Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Supplementary Examination August 2021

Course Code: EC461
Course Name: MICROWAVE DEVICES AND CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) What is MESFET? Mention its structure and operation. (10)

b) Why are GaAs MESFET's preferred to Si MESFET's? (5)

2 a) Explain modes of operation of Gunn diode. (6)

b) An n-type GaAs Gunn diode has the following parameters: (9)

Threshold field E_{th}=2600V/cm

Applied field E=3200V/cm

Device length L=6μm

Doping concentration $n_0 = 24*10^{14}$ cm-^{3}

Operating frequency f=12Ghz

a. Compute the electron drift velocity.

b. Calculate the current density.

c. Estimate the negative electron mobility

3 a) Explain the structure and operation of IMPATT diode. (7)

b) Substantiate why cavity is required for one port negative resistance oscillator. (8)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Derive expressions for S parameters in terms of Z parameters for a 2-port network. (5)

b) For a rectangular waveguide excited with TE_{10}, discuss its equivalent voltage and currents for TE_{10}. Comment on the significance of Network Analysis (equivalent circuit model) or Transmission line modelling at High Frequencies. (10)

5 a Explain working of Double Stub tuning. (8)

b Explain Richard's transformation .What is the significance of λ/8,λ/4 and λ/2 length of transmission lines? (7)

6 a) List the Kuroda Identity. (5)

b) Design a low-pass composite filter with a cut-off frequency of 2MHz and impedances of 75Ω. Place the infinite attenuation pole at 2.05MHz (10)

PART C

Answer any two full questions, each carries 20 marks.

7 a) What is Monolithic MICs? Compare Monolithic MICs with hybrid MICs. (9)

b) Discuss Stripline in planar transmission and also find the Quality factor. (8)

c) Which types of modes are supported by following transmission lines-Stripline, Microstrip and slotline? (3)

8 a) Explain in detail about thick film and thin film technology. (10)

b) Explain the working and applications of Circulators and Isolators. (10)

9 a) Discuss Microwave resonators with neat diagram. (8)

b) Explain the frequency characteristics of single layer square inductor. (7)

c) Explain the configuration of Planar capacitor film. (5)

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