No	Course Information (2019-2020)	
1	Unit name:	Microwave Engineering I
2	Code:	EcE-51013
3	Classification:	Engineering subject
4	Credit value:	3 (2-1-1)
5	Semester/ Year Offered:	1/5
6	Pre-requisite:	Engineering Electromagnetic
7	Mode of delivery:	Lecture, Practical
8	Assessment system and breakdown of marks:	Tutorial, Assignment, Lab Report, Exam
	Tutorial and Assignment	10%
	Practical	20%
	Mid-term/ final Examination	70%
9	Academic staff teaching unit:	Department of Electronic Engineering
10	Course outcomes of unit: In this course students will be able to 1. Derive the wave equations and find the parameters and the fields of plane waves 2. Solve the transmission line problems 3. Design impedance matching networks 4. Simulate smith chart operation and impedance matching using MATLAB	
11	**Synopsis of unit:** This course covers the fundamental concepts of electromagnetic fields and transmission lines. This course includes electromagnetic theory, transmission line theory, impedance matching and tuning. Successful completion of this course will allow students to study more advanced topics in the area of microwave engineering.	
	Topic: **Chapter** **Title** **1** **Electromagnetic Theory** 1.1 Introduction to Microwave Engineering 1.2 Maxwell's Equations 1.3 Fields in Media and Boundary Conditions 1.4 The Wave Equation and Basic Plane Wave Solutions 1.5 General Plane Wave Solutions 1.6 Energy and Power 1.7 Plane Wave Reflection from a Media Interface **2** **Transmission Line Theory** 2.1 The Lumped-Element Circuit Model for a Transmission Line 2.2 Field Analysis of Transmission Lines 2.3 The Terminated Lossless Transmission Line 2.4 The Smith Chart	

	2.5 The Quarter-Wave Transformer 2.6 Generator and Load Mismatches **5 Impedance Matching and Tuning** 5.1 Matching with Lumped Elements (L Networks) 5.2 Single-Stub Tuning 5.3 Double-Stub Tuning 5.4 The Quarter-Wave Transformer 5.5 The Theory of Small Reflections
14	**Main references:** 1. Antenna Theory Analysis and Design, Third Edition, Hoboken, New Jersey. 2. Digital Microwave Communication, John Anderson.
15	Additional references: J. W. Crispin and K. M. Siegel, Eds., Methods of Radar Cross-Section Analysis, Academic Press, New York and London, 1968.

Information on Lab Practical (EcE-51013 Microwave Engineering) 2019-2020

Lab	Activity
1	**Experiment I: Short-circuited and Open-circuited Transmission Line** **Objective:** ➢ To plot voltage, current and impedance characteristics of short-circuited and open-circuited transmission line using MATLAB **Equipment Required:** Computer, MATLAB Software
2	**Experiment II: Basic Smith Chart Operation using MATLAB** **Objective:** ➢ To be able to apply MATLAB scripts ➢ To plot the VSWR circle, load impedance and input impedance on smith chart **Equipment Required:** ➢ Computer, MATLAB Software
3	**Experiment III: Basic Smith Chart Operation (Admittance) using MATLAB** **Objective:** ➢ To be able to apply MATLAB scripts ➢ To plot the VSWR circle, load impedance and input impedance on smith chart **Equipment Required:** ➢ Computer, MATLAB Software
4	**Experiment IV: Single-Stub Series Tuning** **Objective:** ➢ To perform impedance matching **Equipment Required:** ➢ Computer, MATLAB Software
5	**Experiment V: Single-Stub Shunt Tuning** **Objective:** ➢ To perform impedance matching **Equipment Required:** ➢ Computer, MATLAB Software