



R22 Regulation

Subject code: 4E6DA

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

**B.Tech VI Semester Regular Examinations, May 2025**

## ANTENNAS AND WAVE PROPAGATION

(ECE)

Maximum Marks: 60

Date: 16.06.2025

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

### Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Define an antenna and mention the necessity of antenna.	1M	1	1
b)	Determine the radiated power of antenna which has radiation resistance of 300 ohms and current of 5A.	1M	1	3
c)	What is the spacing between elements of Yagi - Uda antenna	1M	2	1
d)	Mention the advantages of folded dipole.	1M	2	1
e)	Define feed method in reflector antennas.	1M	3	1
f)	What are the advantages and applications of microstrip antenna?	1M	3	1
g)	Describe the principle of end-fire array.	1M	4	2
h)	Define binomial array.	1M	4	1
i)	Define skip distance	1M	5	1
j)	What is multi hop propagation?	1M	5	1

### Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Derive the relation between Directivity and effective aperture of an antenna.	5M	1	2
	b) Find the radiation resistance of a loop antenna of diameter 0.5 m operating at a frequency of 1 MHz.	5M		
OR				
3	a) Calculate the power gain of a Half wave dipole whose ohmic losses and directive gain are 7 ohms and 1.64 respectively.	5M	1	3,2
	b) Derive expressions for the components of the radiated field of an alternating current element.	5M		
4	a) Design Yagi-Uda antenna of 6 elements to provide gain of 12 dB if the operating frequency is 200 MHz.	5M	2	2
	b) Discuss different types of horn antennas with neat sketches.	5M		
OR				
5	a) Explain design and the operation principle of helical antenna with neat diagram.	5M	2	1,2

	b) Describe the current distribution and radiation pattern of a folded dipole antenna. Find the input impedance of folded dipole and explain why the antenna has higher bandwidth.			
6	Discuss various types of patches in microstrip antenna with neat sketches & explain about various feed methods of microstrip antennas.	10M	3	4
	OR			
7	a) Compare different feeding methods that are associated with parabolic reflectors. b) A paraboloid reflector of 1.8m diameter is used at 6GHz. Calculate beam width between the nulls and gain in dB.	5M 5M	3	4,3
8	Derive the field components and draw the field pattern for two point source with spacing of $\lambda/2$ and fed with currents of equal magnitude and equal phase	10M	4	4
	OR			
9	a) Explain the absolute method and comparison method for measuring Gain of an antenna. b) Explain the procedure to measure directivity of antenna.	5M 5M	4	2
10	a) Derive an expression for the refractive index of the ionosphere in terms of 'N' and frequency. b) Discuss about sky wave propagation.	5M 5M	5	4
	OR			
11	a) Find the maximum range of Tropospheric transmission for which the height of transmitting antenna is 100ft and that of receiving antenna is 50 ft. b) Derive the relation between Maximum usable frequency (MUF) and skip distance.	5M 5M	5	2