Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam April 2025 (2019 Scheme)

Course Code: ECT446

Course Name: MICROWAVE DEVICES AND CIRCUITS

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Explain the important features of microwaves?	(3)
2		List the key properties of the IMPATT diode and its areas of application.	(3)
3		Discuss the biasing methods in Bipolar transistor?	(3)
4		Describe One port negative resistance oscillators.	(3)
5		Explain the significance of impedance matching.	(3)
6		Write notes on Quarter wave transformer.	(3)
7		Explain the importance of k-β diagram in microwave filters.	(3)
8		Explain the significance of Kuroda's identity in filter implementation	(3)
9		Compare Hybrid MIC & Monolithic MIC .	(3)
10		Write notes on Diode phase shifter.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain four modes of oscillation in Gunn diode.	(14)

OR

12	a)	Explain Ridley–Watkins–Hilsum theory with the help of two valley model.	(8)
	b)	A TRAPATT diode has the following parameters Doping concentration $N_A = 2x10^{15}cm^{-3}$ Current density: J =20kA/cm^2. Calculate the avalanche-zone velocity.	(6)

Module II

13	a)	Explain the structure and working of MESFET.	(7)
	b)	Derive the expression for power gain of microwave amplifier.	(7)

OR

14	a)	Derive the expression for matched gain G_{Tmax} and maximum stable gain G_{msg}	(14)

in Single-Stage transistor amplifier design.

Module III

15 a) Show that when two two-port networks are connected in cascade, the overall ABCD matrix is obtained by multiplying the ABCD matrices of each individual network. (8)

b) Explain the properties of Scattering Matrix? (6)

OR

16 a) Explain matching with lumped elements. (7)

b) Explain the TRL technique in Signal flow graph with neat diagrams (7)

Module IV

17 a) Explain periodic structures in Microwave filters. (6)

b) Explain m-derived section of Image parameter method in filter design. (8)

OR

18 a) Explain filter design by insertion loss method. (10)

b) Explain Richard's transformation in filter implementation. (4)

Module V

19 a) Explain the structure of Microstrip planar transmission line with neat diagram. (8)

b) Explain lumped elements of integrated circuits. (6)

OR

20 a) Explain microwave resonators? (4)

b) Write short notes on : i) Discontinuities ii) Isolator (10)

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