

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024

Subject Code:2161003

Date:25-11-2024

Subject Name:Antenna & Wave Propagation

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1**
- (a) Draw and explain different parts of radiation pattern. **03**
- (b) Explain the following terms with neat and clean figure: **04**
i) Skip distance ii) Multihop propagation
- (c) Define the following terms: **07**
i) Half Power Beam width
ii) Directivity and Gain
iii) Radiation resistance
iv) Antenna efficiency
v) Radiation intensity
vi) Beam efficiency
- Q.2**
- (a) Compare antenna with transmission line. **03**
- (b) Discuss Binomial arrays. **04**
- (c) Derive an expression for radiation resistance of short dipole for far-field region. Prove that radiation resistance of half wave dipole antenna is 73Ω . **07**
- OR**
- (c) How does the Friis transmission theory help to determine loss between the two antennas located in free space? Explain with necessary formula and theory. **07**
- Q.3**
- (a) Describe circular polarization. **03**
- (b) Explain different types of reflector Antennas. **04**
- (c) Derive the expression for the far field pattern of an array of 2 – isotropic point sources i) Equal amplitude and phase ii) Equal amplitude and opposite phase **07**
- OR**
- Q.3**
- (a) Draw the helical antenna with its associated dimensions showing relationship between circumference, spacing, turn length and pitch angle of helix. **03**
- (b) Explain Microstrip antenna briefly. **04**
- (c) Derive an expressions for electric and magnetic components of a short dipole antenna if the spherical system is defined in r , θ and ϕ . **07**

- Q.4 (a)** What is meant by Space Wave? **03**
- (b)** Draw and explain the antenna field zone. **04**
- (c)** Explain different modes of propagations in detail. **07**

OR

- Q.4 (a)** Explain Non-metallic dielectric lens antennas. **03**
- (b)** Explain in brief about antenna for mobile communication. **04**
- (c)** Explain the experimental setup for the measurement of radiation pattern of antenna under test. **07**

- Q.5 (a)** When can an antenna be termed Frequency independent? **03**
- (b)** Explain embedded antenna. **04**
- (c)** Give an expression of radiation resistance of a small loop. **07**

OR

- Q.5 (a)** Explain babinet's principal. **03**
- (b)** Write the applications of helical antenna. **04**
- (c)** With a suitable diagram, discuss the construction and operation of a Yagi antenna. **07**
