Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EC461

Course Name: MICROWAVE DEVICES ANDCIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) What are the limitations of conventional solid state devices at microwaves ? (5)

b) What does IMPATT diode stands for and with neat diagram explain the construction and working of it and derive power and efficiency of the same. ? (10)

2 a) E xplain GaAs MESFET with structure and principle of operation? Why GaAs MESFETs are preferred over Si MESFETs ? (10)

b) Discuss different biasing techniques used for microwave bipolar transistor ? (5)

3 a) Explain one port negative resistance oscillator ? (5)

b) A typical n-type GaAs GUNN diode has the following parameters (10)

Threshold field E_{th} = 2800 V/cm

Applied field E = 3200 V/cm

Device length L = 10 μm

Doping concentration n_o = $2*10^{14}/cm^3$

Operating frequency = 10 GHz

a) Compute the electron drift velocity

b) Current density

c) Negative electron mobility

PART B

Answer any two full questions, each carries 15 marks.

4 a) Find the ABCD matrix coefficient computation of a transmission line section with characteristic impedance 'Z_o' propagation constant 'β' and length 'l' ? (7)

b) Discuss the working of quarter wave transformer and halfwave (8)

5 a) Explain the working of single stub tuning ? (6)

b) Discuss in detail about impedance and frequency scaling (9)

6 a) List the Kuroda's identity. (5)

b) Design a low pass filter for fabricat ion using microstrip line. The specifications are cut-off frequency of 4 GHz, third order, impedance of 50 Ω and a 3 dB equi-ripple characteristics. The normalized low pass proto-type values are $g_1 = 3.3487 = L_1$ $g_{3,} = 3.3487 = L_3$, $g_2 = 0.7117 = C_2$, $g_4 = 1.000 = R_{L.}$ (10)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Compare Monolithic MICs with hybrid MICs (7)

b) Explain stripline in detail. (8)

c) The stripline designed with a dielectric material with b = h = 3.1 mm, w = 2.5 mm Find characteristic impedance Z_o ? $\sqrt{\varepsilon_r} = \sqrt{10.5}$. (5)

8 a) Discuss different configurations of capacitors in MICs. (10)

b) Compare short circuit and open circuit resonator. (5)

c) Discuss discontinuities in MICs. (5)

9 a) Explain the classifications of switches. (7)

b) Write notes on 1)Attenuators 2)Slotlines (7)

c) Classify the losses in Microstrip lines (6)

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