SOLID STATE MICROWAVE DEVICES

Course Code	20EC6401C	**Year**	II	**Semester**	II
Course Category	Honors	**Branch**	ECE	**Course Type**	Theory
Credits	4	**L-T-P**	3-1-0	**Prerequisites**	Microwave Engineering
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Analyse various solid state diodes (L4)
CO2	Operate Transferred-Electron Devices in various applications(L3)
CO3	Make use of various Microwave Solid State Devices.(L3)
CO4	Analyze the characteristics of Microwave Transistors (L4).

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1		2								2				
CO2	2									3				3
CO3	3									3				
CO4		2								2				
Average * (Rounded to nearest integer)	2	3								3				3

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Varactor Diode:** Introduction, Analysis of graded junction, Equivalent circuit, Manley Rowe power relation, Applications of Varactor diode- Parametric amplifiers, Parametric Up converter, Noise properties of Parametric amplifiers, Varactor diode Multiplier, Advantages and Limitations of Parametric amplifiers.	CO1
II	**Tunnel Diode:** Introduction, Principle of operation, Equivalent circuit, Tunnel diode amplifiers, I-V Characteristics of Tunnel diode, **Transferred-Electron Devices-Gunn Diodes**: current-voltage characteristics, Modes of operation of Gunn diode, Applications of Gunn Diode, LSA Diodes, InP Diodes.	CO1,CO2

III	**PIN Diodes:** Description, the I-layer, Equivalent circuit behaviour under reverse bias and forward bias, Diode impedance, Applications.	CO1,CO3
IV	**Avalanche Transit-Time Devices:** Introduction, **Read Diode**- Structure, Operation, Carrier current and external current, Output power and Quality factor, **IMPATT Diode**- Structure, Different doping profile structures, Operation, Small-signal theory , Power output and Efficiency, applications. **TRAPATT**- Structure, Principle of Operation, Power output and Efficiency, **BARITT**- Structure, Principle of Operation, Performance and Applications. .	CO1,CO3
V	**Microwave Transistors:** Introduction, Microwave Transistors- physical structure, Transistor Configurations, principle of operation, V-I characteristics, Equivalent circuit, Amplification phenomena, Power- frequency limitations**, Hetero-junction Bipolar Transistors (HBTs)**- physical structure, Operational Mechanism, Applications	CO3,CO4

Learning Resources
Text Book(s): **1.** Samuel Y. Liao, Microwave Devices and Circuits, 3rd Ed., PHI. 2. M.L. Sisodia, Vijay Lakshmi Gupta Microwaves- Introduction to Circuits, Devices and Antennas ,New Age International Publishers,2001.
Reference Books
1.Annapurna Das, Sisir K Das, Vijay Lakshmi Gupta Microwave Engineering, TMH.
