



# Mahatma Gandhi University Kottayam

<b>Programme</b>	<b>BSc (Honours) Electronics with Computer Technology and Computer Science (Double Major)</b>					
<b>Course Name</b>	Microwave Electronics					
<b>Type of Course</b>	DSE					
<b>Course Code</b>	MG5DSEECC300					
<b>Course Level</b>	<b>300-399</b>					
<b>Course Summary and Justification</b>	This course gives basics of electromagnetic wave theory and the principles behind microwave electronics. It also covers familiarization of different transmission lines and waveguides.					
<b>Semester</b>	5	<b>Credits</b>			4	<b>Total Hours</b>
<b>Course Details</b>	<b>Learning Approach</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Others</b>	
		4				60
<b>Pre-requisites</b>						

### COURSE OUTCOMES(CO)

CO No.	Expected Course Outcome	Learning Domain*	PO No.
1	Explain the concept of electromagnetic waves and understand their properties and applications	U	1,2
2	Demonstrate comprehension of transmission lines and waveguides.	U	1,2
3	Apply the concept of microwave tubes and devices, gaining hands-on experience	A	1,2
4	Create and design practical microwave systems	C	1,2,10

*\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

### COURSE CONTENT

#### Content for Classroom transaction (Units)

Module	Unit	Course description	Hours	CO No.
1	1.1	EM wave spectrum and its applications	2	1
	1.2	Electromagnetic Fields-TE, TEM and TM, Maxwell's Equations (Detailed analysis not required)	6	1
	1.3	Wave Polarization, Phase and Group Velocities	2	1
	1.4	Microwave Frequencies, Microwave Bands, Microwave Devices, Advantages of microwaves, Applications of microwaves	5	1

2	2.1	Two Wire Transmission lines - Equivalent circuit, Characteristics impedance, reflection Coefficient, Standing waves and VSWR, Losses in transmission lines, Impedance matching, Stub matching (Detailed analysis not required)	6	2
	2.2	Multi-conductor Transmission lines - coaxial lines- Striplines- Microstrip line – Advantages and disadvantages	2	2
	2.3	Basic Concept of Waveguide, Advantages over Transmission Line, Qualitative Study of Rectangular Waveguide, TE and TM Modes	4	2
	2.4	Guide Wavelength, Cutoff Wavelength, Group velocity and Phase velocity, Dominant and Degenerate Modes	3	2
3	3.1	Limitations of vacuum tubes	4	3
	3.2	Multi-cavity Klystron – construction and operation	4	3
	3.3	Magnetrons-Working of Magnetrons	3	3
	3.4	Varactor diode, Gunn diode-Applications	4	3
4	4.1	Waveguide couplings, Bends and Corners	2	4
	4.2	Taper and Twists, T junctions, Magic Tees	4	4
	4.3	Hybrid rings, Cavity resonators	4	4
	4.4	Directional Couplers, Isolators, Circulators	5	4
5		<b>Teacher specific content</b>		

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Leverage a blended learning approach with a mix of lectures, interactive discussions, and hands-on lab sessions
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous Comprehensive Assessment (CCA)</b> Theory: - 30 Marks Internal Test, Seminar Presentation, Case Studies/Projects/Site visit/others <b>B. End Semester Evaluation</b> 1. Written Test (70 marks) – 2 Hour ( Duration of Examination ) a. MCQ – 16x1 = 16 Marks b. Short answer questions (6 out of 8 questions)-6x5=30 marks c. Essay questions -2 out of 4 - 2x12=24 marks

### References

1. Kulkarni, Muralidhar. Microwave and radar engineering. Vol. 17. Umesh Publications, New Delhi, 2009.
2. Kennedy, George, Brendan Davis, and S. R. M. Prasanna. Electronic communication systems. Vol. 20. Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1985.

### Suggested Readings

1. Liao, Samuel Y. Microwave devices and circuits. Pearson Education India, 1990.
2. Sadiku, Mathew NO. "Principles of Electromagnetics", Oxford University Press Inc. First India edition, 2009. 2." (2015).
3. Jordan, Edward Conrad. "Electromagnetic waves and radiating systems." (1968).
4. D. M. Pozar, "Microwave Engineering," Wiley, New York, 1998.

5. Rao, Elements of Engineering Electromagnetics, Pearson.
6. Rao and Narayanappa, Engineering Electromagnetics, Cengage



**MGU-UGP (HONOURS)**

# *Syllabus*