, Power, phase shift, Attenuation

(10 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition(Pub. Yr.)
1	Microwave Devices andCircuits	S.M. Liao	Pearson	3rd (2007)
2	Microwave Engineering:Passive Circuits	Peter A. Rizzi	PHI	1st (2009)
3	Electromagnetic Waves &Radiating Systems	E. C. Jordan & K. G. Balman	Pearson Education	2nd (2015)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Microwave Engineering	D.M. Pozar	Wiley India Pvt. Ltd	4th (2012)
2	Foundations for Microwave Engineering	RE Collin, Wiley IndiaPvt. Ltd	Wiley India Pvt. Ltd	2nd (2007)