

Department Elective Course -3

EC318: RF MEMS Design and Technology

Course Title:	Course Structure			Pre-Requisite
	L	T	P	
RF MEMS Design and Technology	3	0	2	Electromagnetic Filed Theory

Course Objective:

1. Introduction to basics of RF MEMS and sensor system
2. To study the essential material properties of RF MEMS devices
3. To study various sensing and transduction techniques for RF MEMS
4. To know various fabrication and machining processes of different RF MEMS devices
5. To be able to design various RF MEMS devices in a 3-D simulator

Course Outcomes:

- CO1: To know important concepts applicable to RF MEMS and their fabrication.
- CO2: Understanding the working of RF MEMS sensors, actuators, switches, etc.
- CO 3: Apply the concept of RF MEMS technology to design different devices for different applications
- CO 4: Applications of RF MEMS device and their integration with system
- CO 5: Be familiar with design and analysis the RF MEMS based devices in the 3-D simulator

S. No.	Contents	Contact Hours
Unit 1.	Introduction and origin of MEMS, driving force for MEMS development, fabrication process and RF MEMS. RF MEMS material and fabrication technologies: Conventional IC fabrication processes, bulk micro machining, surface micro machining, LIGA process.	6
Unit 2.	RF MEMS Sensors, Classification and terminology of sensors, evolution of semiconductor sensors, sensor characterization basic concept of acoustic, mechanical, magnetic, radiation, thermal sensors and integrated sensors.	8
Unit 3.	Actuation mechanism for RF MEMS devices: Electrostatic switching, approaches for low-actuation-voltage switches, mercury contact switches, magnetic switching, electromagnetic switching, thermal switching, The RF MEMS switch; Cantilever based MEMS switch, Membrane based switch design microwave	10

	material and mechanical considerations.	
Unit 4.	RF MEMS based components: transmission lines, membrane supported micro-strip line, coplanar waveguide, micro-machined waveguide, inductors, capacitors and tunable capacitors.	8
Unit 5.	MEMS based RF and microwave circuits: RF MEMS antenna and reconfigurable antenna, phase shifter, resonators, filters etc. Integration and packaging for RF MEMS devices.	10
	TOTAL	42

Books:-

S. No	Name of Books/Authors/Publisher
1.	RF MEMS and Their Applications/ Vijay K. Varadan, K.J. Vinoy, K.A. Jose/ 1 st Ed, John Wiley & Sons Inc2003
2.	RF MEMS Switches and Integrated Switching Circuits/ Ai Qun Liu/ 2 nd Ed, Springer-Verlag New York Inc, 2010.
3.	RF MEMS Theory,Design and Technology/ Gaberiel M.Rebiz/1 st Ed, John Wiley & Sons,2003.