



C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology and Engineering
DEPARTMENT OF: - Electronics & Communication Engineering
SEMESTER: - VII
CODE: - 4TE07MRE1
NAME: – Microwave & Radar Engineering (MRE)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Sessional Exam		University Exam		Internal			University
							Marks	Hours	Marks	Hours	Pr	TW		Pr
4TE07MRE1	Microwave & Radar Engineering (MRE)	04	00	02	06	05	30	1.5	70	3.0	---	20	30	150

Objectives:-

- In this course, student will study the concept of transmission line, waveguide propagation in rectangular/circular wave guide, cavity resonators, microwave component, different measurement techniques, microwave antennas, MTI RADAR,

Prerequisite:-

- Students should have a firm grasp of Electromagnetic theory including Maxwell's equations & Micro strip antennas.

Course Outline:-

Sr. No.	Course Content	Hours
1	Introduction to Transmission line: Two wire transmission line, Voltage and current relationship in transmission line, Characteristic impedance, Reflection coefficient, input impedance, Standing waves, stub matching, Multi conductor transmission line, types of micro strip lines.	08
2	Waveguides and Propagation Modes: Introduction, Types of Wave Guide, rectangular wave guide, TE & TM mode in rectangular waveguide, boundary conditions, modes in wave guide, TE ₁₀ mode in rectangular waveguide, circular wave guide, TEM mode in circular wave guide.	05
3	Microwave Tubes Introduction, Microwave tubes, Limitation of Conventional tube at UHF, Review of Microwave tubes, Two cavity & Multi cavity klystrons, Reflex klystron, TWT and Magnetron working performance & application of tubes.	04

4	Solid state Microwave devices Introduction, microwave transistor, MOSFETs, varactor diode, PIN diode, tunnel diode, Scotty diode, IMPATT diode, TRAPATT Diode, gunn diode, parametric amplifier.	06
5	Microwave Component: Introduction, E-plane Tee, H-plane Tee, magic Tee, directional Coupler, Isolators and circulators , Cavity resonators, Performance of components using ‘S’ parameters.	06
6	Microwave Measurement : Measurement of Frequency, Impedance (using slotted section), power, VSWR, insertion loss and permeability, Dielectric constants and Attenuation at microwave frequencies.	04
7	Introduction to RADARs Introduction, Block diagram of Radar, range, Bearing, Altitude, simple form of radar equations, Applications of RADAR, Pulsed Radar, Range of Radar, Plan position indicator(PPI)	05
8	CW and Frequency Modulated RADAR Introduction, Doppler Effect, CW Radar, CW radar with IF amplification, Frequency modulated CW radar (FMCW)	06
9	MTI & Pulsed Doppler RADAR Introduction, Moving Target Indicator Radar, Delay lines and cancellations, staggered pulse repetition Frequencies, stub clutter visibility, cancellation ratio, Limitations of MTI performance, equipment instabilities, internal fluctuations	06

Learning Outcomes:-

After the successful completion of the course, students will be able to

- Understand the practical importance of Transmission line & other parameters like reflection coefficient, VSWR in Microwave theory.
- Measure Power, attenuation, measurement of impedance, insertion loss.
- Create a model of E-plane TEE and H-plane TEE in simulator,.

Books Recommended:-

1. Microwave devices and Circuits, **Samuel Liao**, PHI.
2. Fundamentals of Microwave Engineering, **Anoop Singh and Seema verma**, PHI.
3. Microwave devices & Radar Engg., **M .Kulkarni**, Umesh Publication.
4. Radar, Sonar & Navigation engineering, **K. K. Sharma**, Katson Publication.
5. Microwave Engineering, **Sanjeeva gupta**, Khanna publication.
6. Microwaves and Radar, **A.K. Maini**, Khanna publication.
7. Microwave Engineering, **A. K. Gautam**, S. K. Katariya publication.

