Register Number: ……..

B.E., DEGREE EXAMINATIONS: NOV/DEC 2012

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE121**:** Microwave Engineering

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The microwave X – band frequency range is
   a) 8-12 GHz b) 2-4 GHz
   c) 18- 26 GHz d) 26-40 GHz
2. The following is one of the non reciprocal Device
   a) Isolator b) Attenuator
   c) Hybrid ring d) Magic Tee
3. Klystron is a
   a) Microwave Semiconductor Device b) Microwave Tube
   c) Radio Frequency Device d) Low Frequency Device
4. The concept of
   a) Amplitude Modulation is used in a klystron b) Frequency Modulation is used in a klystron
   c) Phase modulation is used in a klystron d) Velocity modulation is used in a klystron
5. Gunn diode is a
   a) Negative resistance Device b) Low frequency Device
   c) High noise Device d) Positive resistance Device
6. In the following Devices IMPATT,TRAPATT,BARITT --- TT stands for
   a) Total time b) Transit time
   c) Tunneling time d) Transfer time
7. Microstrip line is a
   a) RF transmission line b) Microwave transmission line
   c) Very high frequency transmission line d) Audio frequency transmission line
8. Silicon dioxide is a
   a) Conducting material b) Substrate material

9. A matched load is a microwave component which

a) Reflects power b) Absorbs power

c) Transmits power d) Scatters power

10. Microwave power can be measured using a

a) Thermistor mount b) Resistor mount

c) Capacitor mount d) Inductor mount

PART B (10 x 2 = 20 Marks)

11. Define Scattering parameters of a two port network.
12. Sketch wave guide corners and Bends.
13. Explain reflex klystron
14. What is apple gate diagram? Draw the apple gate diagram for reflex or two cavity Klystron.
15. Draw the diagram of surface geometries of microwave transistor.
16. Draw and explain the physical description of a READ diode with doping profile.
17. Describe the Schematic diagram of a parallel strip line.
18. List the advantages of Monolithic microwave Integrated circuits.
19. Name two methods to measure impedance.
20. How insertion loss and attenuation losses are measured at microwave frequency range?

PART C (5 x 14 = 70 Marks)

21. a) (i) Derive S matrix of E plane Tee and Magic Tee (7)

(ii) Explain the working principle of Faraday rotation Isolator (7)

(OR)

b) (i) From first principles derive S matrix of directional coupler (7)

(ii) Describe about 3 or 4 Port circulator in detail. (7)

22. a) (i) Explain the principle of velocity modulation of two cavity klystron with a neat schematic diagram. (7)

(ii) Derive the expression for velocity modulation of two cavity klystron (7)

(OR)

b) (i) Draw and explain the working principle of traveling wave tube, also explain the slow wave structure used in traveling wave tube. (7)

(ii) Explain the oscillation mechanism and the electron trajectory concept of cylindrical Magnetron oscillator (7)

23.	a)	(i)	Draw the geometrical diagrams of GaAsFET and explain	(7)
		(ii)	What are the modes of operation that result in microwave oscillations in a Gunn diode? Explain	(7)
			(OR)	
	b)	(i)	Explain using multi valley energy diagram the IV characteristics of Gunn diode.	(7)
		(ii)	Describe the construction and operating principle of IMPATT diode	(7)
24.	a)	(i)	Explain the structure and features of Microstrip transmission line	(7)
		(ii)	Discuss the various losses in Microstrip line and quality factor Q of microstrip line.	(7)
			(OR)	
	b)		What are the processes involved in the fabrication of monolithic microwave integrated circuits? Describe in detail with necessary diagrams.	
25.	a)	(i)	Draw the Block diagram for the slotted line method of VSWR measurement and explain.	(7)
		(ii)	Describe the operation of frequency meter.	(7)
			(OR)	
	b)	(i)	Draw the Block Schematic of a general purpose microwave test bench and explain the functions of each block.	(7)
		(ii)	Explain a method for Low power measurement.	(7)

****