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Course Code

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Sixth Semester B.E. Degree Examinations, May/June 2026

MICROWAVES AND ANTENNAS

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBT:CO:PI)</u>
<u>Module-1</u>			
1.	a. With a neat sketch, explain reflex klystron oscillator characteristics.	10	(2 : 1 : 1.3.1)
	b. Derive the expressions for reflection and transmission coefficients in terms of load and characteristics impedance.	10	(2 : 1 : 1.3.1)
(OR)			
2.	a. Analyze the working of a Gunn diode oscillator with the help of a neat figure.	10	(2 : 1 : 1.3.1)
	b. With neat sketch, explain smith chart, and show how load impedance and VSWR circle is located.	10	(2 : 1 : 1.3.1)
<u>Module-2</u>			
3.	a. Define the following losses and derive the necessary expressions in S parameters. (i) Insertion loss (ii) Transmission loss (iii) Reflection loss (iv) Return loss.	10	(2 : 2 : 1.3.1)
	b. Deduce S-matrix representation of multiport network and list the various properties of microwave network with S-matrix.	10	(2 : 2 : 1.3.1)
(OR)			
4.	a. Explain the operation of precision type phase shifter with a neat sketch.	10	(2 : 2 : 1.3.1)
	b. Explain the characteristics of magic tee, obtain S-matrix representation.	10	(2 : 2 : 1.3.1)
<u>Module-3</u>			
5.	a. With neat sketch of power pattern, explain (i) HPBW (ii) FNBW and obtain (i)HPBW (ii) FNBW Given $E(\theta) = \cos(\theta)$	08	(2 : 3 : 1.3.1)
	b. Derive an expression for beam area of radiation pattern of antenna.	06	(2 : 3 : 1.3.1)
	c. Briefly discuss radiation intensity and beam efficiency.	06	(2 : 3 : 1.3.1)
(OR)			
6.	a. Find the beam area of a radiation pattern given by $E(\theta) = \sin^2(\theta)$, $0 \leq \theta \leq 90$. Also calculate its HPBW.	10	(2 : 3 : 1.3.1)

- b. With neat sketch, explain short electric dipole illustrating its field components with necessary equations. **10 (2 :3 : 1.3.1)**

Module-4

7. a. State the power theorem and derive the expression for pointing vector. **10 (2 :4 : 1.3.1)**
 b. If there are two isotropic point sources of same amplitude and opposite phase, derive an expression for the resultant field and plot the radiation pattern. **10 (2 :4 : 1.3.1)**

(OR)

8. a. Briefly explain the operation of two types of smart antennas with neat sketches. **12 (2 :4 : 1.3.1)**
 b. Apply the principles of smart antenna technology to demonstrate their use in various real-world applications. **08 (2 :4 : 1.3.1)**

Module-5

9. a. Analyze the basic characteristics of microstrip antennas and differentiate various antenna shapes with the help of neat sketches. **10 (2 :5 : 1.3.1)**
 b. Discuss with neat sketch the feeding methods of microstrip antennas. **10 (2 :5 : 1.3.1)**

(OR)

10. a. Discuss the following with neat diagrams **10 (2 :5 : 1.3.1)**
 (i) Yagi–Uda antenna (ii) Parabolic reflector.
 b. Apply the concepts of antennas to illustrate their applications in **10 (2 :5 : 1.3.1)**
 (i) Cell phones (ii) RADAR (iii) Satellite and Defence communications.

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