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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

**End Semester Examination – April/May – 2017**

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| **Code :** | **14EC3014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED RADIATION SYSTEMS** | **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. | | Derive expression for the radiated power density and radiated Intensity in the far field. | CO1 | 16 |
| b. | | Find the far field distance for an antenna with maximum dimension of 0.25λ at 900MHz. | CO1 | 4 |
|  | | (OR) | | | |
| 2. | a. | | Summarize the general procedure for determining the antenna radiation characteristics in the far field. | CO1 | 12 |
| b. | | Calculate the directivity of a) an Isotropic antenna and b) antenna having aperture area of 0.119λ2. | CO1 | 4 |
| c. | | Calculate the bandwidth ratio with 100MHz optimum operating frequency (fc) for a) 05MHz bandwidth b) 10MHz bandwidth and c) 20 MHz bandwidth. | CO1 | 4 |
| 3. | a. | | Show that radiation resistance R of the very small dipole is equal to. | CO1 | 12 |
|  | b. | | Assess the ways that can be used to obtain the expression for radiated power. | CO1 | 4 |
|  | c. | | Why do you practice the two step approach ahead of one step approach in finding the far fields? | CO1 | 4 |
| (OR) | | | | | |
| 4. | a. | | If the length of the dipole is decreased (consider 1.5λ, λ, λ/2, and λ/10), What will happen to the input impedance, radiation pattern, HPBW and Directivity parameters? Give your opinion. | CO1 | 12 |
|  | b. | | How do the effective aperture and directivity are associated? | CO1 | 4 |
|  | c. | | Write the equation to find vector potential A for the Volumetric, Surface and line distributed current densities. | CO1 | 4 |
| 5. | a. | | Derive the array factor of N- isotropic element linear array with uniform amplitude and spacing along z-axis. | CO1 | 16 |
|  | b. | | Draw the radiation pattern for a linear uniform array of N isotropic elements, if:  β = 0  β = − kd | CO1 | 4 |
| (OR) | | | | | |
| 6. | a. | | Explain the geometry of a log periodic antenna. Give the design equations and uses of log periodic antenna. | CO1 | 14 |
|  | b. | | Draw the structure of 3-elements Yagi-Uda antenna and give the dimensions and spacing between the elements in terms of wavelength. | CO1 | 3 |
|  | c. | | How to increase the radiation resistance of a loop antenna? | CO1 | 3 |
| 7. | a. | | Derive the far field expression of electric and magnetic field components for a pyramidal horn. | CO2 | 15 |
|  | b. | | What features of horn antenna are responsible for its widespread applicability? | CO2 | 5 |
| (OR) | | | | | |
| 8. | a. | | Derive the expression relating the subtended angle and f/d ratio for a front fed parabolic reflector. | CO2 | 12 |
|  | b. | | A widely used microwave antenna is the circular aperture. Justify the statement. | CO2 | 4 |
|  | c. | | Compute the directivity in decibels for a rectangular aperture with Lx=10λ and Ly= 20λ for a completely uniform aperture illumination | CO2 | 4 |
|  | | | **Compulsory:** |  |  |
| 9. | a. | | Discuss the construction and characteristics of micro-strip antennas. | CO2 | 15 |
|  | b. | | Design a rectangular micro-strip patch with dimensions W and L, over a single substrate whose f is 10GHz. єr for the substrate is given as 10.2 and height of the substrate is 0.127 cm. Determine the physical dimensions of the patch taking into account fringing field. | CO2 | 5 |

ALL THE BEST