Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fifth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECT5005-Antennas and Wave Propagation

COURSE OUTCOMES

CO1: Describe different antenna parameters.
CO2: Design and analyze various wire antennas.
CO3: Compare different antenna arrays.
CO4: Illustrate techniques used for antenna parameter measurements.
CO5: Analyze the performance of aperture antennas.
CO6: Identify the different types of propagation of radio waves at various frequencies.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Classify the antenna types.	CO1	[K_2]
2.	Interpret the significance of far field region of an antenna.	CO1	[K_3]
3.	Calculate the directivity for a 20-turn helical antenna operating at 3 GHz with circumference C = 10 cm and the spacing between the turns is 0.3λ.	CO2	[K_3]
4.	Justify the reason for using Yagi antenna for TV broadcast reception.	CO2	[K_3]
5.	Recall the concept of Binomial array and point out its drawbacks.	CO3	[K_2]
6.	List the methods of antenna impedance measurement.	CO4	[K_2]
7.	Show the relationship between dipole and slot impedances.	CO5	[K_2]
8.	List the antennas used in mobile handsets and base stations.	CO5	[K_2]
9.	A HF radio link has to be establised between two points at a distance of 2500 km on earth's surface. Consider the ionosphere height to be 200km and fc = 5MHz. Calculate MUF for the given path.	CO6	[K_3]
10.	Define skip distance.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Make use of reciprocity theorem for antennas, show that the transmitting and receiving radiation patterns of antenna are equal.	6	CO1	[K_3]
	b)	Illustrate the relationship between directivity, gain and effective aperture.	6	CO1	[K_2]

	c)	A GSM 1800 cell tower antenna is transmitting 20W of power in the frequency range of 1840 to 1845 MHz. The gain of the antenna is 17dB.Find the power density at a distance of 50m 300m in the direction of maximum radiation.	4	CO1	[K_3]
12.	a)	Analyze the expressions for field components, power radiated and radiation resistance of a half wave dipole antenna.	12	CO2	[K_3]
	b)	Discuss the principle of loop antenna.	4	CO2	[K_2]
13.	a)	Examine the maxima directions, minima directions, and half power point directions for an array of two-point sources with equal amplitude and opposite phase.	8	CO3	[K_3]
	b)	Elaborate the methods for measuring the gain of antenna with necessary sketch.	8	CO4	[K_2]
14.	a)	Illustrate the working of Parabolic reflector antenna and discuss its feed systems.	10	CO5	[K_2]
	b)	Design a rectangular Microstrip patch antenna using a substrate with dielectric constant of 2.2, h = 0.1588 cm so as to resonate at 2.45 GHz.	6	CO5	[K_3]
15.	a)	Discuss the effects of earth's magnetic field on ionosphere radio wave propagation. List the factors that affect the propagation of radio waves.	10	CO6	[K_2]
	b)	Justify the use of high frequency waves in sky wave propagation. Explain the mechanism of propagation.	6	CO6	[K_3]
16.	a)	Explain the construction and principle of operation of a Log Periodic antenna with a suitable diagram.	10	CO2	[K_2]
	b)	Justify the selection of antennas based on the frequency of operation.	6	CO5	[K_3]

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