

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Seventh Semester

Electronics and Communication Engineering

EC8701 - ANTENNAS AND MICROWAVE ENGINEERING

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|---|-------------------------------|
| 1. Trace the two dimensional radiation pattern of a directional antenna. | 2,K2,CO1 |
| 2. Describe the equation for antenna noise temperature with its definition. | 2,K2,CO1 |
| 3. Compute the radiation resistance of current element whose overall length is $\lambda/50$. | 2,K2,CO2 |
| 4. List the disadvantages of loop antennas. | 2,K1,CO2 |
| 5. Examine directivity of directional couplers. | 2,K1,CO4 |
| 6. Define Faraday rotation. | 2,K2,CO4 |
| 7. Identify the factors that reduce the efficiency of IMPATT diodes. | 2,K2,CO5 |
| 8. Infer why magnetron is called a cross field device. | 2,K2,CO5 |
| 9. List the needs for impedance matching networks. | 2,K1,CO6 |
| 10. Identify the function of a mixer. | 2,K2,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) (i) An antenna has a field pattern given by $E(\theta) = \cos\theta \cos 2\theta$ for $0^\circ \leq \theta \leq 90^\circ$. Compute (a) HPBW (b) FNBW. 8, K2,CO1
- (ii) Explain the concept of radiation pattern and directivity of an antenna. 5, K2,CO1

OR

- b) Explain the concept of (a) Bandwidth (b) Beam efficiency (c) Antenna Temperature (d) link budget and link margin. 13, K2,CO1
12. a) Determine the power radiated by a half wave dipole antenna and hence obtain its radiation resistance. Also find its directivity. 13, K3,CO2
- OR**
- b) Compare different types of horn antenna structures with neat diagrams. Also determine its directivity and beamwidth. 13, K2,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) Explain the noise characteristics of a microwave receiver front end with necessary diagrams and mathematical expression. *13, K2, CO4*

OR

b) Explain the working of Magic Tee with neat diagram and also obtain its scattering matrix. *13, K2, CO4*

14. a) Determine the working principle of Gunn diode as a transferred electron device with two valley models, Also draw the structure, equivalent circuit and V-I characteristics of Gunn diode. *13, K2, CO5*

OR

b) Describe velocity modulation and explain the working principle of reflex klystron and bunching parameter. *13, K2, CO5*

15. a) Describe the characteristics of amplifier and Examine the transducer power gain, unilateral power gain, available power gain and operating power gain of a microwave amplifier using S parameters. *13, K2, CO6*

OR

b) Classify the methods to design the filter for microwave frequencies. *13, K2, CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Trace the radiation pattern of a linear array of 4 isotropic elements spaced $\lambda/2$ apart and fed in phase with equal currents. *15, K2, CO3*

OR

b) Explain in detail the concept, design principles and types of phased array. Also explain the different feeding methods of phased array. *15, K2, CO3*