

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2161003
Date:14/05/2019
Subject Name:Antenna & Wave Propagation
Time:10:30 AM TO 01:00 PM
Total Marks: 70
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.

Figures to the right indicate full marks.

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|-----|---|----|
| Q.1 | (a) Define terms with respect to Antenna systems:
1) Antenna 2) Beam efficiency 3) Radiation intensity 4) Directivity 5) Gain of the antenna 6) Effective length of antenna 7) Effective aperture. | 07 |
| | (b) Define terms Polarization and modes of propagating waves. With appropriate figures describe different polarizations of an EM wave while its propagation. | 07 |
| Q.2 | (a) List out various types of Antenna systems. | 03 |
| | (b) “Radiation resistance of a quadrature wavelength monopole antenna is 36.5Ω ”. Justify your answer with necessary calculations for it. | 04 |
| | (c) Explain in detail about Hertzian Dipole antenna systems. Also calculate radiation resistance value of a Hertzian dipole antenna of having length $\lambda/40$, $\lambda/60$ and $\lambda/80$ respectively. | 07 |
| | OR | |
| | (c) Obtain the ratio of E_θ and H_ϕ field components of a current element at a distance point in free space with necessary derivations using Maxwell’s equation. | 07 |
| Q.3 | (a) Enlist different atmospheric layers with their approximate height, to be considered while wave propagation. | 03 |
| | (b) Describe the principle of pattern multiplication in the working of Array antennas. | 04 |
| | (c) State Babinet’s principle and discuss its usability in the slot antennas and complementary antennas. “Log periodic antenna offers wide band width operations.” Justify your answer. | 07 |
| | OR | |
| Q.3 | (a) Draw field pattern of an array of 4 isotropic point sources. separated by half wave length distance. | 03 |
| | (b) Enlist and discuss about various antenna field radiation zones briefly. | 04 |
| | (c) Prove that during wave propagation phenomenon $MUF = f_c / \cos(\Theta)$. Also derive equations of gain of parabolic disc antenna. | 07 |
| Q.4 | (a) Explain about log periodic antenna with necessary figures. | 03 |
| | (b) Enlist different feeding methods for antenna systems and describe any one of them in detail. | 04 |
| | (c) List out all antenna Gain measurement methods and describe any two of them in detail. | 07 |
| | OR | |
| Q.4 | (a) Explain about loop antenna with necessary details. | 03 |
| | (b) Describe lens antenna in detail. | 04 |

- (c) Describe phase measurement method used in antenna system in detail. **07**
- Q.5** (a) Describe Ultra-Wide Band (UWB) antenna in brief. **03**
- (b) Draw five elements Yagi-Uda antenna system. Suggest ways to improve working performance of basic Yagi-Uda antenna. **04**
- (c) Explain terms with reference to Wave propagation phenomenon: (i) Duct propagation (ii) Virtual height (iii) MUF (iv) Skip distance **07**
- OR**
- Q.5** (a) Describe Smart antennas briefly. **03**
- (b) Differentiate End fire and Broadside array antennas. **04**
- (c) Describe Micro strip antenna in detail. Also enlist advantages and disadvantages related to them. **07**

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