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Reg. No: ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Supplementary Examinations February-2022
MICROWAVE THEORY AND TECHNIQUES
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 60

PART-A
(Answer all the Questions 5 x 2 = 10 Marks)

1	a	Distinguish between the waveguide and transmission lines.	2M
	b	What do you mean by Faraday rotation?	2M
	c	What is an attenuator and mention different attenuator?	2M
	d	What is transit time?	2M
	e	List the possible errors in VSWR measurement.	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	Relate the Wavelengths and Impedance of the transverse electric (TE) field in terms of cutoff frequency.	10M

OR

3	a	A rectangular metal wave guide filled with a dielectric material of relative Permittivity $\varepsilon_r=4$ has the inside dimensions $3.0cm \times 1.2cm$. Evaluate the cut off frequency for the dominant mode.	4M
	b	Explain briefly on: (i) Guide wavelength (ii) dominant mode and (iii) over mode conditions in waveguide..	6M

UNIT-II

4	a	Explain the mechanism of electromagnetic wave propagation in Rectangular Waveguide.	6M
	b	Explain the working of coaxial transmission line with the help of a cross-section	4M

OR

5	a	Discuss about the excitation modes in circular waveguides.	4M
	b	Explain the working of strip line transmission line with the help of a neat sketch of its field distribution. Obtain the expression for characteristic impedance.	6M

UNIT-III

6	a	What is the principle of phase shifter? Sketch the diagram of phase shifter and discuss the working mechanism.	5M
	b	Explain the significance and formulation of S-matrix in detail.	5M

OR

7	a	Deduce the S-matrix for directional coupler.	5M
	b	State and prove the following properties of S-parameters: (i) Zero diagonal property (ii) Unitary property, and (iii) Phase shift property	5M

UNIT-IV

8   Discuss in detail about the working of Reflex Klystron with mechanism and modes of oscillation.   **10M**

OR

9   a   A reflex Klystron operates at the peak of n= 1 or ¾ mode. The dc power input is 40mw and ratio of V1 over V0 is 0.278   **5M**
i) Determine the efficiency of the reflex Klystron.
ii) Find the total power output in mW.
iii) The 20% of the power delivered by the electron beam is dissipated in the cavity walls find the power delivered to the load.

b   Explain the process of velocity modulation of a Reflex Klystron.   **5M**

UNIT-V

10   a   With the help of a neat sketch, briefly explain the functions of different blocks of a microwave bench.   **5M**

b   Explain how high values of VSWR(S>20) can be measured directly from the VSWR meter using the experimental set-up.   **5M**

OR

11   a   Explain in detail about Swept Frequency method of Q Measurement.   **5M**

b   Explain the measurement of Quality factor (Q) using slotted line method.   **5M**

END