R22 Regulation *Subject code:4E6DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

ANTENNAS AND WAVE PROPAGATION

(ECE)

Maximum Marks: 60 Date:13.04.2026 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	BTL
1.a)	Distinguish between near field and far fields.	1M	1	1
b)	Write the relation between effective aperture and Directivity.	1M	1	1
c)	List out all VHF, UHF and Microwave antennas.	1M	2	1
d)	List the applications of helical antenna.	1M	2	1
e)	List the advantages of Microstrip Patch antennas.	1M	3	2
f)	Define corner reflector antenna.	1M	3	2
g)	A linear broad-side array consists of 4 equal isotropic sources with $\lambda/3$ spacing (overall length of array $=\lambda$). Calculate the beam width.	1M	4	1
h)	What is the need of antenna measurement and what are drawbacks of antenna measurement?	1M	4	2
i)	Define super refraction.	1M	5	2
j)	Write the relation between MUF and Skip Distance.	1M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Find the radiation resistance of a loop antenna of diameter 0.5 m operating at a frequency of 1 MHz.	5M	1	3
	b) Derive the expression for far field components of a small loop antenna.	5M	1	3
	OR			
3	a) Calculate the radiation efficiency of an antenna and directivity in dB if antenna has radiation resistance of 73 ohms and a loss resistance of 7 ohms Gain is 20.	5M	1	3
	b) Derive the expressions for the Directivity of Half dipole antenna.	5M	1	3
4	a) Derive design equations of horn antenna.	5M	2	2
	b) Design Yagi uda antenna of 6 elements to provide a gain of 12dB if the operating frequency is 200MHz.	5M	2	4
	OR			

5	a) Derive the construction and basic principles of operation of a helical antenna under (i) normal mode of operation (ii) axial mode of operation. b) Explain the working of folded dipole antenna.	5M 5M	2	3
6	Discuss various types of patches in microstrip antenna with neat sketches and explain about various feed methods of microstrip antennas.	10M	3	4
	OR			
7	What is basic concept of reflector antennas and explain different types of reflector antennas?	10M	3	2
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	3	3
	OR			
9	a) A broadside array of identical antennas consists 8 isotropic radiators separated by distance $\lambda/2$. Find radiation field in a plane containing the line of array showing directions of maxima and null. b) An end fire array consisting of several half wave length long isotropic radiators having directive gain of 30. Find the length of array for broad side antenna?	4M 6M	4 4	2 3
10	a) Describe the troposphere and explain how ducts can be used for microwave Propagation. b) Find the maximum range of Tropospheric transmission for which the height of transmitting antenna is 100ft and that of receiving antenna is 50 ft.	5M 5M	5	2 3
	OR			
11	a) Derive the expression for refractive index of ionosphere by making suitable assumptions. b) Derive the relation between Maximum usable frequency (MUF) and skip distance.	5M 5M	5	4