Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination – June – 2017**

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| **Code :** | **14EC2020** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ANTENNA THEORY AND WAVE PROPAGATION** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Illustrate the current distribution of a short dipole antenna and deduce the equation for far field components Eθ and Hφ. | CO2 | 15 |
| b. | Relate Gain and Effective area of an antenna. Define Radiation Intensity.What is the relation between radiation intensity and total power radiated by an antenna? | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Show that currents and voltages at the terminals of two antennas satisfy reciprocity theorem of circuit theory. Use the theorem to prove the equality of impedances and effective lengths of antenna used in transmission and in reception. | CO1 | 14 |
| b. | Calculate the maximum effective aperture of a half wave antenna assuming that induced current has sinusoidal distribution and show that it is equal to . | CO1 | 6 |
| 3. | a. | Deduce expression for the radiation pattern of a uniform linear array with N identical isotrophic elements. | CO2 | 12 |
| b. | Explain the principle of multiplication of patterns in case of an antenna array. | CO2 | 8 |
| (OR) | | | | |
| 4. | a. | Sketch & Describe the broadside array and its radiation pattern. Briefly explain how the pattern come out. Is this array resonant? | CO2 | 5 |
|  | b. | Obtain the expression to denote the direction pattern maxima, direction pattern minima and beamwidth of N-element broadside array. | CO1 | 15 |
| 5. |  | Show that for a square loop of dimensions a x a(a<<radiated fields are given by  and . With a neat sketch, consider and point out all the necessary assumptions and definitions required to accomplish the above expressions. | CO3 | 20 |
| (OR) | | | | |
| 6. | a. | Visualize the physical structure of a log periodic dipole array and express its design equations. | CO3 | 14 |
|  | b. | Point out the resultant field effects from the following cases in the log-periodic antenna array.   1. dipole with length= 2. dipole with length< 3. dipole with length> | CO2 | 6 |
| 7. |  | Obtain the radiated fields from Huygen’s Source | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | Explain the important features of horn antenna and principle of its working. How is the antenna fed and what are its applications? | CO3 | 10 |
|  | b. | Illustrate with neat diagram the working principle of Microstrip antenna with applications. | CO3 | 10 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Briefly describe the composition of ionosphere. Prove that the refractive index of a layer of the ionosphere is given by where ‘N’ is the ionic density. | CO3 | 14 |
| b. | How does earth’s magnetic field affect the ionospheric propagation? | CO3 | 6 |

ALL THE BEST