

Hall Ticket Number:

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Code No. : 16439 AS

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.C.E.) VI-Semester Advanced Supplementary Examinations, August-2022

## Antennas and Wave Propagation

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Draw the current distributions for linear dipoles of length (i) $l \ll \lambda$ , (ii) $\lambda/2 < l < \lambda$ .	2	2	2	1
2.	Explain three different radiated field regions of an antenna.	2	1	1	1
3.	Find the radiation resistance of an infinitesimal dipole whose overall length is $l = \lambda/50$ .	2	3	2	2
4.	Give the significance of radiation resistance and what is the radiation resistance of a half wave dipole?	2	1	2	1
5.	Explain broad-side radiation of an antenna array.	2	1	3	1
6.	What is binomial array? What are advantages and disadvantages of binomial array?	2	1	3	1
7.	What are the various feeding techniques in microstrip antenna?	2	1	4	3
8.	What are applications and advantages of reflector antennas?	2	1	4	1
9.	List out various wave propagation techniques along with their operating frequencies.	2	1	5	3
10.	What is the difference between traditional antenna and Smart antennas?	2	1	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Describe the following parameters for any antenna a) Radiation Pattern b) Antenna Gain c) Antenna Efficiency d) Bandwidth e) Polarization	5	2	1	1
b)	Calculate the efficiency of the dipole antenna having a radiation resistance of $10\Omega$ and loss resistance of $3\Omega$ .	3	3	2	2
12. a)	Derive the expression electric field component of Infinitesimal Dipole.	4	4	2	3
b)	Explain the significance of ground effects on radiation pattern of vertical and horizontal antennas.	4	2	2	4

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13. a)	Find the progressive phase shift for an End Fire array with two elements and distance of separation given by $d=\lambda/2$ .	4	4	3	2
b)	Differentiate between Broadside array and End fire array and their radiation mechanism with necessary conditions.	4	2	3	1
14. a)	Write the empirical formulas for the design of rectangular microstrip antenna.	3	4	4	3
b)	Design a three element Yagi-Uda antenna at 900 MHz.	5	3	4	3
15. a)	Explain the basic concepts and benefits of smart antenna systems.	3	2	5	3
b)	Explain different modes of wave propagation and explain the ionosphere propagation and part played by each layer in it.	5	2	5	3
16. a)	Derive the expression of effective aperture and aperture efficiency.	4	4	1	1
b)	Explain the operation and radiation pattern of a small loop antenna.	4	4	2	1
17.	Answer any <i>two</i> of the following:				
a)	Explain the pattern multiplication with suitable example.	4	4	3	3
b)	Discuss various beamforming techniques, advantages, disadvantages and its applications.	4	2	4	1
c)	A sky wave is propagated with angle of incidence $\theta_i=30^\circ$ with critical frequency of 900 MHZ. Calculate the Maximum Usable Frequency $f_{muf}$ .	4	3	5	2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	33.75%
iii)	Blooms Taxonomy Level – 3 & 4	46.25%

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