

6E3085

B.Tech. VI Semester (Back) Examination, April/May - 2017
Electronics & Communication Engg.
6EC1(O) Microwave Engg. - II

Time : 3 Hours**Maximum Marks : 80****Min. Passing Marks : 26****Instructions to Candidates:**

Attempt any **five questions**, selecting **one question from each unit**. All Questions carry **equal marks**. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit-I

1. a) Why ordinary diodes and transistors are useful in microwave detection and microwave applications? (4)
- b) How will you detect microwave signals? Explain different methods used for power measurement of low power (< 1 mw), and high power (> 10 mw). (8)
- c) The double minimum method is used to determine the VSWR and found separation between two adjacent null is 4cm. If twice minimum power points are at 2.5mm, determine the VSWR. (4)

(OR)

1. a) Explain the methods of impedance measurement with suitable diagrams. (10)
- b) An unknown load terminates a 50Ω microwave line. The VSWR measured is 2.4 and the first minima is located at a distance 0.313λ from the load. Find the unknown load and reflection coefficient. (6)

Unit-II

2. a) A lossless dielectric filled parallel stripline has characteristic impedance of 50Ω and $d = 3.0\text{mm}$ ($\epsilon_0 = 8.85 \times 10^{-12}$ F/m, $\epsilon_r = 6$), Calculate. (10)
 - i) Required width of conductor strip
 - ii) Stripline inductance
 - iii) Stripline capacitance
 - iv) Phase velocity
- b) What are slot lines and how do they differ from micro striplines. (6)

(OR)

2. a) Explain parallel striplines and thus distributed parameters, characteristics impedance and attenuation losses. (8)
- b) A micro strip is designed with dielectric constant $\epsilon_r = 5.23$. The microstrip has width 10 mils, thickness 2.8 mils and it is located at a height $h = 7$ mils. Find the effective dielectric constant and characteristic impedance. (8)

Unit-III

3. a) What are [ABCD] parameters? How can these be related to : (8)
- i) Z and
- ii) S-parameters
- b) The scattering matrix of a two-port microwave network is given below : (8)

$$S = \begin{bmatrix} 0.10 \angle 0^\circ & 0.90 \angle -45^\circ \\ 0.90 \angle 45^\circ & 0.3 \angle 0^\circ \end{bmatrix}$$

Find return loss if port 2 is terminated in short circuit

(OR)

3. a) What are signal flow graphs? How are they advantageous in microwave network analysis? (8)
- b) The impedance matrix of a certain microwave circuit is $[Z] = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$ determine the corresponding scattering matrix. (8)

Unit-IV

4. a) What are charge coupled devices? Using suitable diagrams explain the working of buried CCD and CCD structures. (10)
- b) Calculate the charge transfer efficiency of a 330 stage CCD, If the charge transfer loss is 0.01%. What fraction of charge pulse remains in packet when finally delivered to the memory circuit? (6)

(OR)

4. a) Write short notes on : (9)
- i) Tunnel diode
- ii) PIN as switch
- iii) PIN as modulator
- b) What is varactor? Draw a layout of a varactor and hence obtain the equivalent circuit. (7)

Unit-V

5. a) Draw all steps involved in the fabrication of MOSFET'S. Discuss the major difference between low frequency and MMIC fabrication. (10)
- b) What are the characteristics of substrate material and conductor materials used for MMICs. (6)

(OR)

5. a) Outline the planar passive elements used in MMICs. (8)
- b) What are the various process used to grow epitaxy layer on the substrate? (8)

