R13

Code No: 117FE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, July/August - 2023

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define an effective dielectric constant in microstrip lines.	[2]
b)	List the microwave frequency bands.	[3]
c)	What is Faraday rotation?	[2]
d)	Name the three types of coupling devices.	[3]
e)	What is the advantage of Reflex Klystron over 2-cavity Klystron?	[2]
f)	What are slow wave structures? Why are they used?	[3]
g)	What are the different types of Magnetrons?	[2]
h)	Give the classification of microwave solid state devices.	[3]
i)	What is a bolometer?	[2]
j)	Define Scattering matrix. Give its significance.	[3]

PART – B

(50 Marks)

2.a) Analyze TM mode in rectangular waveguide.
b) Explain about phase and group velocities. [6+4]

OR

3.a) Explain in detail about power losses in rectangular waveguides.
b) Give expressions for power transmitted through rectangular waveguide for TE and TM modes. [6+4]

4. Write notes on the following.
a) E-plane Tee
b) Microwave Circulator [5+5]

OR

5.a) What is a directional coupler? Explain and illustrate a two-hole directional coupler.
b) Write briefly on waveguide phase shifters. [5+5]

6. With a neat diagram of the structure of 2-cavity Klystron, explain the bunching process in it. [10]

OR

7.a) Explain the limitations of conventional tubes at microwave frequencies.
b) Derive an expression for output power gain of helix TWT in decibels. [6+4]

8. Explain the working of Cylindrical Travelling Wave Magnetron with neat sketches. [10]

OR

9.a) Draw the V-I characteristics of Gunn diode and explain how it generates oscillations.

b) Describe the LSA mode of a Gunn diode. [6+4]

10. Calculate S-matrices for the following.
a) H-plane Tee
b) Magic Tee [5+5]

OR

11. Explain in detail about measurement of low and high VSWR. [10]

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