Reg. No.												

Question Paper Code	12316

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

First Semester

M.E. - Communication Systems

20PCOPC101 - ADVANCED RADIATION SYSTEMS

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	State Huygen's principle.	*2,K1,CO2*
2.	List the merits and demerits of offset feed reflector antenna.	*2,K1,CO2*
3.	Illustrate the effects of phase quantization.	*2,K2,CO3*
4.	State the principle of phased array antenna.	*2,K1,CO3*
5.	List the drawbacks of microstrip array.	*2,K1,CO4*
6.	Write the design formula(s) for a rectangular patch antenna.	*2,K1,CO4*
7.	Interpret the role of a folded dipole in Yagi antenna.	*2,K2,CO5*
8.	Mention the advantages and disadvantages of Vivaldi antenna.	*2,K1,CO5*
9.	Draw the block diagram to measure the radiation pattern of an antenna.	*2,K1,CO6*
10.	Outline the features of an anechoic chamber and mention its uses.	*2,K2,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Derive the electric and magnetic field equations for a rectangular aperture on an infinite ground plane.	*13,K2,CO2*
		OR	
	b)	Describe in detail the radiation from a parabolic reflector.	*13,K2,CO2*
12.	a)	Derive the parameters of broadside array, end fire array and Hansen – Woodyard array and compare the expressions obtained.	*13,K2,CO3*
		OR	
	b)	Explain in detail the basic structure of a phased array. Also describe its application in tracking.	*13,K2,CO3*
13.	a)	Using suitable diagram and equations, explain the design procedure involved in the Microstrip array and feed network design.	*13,K2,CO4*
		OR	

b) Describe the radiation of a circular patch antenna in cavity model. *13,K2,CO4*

14. a) (i) Explain the construction and working of Log periodic dipole antenna with a neat diagram. *7,K2,CO5*

(ii) Describe about base station and hand set antenna. *6,K2,CO5*

OR

b) Design a yagi uda antenna of six elements to provide a gain of 12 dB if the operating frequency is 200MHz. *13,K2,CO5*

15. a) Analyze the CATR reflector edge treatments to reduce the diffracted fields in the quiet zone. *13,K2,CO6*

OR

b) "Free space ranges are designed to suppress the contributions from the surrounding environment" Justify. *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) (i) The normalized radiation intensity of an antenna is represented by $U=Cos^2\theta Cos^2(3\theta)$, $(0 \le \theta \le 90^o, 0 \le \emptyset \le 360^o)$. Find the half-power beam width and first-null beam width in radians and degrees. *7,K3,CO1*

(ii) The radial component of the radiated power density of an antenna is given by $W_{rad}=\mathbf{a_r}A_0 sin\theta/r^2$ W/m^2, find the maximum directivity of the antenna. Write an expression for the directivity as a function of the directional angles and $\emptyset$. *8,K3,CO1*

OR

b) The radiation intensity of an antenna is given by $U(\theta,\emptyset)=B_0 Sin\theta Sin^2\emptyset$, $0 \le \theta \le \pi$, $0 \le \emptyset \le \pi$, and 0 elsewhere. Determine the maximum directivity using numerical techniques. Compare it with the exact value *15,K3,CO1*