VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (E.C.E.) VI-Semester Main & Backlog Examinations, July-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.	Define antenna beam area and calculate the beam area given $\phi_{HP}=30^0$, $\Theta_{HP}=60^0$.	2	1	1	1
2.	Differentiate various antenna radiating field zones.	2	1	1	1
3.	Compare half wave dipole and quarter wave monopole antennas.	2	2	2	1
4.	Illustrate the ground effect on radiation patterns of horizontal and vertically polarized antennas.	2	2	2	1
5	Determine the directivity of a linear broadside array consists of four equal isotropic point sources with a spacing of d= $\lambda/3$.	2	3	3	2
6.	Write the conditions of array to operate along Broadside and End Fire directions.	2	1	3	1
7.	List out the different feeding mechanisms to overcome losses associated with parabolic reflector?	2	1	4	1
8.	What is the purpose of flaring in a sectorial and pyramidal horn antenna?	2	2	4	1
9.	Justify the statement: "ground wave propagation is not suitable at high frequencies"	2	2	5	1,PSO2
10.	The maximum density of the ionosphere layer is given by $1X10^{12}/cm^3$. What will be the critical frequency.	2	3	5	2,PSO2

Part-B (5×8 = 40 Marks)

11. a)	Explain the radiation mechanisms of a single wire and two wires along with the necessary conditions.	5	2	2	1
b)	Calculate the maximum effective aperture of an antenna which is operating at a wavelength of 2m and has a directivity of 100.	3	3	1	2
12. a)	Solve the expressions of power radiated and radiation resistance of an alternating current element?	5	4	2	3
b)	A thin wire antenna is $\lambda/15$ m long with loss resistance of 1.5Ω. Calculate the a) Radiation Resistance b) Antenna Efficiency c) Directivity if the power gain is 20.	3	3	2	2

			M	L	CO	PO
13.	a)	Explain the significance of Binomial array along with its advantages and disadvantages.	5	2	3	1
	b)	Draw the pattern of 4 isotropic elements fed in phase, spaced $\lambda/2$ apart by using the principle of pattern multiplication.	3	3	3	2
14.	a)	What are the different modes of operation of helical antennas? Explain the normal mode of operation of a helical antenna.	4	4	4	3
	b)	Design a Yagi- Uda antenna at 185 MHz with single reflector, driven element and three directors.	4	3	4	2
15.	a)	Describe the structure of the ionosphere and the part played by each layer in the long distance transmission or radio signals in the HF band.	5	2	5	1,PSO2
	b)	Find the distance up to which line of sight communication is possible if the height of the transmitting and receiving antennas are 45m and 20m respectively.	3	3	5	2,PSO2
16.	a)	Explain the significance of following Antenna parameters. a) Radiation Intensity b) Beam Width c) Bandwidth d) Polarization	4	1	1	1
	b)	Explain how the loop antenna can be used for direction finding.	4	4	2	1
17.		Answer any *two* of the following:				
	a)	Derive the expression for array factor of n element uniform linear array.	4	2	3	1
	b)	Design a rectangular microstrip antenna with length L and width W at 2.4GHz for a given substrate having relative permittivity (ϵ_r) of 2.32 and a height (h) of 0.16cm.	4	3	4	3
	c)	What is the significance of the smart antenna and list out any two advantages of smart antennas?	4	1	5	1

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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