Academic Course Description

SRM University
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering

CO2107-MICROWAVE INTEGRATED CIRCUITS

Third Semester, 2014-15 (Odd semester)

Course (catalog) description: This course will give a broad introduction to MIC techniques and will give students an opportunity to study the current literature and to design MICs. Goal of this course is to cover a sufficient selection of technology used in MICs such that the fabrication and operation of many microwave devices will be understandable.
Compulsory/Elective course: Elective course for M. Tech (CS) II year students
Credit hours: 3 credits

Course coordinator: Mr. E. Sivakumar, Assistant Professor, Department of ECE

Instructor(s)

Name of the instructor	Class handling	Office location	Office phone	Email	Consultation
Mr. E.Sivakumar	M.TECH CS	TP12S9		sivakumar.e@ktr.srmuniv.ac.in	Day 4 9.00 AM to 11.00 AM

Relationship to other courses

Pre-requisites : Microwave devices and Circuits

Assumed knowledge : Basic Knowledge in Microwave and RF Design

Following courses : *Nil*

Reference Books

1. Leo G. Maloratsky, “Passive RF and Microwave integrated circuits,” Elsevier, 2004.
2. Gupta K. C and Amarjit Singh, “Microwave integrated circuits”, John Wiley, Newyork, 1975.
3. Hoffman R.K “Handbook of microwave integrated circuits”, Artech House, Bostan,1987

Class schedule: Four 50 minutes Lecture sessions per week

Section	Schedule
	Day-1 2nd & 3rd hr
Communication System	Day-4 4th hr Day-5 5th hr

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Communication | Signal Processing | **Electronics** | **VLSI |** Embedded

Test Schedule - Theory

S. No.	Test	Portions	Duration
1	Cycle Test	Sessions 1 to 9 Session 37 to 42	1 hr 40 min
2	Model Exam	sessions 1 to 45	3 hrs

Course objectives

1. Knowledge of the concept of microstrip line and its interpretation in the analysis and design of microstrip line
2. Design and Analysis of non-reciprocal components, active devices, High Power and Low Power Circuits.
3. Micro fabrication of MIC devices will be covered in order to understand the major MIC fabrication techniques and how they interact with system design strategies.

Course outcomes

The learning outcomes for this course are as follows:

1. Be able to design lumped elements using microstrip.
2. Be able to design distributed elements using microstrip.
3. Be able to design microwave amplifiers.

Session plan

Session	Topics	Text / Chapter
UNIT I - ANALYSIS OF MIC (9 hours) **Introduction, Types of MICs and their technology, Propagating models, Analysis of MIC by conformal transformation, Numerical method, Hybrid mode analysis, Losses in microstrip, Introduction to slot line and coplanar waveguide**.		
1	Introduction	[1]-Chapters 1,2 [2]-chapters 10
2	Types of MICs and their technology	
3	Types of MICs and their technology	

Session	Topics	Text / Chapter
4	Propagating models	
5	Analysis of MIC by conformal transformation	
6	Numerical method, Hybrid mode analysis	
7	Losses in microstrip	
8	Introduction to slot line	
9	Coplanar waveguide	
UNIT II - COUPLERS AND LUMPED ELEMENTS IN MIC (9 hours) **Introduction to coupled microstrip, Even and odd mode analysis, Branch line couplers, Design and fabrication of lumped elements for MICs, Comparison with distributed circuits**		
10	Introduction to coupled microstrip	
11	Even and odd mode analysis	
12	Branch line couplers	[1]-chapters 3,7
13	Branch line couplers	
14	Design and fabrication of lumped elements for MICs	
14	Design and fabrication of lumped elements for MICs**,**	[2]-chapters 11
16	Measurements on lumped elements	
17	Circuit using lumped elements	[1]-chapter 4
18	Comparison with distributed circuits	
UNIT III - PASSIVE AND ACTIVE COMPONENTS IN MIC (9hours) **Ferromagnetic substrates and inserts, Microstrip circulators, Phase shifters, Microwave transistors, Parametric diodes and amplifiers, PIN diodes, Transferred electron devices, Avalanche diodes, IMPATT, BARITT devices.**		
19	Ferromagnetic substrates and inserts	[1]-chapters 10,11,12

Session	Topics	Text / Chapter
20	Microstrip circulators	[2]-chapters 7,8,4,9
21	Phase shifters	
22	Microwave transistors	
23	Parametric diodes and amplifiers	
24	PIN diodes	
25	Transferred electron devices,	
26	Avalanche diodes, IMPATT	
27	BARITT devices	
UNIT IV - MIC CIRCUITS AND ITS APPLICASTION (9 hours) **Introduction, Impedance transformers, Filters, High power circuits, Low power circuits, MICs in Radar and satellite**		
28	Introduction	[2]-chapters 7,12
29	Impedance transformers	
30	Impedance transformers	
31	Filters	
32	Filters	
33	High power circuits	
34	Low power circuits	
35	MICs in Radar and satellite	
36	MICs in Radar and satellite	

Session	Topics	Text / Chapter
UNIT V - FABRICATION PROCESS IN MIC (9 hours) **Fabrication process of MMIC, Hybrid MICs, Dielectric substances, Thick film and thin film technology and materials, Testing methods, Encapsulation and mounting of devices.**		
37	Fabrication process of MMIC	[1]-chapter 14 [2]-chapter 10
38	Fabrication process of MMIC	
39	Hybrid MICs	
40	Hybrid MICs	
41	Dielectric substances	
42	Thick film and thin film technology and materials	
43	Testing methods	
44	Encapsulation and mounting of devices	
45	Revision	

Evaluation methods

Cycle Test	-	20%
Model Test	-	20%
Term Paper/surprise test	-	10%
Final exam	-	50%

Prepared by: Mr. E. Sivakumar, Assistant Professor, Department of ECE

Dated: 25th June 2014 **Revision No.:** 00 **Date of revision:** NA