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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - MAY 2023**

Semester : Semester VI - B.Tech ECE - 2020

Course Code : ECE3112

Course Name : Sem VI - ECE3112 - Antenna and Microwave Engineering

Program : B.Tech. Electronics and Communication Engineering

Date : 19-MAY-2023

Time : 2.00 PM - 3.30 PM

Max Marks : 60

Weightage : 30%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Can an antenna have more than 0 dB gain in all the directions? Why or why not?
(CO1) [Knowledge]
2. Does a Yagi-Uda antenna have multiple reflectors or multiple directors
(CO2) [Knowledge]
3. State whether an antenna is a dissipating passive device or a transmitting active device. Justify your answer
(CO1) [Knowledge]
4. What do you mean by half-power beam width?
(CO1) [Knowledge]
5. List out the applications of a helical antenna.
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

6. Assume a broadcasting system operating at 100MHz, employing a halfwave dipole antenna having a gain of 2.15 dB. The power supplied to the transmitting antenna is 1 kW. The minimum power to be delivered to the receiving antenna is 1nW. If the distance between two antennas is 500 km. Find the minimum gain of receiving antenna.

(CO1) [Comprehension]

7. An antenna has 3 major elements namely: driven element, reflector, and director. It is designed to operate in very high and ultra-high frequency bands (30MHz - 3GHz) and is famous for its high gain and directivity. Identify the antenna and explain their construction very briefly.

(CO2) [Comprehension]

8. The Friis Transmission Equation is used to calculate the power received from one antenna when transmitted from another antenna separated by some distance. Suppose you have been asked to design an antenna operating at 1 GHz with a gain of 25 dB. What power should be supplied to the transmitting antenna such that the minimum power that is delivered to the receiving antenna is 10.8 mW. The transmitting and the receiving antenna are 0.5 km apart. The gain of the receiving antenna is 20 dB.

(CO1) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

9. The beam-shape of an antenna radiation pattern is an important parameter to determine the antenna performance. Generally, the term half-power beam-width (HPBW), which denotes the half-power points on the radiation pattern is used to make an approximate estimation of the directivity. Consider an antenna whose HPBWs in two orthogonal planes are 28° and 35° . If the antenna is operating at 500 MHz determine its effective aperture.

(CO1) [Application]

10. The Yagi-Uda antenna, is a directional antenna consisting of a reflector, a driven element, and one or more directors. These antennas find their utility in rooftop terrestrial television antennas, in point-to-point fixed communication links, in radar antennas, just to name a few. Suppose you have been asked to design a three-element Yagi-Uda antenna to operate at a frequency of 200 MHz.

(i) Mention all the necessary equations for the dimensions of the various elements and the inter-element spacing.

(ii) Evaluate the dimension of all the elements.

(CO2) [Application]