

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER- VI EXAMINATION – SUMMER 2020****Subject Code: 2161003****Date: 27/10/2020****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.
3. Figures to the right indicate full marks.

- Q.1**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain the polarization of waves and describe elliptical polarization.     | <b>03</b> |
| (b) | Discuss the antenna field zone.   | <b>04</b> |
| (c) | Define Antenna and enlist its functions. Compare it with transmission line. | <b>07</b> |

- Q.2**
- |      |  |           |
|------|--|-----------|
| (a)  | Determine the distance from short dipole operating at 1MHz at which radiation field is 4 times the induction field.                                      | <b>03</b> |
| (b)  | How does the Friis transmission theory help to determine loss between the two antennas located in free space? Explain with necessary formula and theory. | <b>04</b> |
| (c)  | Define the following terms.(draw necessary figures and write equations if any)   | <b>07</b> |
| i)   | Front-to-back ratio  |           |
| ii)  | Resolution   |           |
| iii) | Antenna apertures-physical and effective apertures   |           |
| iv)  | Beam efficiency, stray factor  |           |
| v)   | Radiation resistance   |           |

**OR**

- |     |  |           |
|-----|--|-----------|
| (c) | Starting from retarded current, derive an expressions for electric and magnetic components of a short dipole antenna if the spherical system is defined in $r$ , $\theta$ and $\phi$ . | <b>07</b> |
|-----|--|-----------|
- Q.3**
- |     |  |           |
|-----|--|-----------|
| (a) | Estimate directivity of an antenna with $\theta_{HP}=2^\circ$ and $\phi_{HP}=1^\circ$ . Find gain of this antenna if efficiency factor $k=0.5$ . | <b>03</b> |
| (b) | Explain the experimental setup for the measurement of Gain of antenna.   | <b>04</b> |
| (c) | Enlist various types of horn antennas. Describe their functioning. Explain corrugated horn antenna.  | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain the principle of Folded dipole antenna with clean and neat figure.  | <b>03</b> |
| (b) | Explain how log-periodic antenna is works as broadband antenna.   | <b>04</b> |
| (c) | Define Pattern Multiplication principle. Using it, explain radiation pattern of 4 isotropic elements fed in phase, spaced $\lambda/2$ . | <b>07</b> |

- Q.4**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain reflector- lens antenna.  | <b>03</b> |
| (b) | Explain practical design consideration for the helical antenna.   | <b>04</b> |
| (c) | Describe the working principle, design and applications of microstrip patch antenna. Explain the physical significance of fringing field. | <b>07</b> |

**OR**

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain Cassegrain feed with necessary figure.                   | <b>03</b> |
| (b) | Compare the far field equations of small loop with short dipole. | <b>04</b> |

- (c) What do you mean by non-resonance antenna? Explain the design of rhombic antenna and enlist its advantages and disadvantages. **07**

- Q.5** (a) Explain multihop propagation briefly. **03**  
(b) Explain babinet's principal. **04**  
(c) Explain the Different modes of Radio wave propagation. **07**

**OR**

- Q.5** (a) Explain the features of Yagi Uda antenna **03**  
(b) Define the following terms.(draw necessary figures) **04**  
(i) Maximum usable frequency (ii) Skip distance  
(c) Explain the different layers of atmosphere. **07**

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