Total No. of Questions :10] *[Total No. of Printed Pages :4*

Roll No.....

EC - 604

B.E. VI Semester

Examination, December 2012

Microwave Engineering

Time : Three Hours

Maximum Marks : 100 ***Minimum Pass Marks :35***

Note : 1. Attempt any one question from each Unit.

2. All questions carry equal marks.

3. Assume suitable data if found missing.

UNIT - I

1) What is a dominant mode and degenerate mode? Discuss power transmission and power losses in a rectangular wave guide? What are the techniques for excitations of modes in a rectangular wave guide? An air - filled rectangular wave guide has dimensions a = 6 cm and b = 4cm. The signal frequency is 3 GHz. Compute the following for the TE_{10} mode:

   a) Cut off frequency

   b) Wavelength in waveguide

   c) Phase constant and phase velocity in the waveguide.

   d) Group velocity and wave impedance in the waveguide.

OR

2) Explain the following :

   a) strip lines

   b) Microstrip lines.

A shielded strip line has the following parameters:

Dielectric constant of the insulator (Polystrene) :	ε_r=2.56
Strip width:	ω =25 mils
Strip thickness:	t = 14 mils
Shield depth	d=70 mils

Calculate:

a) The k. factor

b) The fringe capacitance

c) The characteristic impedance of the line

What are the various losses in Microstrip lines: Derive quality factor ϕ of microstrip lines.

UNIT - II

3) Discuss principle of operation and properties of E - plane Tee. Derive S-matrix for it.

OR

4) Write a detailed note on the following :

a) Ferrites

b) Hybrid T

c) Rectangular cavity Resonator and equations for resonant frequency and quality factor.

UNIT - III

5) What is a parametric amplifier? How is it different from a

normal amplifier? State Manley-Rowe relations as applied to parametric amplifiers; What are the conditions for parametric up converter and down converter? Discuss the amplification mechanism of a parametric amplifier by use its equivalent circuit? Briefly explain

i) Degenerate para amp.

ii) Non-degenerate para amp.

iii) Broadband para amp.

iv) Cooled para amp.

OR

6) Write a detailed note on the following:

a) P-I-N diodes

b) Microwave detector diodes

c) Varactor Diodes

d) TRAPATT

UNIT - IV

7) What are cross-field devices? How does a magnetron sustain its oscillations using this cross-field? How is bunching achieved in accenity magnetron? Explain the phase focussing effect? What is strapping in magnetron? Derive an expression for the cut-off magnetic field (flux) density with reference to a cylindrical magnetron.

OR

8) Explain Reflex Klystron under the following points:

a) Construction and schematic diagram

b) Operation

c) Operating characteristics

d) Mathematical Analysis

UNIT - V

9) Explain the double minimum method of measuring VSWR? Explain VSWR meter and slotted line arrangement?

OR

10) Discuss Microwave frequency measurement techniques? Explain Broad-band and tuned detectors. What is square -law detection.

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