Hall Ticket Number:

Code No. : 16445 O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.C.E.) VI-Semester Backlog Examinations, May/June-2023

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 with length (i) $l = \lambda/2$ and (ii) $l = \lambda$.	2	1	1	2
2.	List the various antenna polarization techniques.	2	1	1	1
3.	Differentiate Gain and Directivity	2	1	2	1
4.	Find the radiation resistance of a single-turn small circular loop with radius of the loop is $\lambda/25$.	2	2	2	2
5.	What is the principle of pattern of multiplication	2	2	3	1
6.	Why antenna array is used?	2	1	3	2
7.	How log periodic antenna is used for wideband applications	2	2	4	1
8.	What are the important parts of microstrip antenna?	2	1	4	1
9.	Define the term skin depth related to sky wave propagation	2	2	5	1
10.	Write the applications of smart antenna.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	A hypothetical isotropic antenna is radiating in free-space. At a distance of 100 m from the antenna, the total electric field (E_θ) is measured to be 5 V/m. Find the (i) Power density (W_{rad}) (ii) Total Power radiated (P_{rad}).	4	3	1	1,2, Pso3
b)	Explain the differences between Omni directional and Isotropic antenna	4	2	1	2
12. a)	A horizontal infinitesimal electric dipole of constant current I_o is placed symmetrically about the origin and directed along the x-axis. Derive the expressions far-zone fields radiated by the dipole.	4	3	2	1
b)	Calculate the radiation resistance of half-wave dipole antenna.	4	3	3	2

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13. a)	Three isotropic sources, with spacing d between them, are placed along the z-axis. The excitation coefficient of each outside element is unity while that of the center element is 2. For a spacing of $d = \lambda/4$ between the elements, find the array factor of the array.	4	4	3	2
b)	What is the difference between the end fire and broadside antenna array. Calculate the directivity of N element isotropic antenna array spaced with a distance of 'd'.	4	4	3	2
14. a)	Draw the neat sketches of E-Plane, H plane Horn antennas	4	2	4	1
b)	Discuss the geometry of a parabolic reflector and the significance of f/D ratio.	4	2	4	1
15. a)	Explain the architecture of a smart antenna system.	4	1	5	1, PSO-2
b)	Explain different modes of wave propagation.	4	2	5	1
16. a)	Derive the expression for the Friis transmission equation.	4	2	1	2
b)	Explain ground effect on antenna in detail.	4	2	2	1
17.	Answer any ***two*** of the following:				
a)	Two isotropic point source is place along z-axis with inter element distance of d, Calculate the total electric field of two isotropic antenna element.	4	3	3	4
b)	Explain various modes of radio wave propagation used in current scenario.	4	3	4	4
c)	Explain the working phenomenon of Yagi_Uda antenna arrays. Mention its applications.	4	3	5	4

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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