**20EC502**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **December, 2023** | **Electronics & Communication Engineering** | | |
| **Fifth Semester** | **Antennas and Wave Propagation** | | |
| **Time: Three Hours** | | **Maximum: 70 Marks** | |
| ***Answer Question No. 1 Compulsorily.*** | | | **(14X1 = 14 Marks)** |
| ***Answer ANY ONE question from each Unit.*** | | | **(4X14=56 Marks)** |
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| 1. | a) | Define the Antenna | CO1 | L2 | 1M |
|  | b) | If the electric field strength of a plane wave is 2v/m. What is the strength of a magnetic field H in free space | CO1 | L1 | 1M |
|  | c) | What is meant by radiation pattern? | CO2 | L1 | 1M |
|  | d) | Define directivity of an antenna | CO2 | L2 | 1M |
|  | e) | What is meant by isotropic radiator? | CO3 | L3 | 1M |
|  | f) | What are the field zone? | CO3 | L2 | 1M |
|  | g) | Define Binomial Array Antenna. | CO3 | L2 | 1M |
|  | h) | What is folded dipole antenna? | CO4 | L2 | 1M |
|  | i) | What is meant by antenna polarization | CO4 | L1 | 1M |
|  | j) | What is pattern multiplication | CO4 | L2 | 1M |
|  | k) | Define gyro frequency. | CO5 | L1 | 1M |
|  | l) | Define skip distance | CO5 | L1 | 1M |
|  | m) | What is meant by Shadow zone? | CO5 | L1 | 1M |
|  | n) | What is duct Propagation | CO5 | L1 | 1M |
| **Unit -I** | | | | | |
| 2. | a) | Explain the radiation mechanism using two wire line approach | CO1 | L1 | 7M |
|  | b) | Discuss about potential functions using Maxwell's equations approach | CO1 | L3 | 7M |
| **(OR)** | | | | | |
| 3. | a) | Derive the expressions for field components of an alternating current element. | CO1 | L2 | 7M |
|  | b) | Find the radiation efficiency of a Hertzian Dipole of length 0.03λ at a frequency of 100 MHz if the loss resistance is 0.01 2Ω | CO1 | L1 | 7M |
| **Unit -II** | | | | | |
| 4. | a) | Derive the relation between the effective area and gain of an antenna | CO2 | L3 | 7M |
|  | b) | What is an antenna array and derive the expression for array factor of a uniform linear array? | CO2 | L4 | 7M |
| **(OR)** | | | | | |
| 5. | a) | Derive Array factor for N-Element uniform linear array and write its properties | CO2 | L1 | 7M |
|  | b) | Define the antenna efficiency? What are the different losses associated with the antenna | CO2 | L3 | 7M |
| **Unit -III** | | | | | |
| 6. | a) | Explain the working of a Rhombic antenna. Design Rhombic antenna for maximum field intensity with independent variable height | CO3 | L4 | 7M |
|  | b) | Explain loop antenna operation and its importance | CO3 | L2 | 7M |
| **(OR)** | | | | | |
| 7. | a) | Explain the basic principle of Micro-strip antenna with neat sketch and mention advantage and disadvantages. | CO4 | L1 | 7M |
|  | b) | Explain the construction and working of Helical Antenna & calculate Axial Ratio and pitch angle in normal mode | CO4 | L2 | 7M |
| **Unit -IV** | | | | | |
| 8. | a) | Derive the relationship between MUF and critical frequency | CO5 | L1 | 7M |
|  | b) | Describe briefly the salient features of ground wave propagation. | CO5 | L3 | 7M |
| **(OR)** | | | | | |
| 9. | a) | Obtain the field strength expression at receiving point for free space propagation | CO5 | L2 | 7M |
|  | b) | Assume the reflection takes place at a height of 400Km and that the maximum density in the ionosphere corresponding to a 0.9 refractive index at 10MHz. What will be the range for which the MUF is 10MHz | CO5 | L3 | 7M |

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