U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 16EC5DCMWE **Max Marks: 100**
Course: Microwave Engineering **Date: 17.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
Revealing of identification, appeal to evaluator will be treated as malpractice.

B.M.S.C.E - ODD SEM 2022-23

UNIT - I

1 a) Why transmission lines are called distributed parameter networks? Derive the expression for voltage V(z) and current I(z) on a uniform transmission line considering lumped equivalent circuit of a small section of a uniform transmission line. **10**

b) Explain in brief reflection coefficient, Transmission coefficient and Standing wave ratio with respect to a transmission line. Derive the relation between them. **10**

UNIT - II

2 a) State and prove properties of scattering matrix. **12**

b) S-parameters of a two-port network are given by **08**

$$[S] = \begin{bmatrix} 0.1\angle 0^o & 0.9\angle 45^o \\ 0.9\angle 45^o & 0.3\angle 45^o \end{bmatrix}$$

Determine whether network is (i) Reciprocal (ii) Lossless

What is the return loss at port 1 when port 2 is short circuited.

UNIT - III

3 a) Explain construction and operation of a Magic-Tee with neat diagram. Obtain it's S-matrix. Explain any one application of Magic-Tee. **10**

b) A 3-port circulator has an insertion loss of 1dB and an isolation of 30dB. If VSWR=1.5, Obtain it's S-matrix. **10**

OR

4 a) What is a circulator? Explain any one way of obtaining a 4-port circulator. Write it's S-matrix. **10**

b) Show that if a pair of ports of a 4-port lossless reciprocal Junction are de-coupled, the other pair of ports are also de-coupled. **10**

UNIT - IV

5	a)	Explain the construction and operation of PIN diode. Compare PIN diode with ordinary PN junction diode. With neat diagram, explain how a PIN diode is used as RF Switch.	**10**
	b)	With neat diagrams, describe the construction of any one form of IMPATT diode. Explain its operation with relevant waveforms.	**08**
	c)	An IMPATT diode has a drift length of 2 micro meter. Determine the operating frequency of IMPATT diode if the drift velocity for Si is 10^7cm/sec.	**02**

OR

6	a)	With neat diagrams, explain the working of Reflex Klystron Oscillator. A Reflex Klystron is to be operated at 10GHz with a beam voltage of 300V, Repeller space of 0.1 cm, and $1\frac{3}{4}$ mode. Calculate PRFmax and corresponding repeller voltage for a beam current of 20 mA.	**12**
	b)	With neat diagram explain the working of a negative resistance Parametric Amplifier. Compare negative resistance Parametric amplifier and Parametric Up –converter.	**08**

UNIT - V

7	a)	Explain what you understand by EMI and EMC and why it is important in RF design.	**10**
	b)	Describe how microwaves are utilized in medical field and explain the effect of Microwaves on human body.	**10**

******

B.M.S.C.E. - ODD SEM 2022-23