

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- VI • EXAMINATION-SUMMER 2015****Subject Code: 161003****Date: 08/05/2015****Subject Name: ANTENNA & WAVE PROPAGATION****Time: 10.30am-01.00pm****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) Define : i) Far field, ii) Near field, iii) Effective length of antenna, iv) Directivity, v) Find relation between radian and steradian, vi) Polarization, vii) radiation resistance. **07**
- (b) Explain principle of pattern multiplication for array of point sources. Give two examples of short dipole. **07**
- Q.2** (a) Explain Schelkunoff theorem. Explain its usefulness. **07**
- (b) How impedance matching is done with the help of folded dipole antenna. **07**
- OR**
- (b) Explain Broadside array and End fire array, considering linear array of four isotropic sources. **07**
- Q.3** (a) What is a slot antenna and where is it used? State Babinet's principle and illustrate its application to slot antennas and complementary antennas. **07**
- (b) Derive the expression for radiated power and radiation resistance of a small current element. Find the radiation resistance of a hertzian dipole of length $\lambda/10$. **07**
- OR**
- Q.3** (a) i) Discuss Dolph-Tchebysheff distribution for linear arrays. **07**
- ii) The radiation resistance of an antenna is 80Ω and loss resistance is 10Ω . Calculate antenna efficiency.
- (b) Explain the working of an artificial dielectric lens antenna and derive the relation for effective index of refraction of such a lens formed by conducting sphere. **07**
- Q.4** (a) Two planes 50km apart are in radio communication. The transmitting plane delivers 2000 watts. Its antenna gain being 40 in the direction of other plane. The power absorbed by the receiving antenna of the second plane is 20 micro watts. Calculate: i) electric field strength of the incident wave at the receiving antenna, ii) effective aperture. **07**
- (b) Derive the far field components and the radiation resistance of a small circular loop with radius 'a' and with a uniform phase current. **07**
- OR**
- Q.4** (a) i) Explain Yagi-uda antenna in details. **07**
- ii) What are frequency scanning arrays?
- (b) Explain the basic concept of reflector antenna. What are the different types of reflector antenna? Write different expressions for BWFN and HPBW for parabolic reflector with circular aperture. **07**
- Q.5** (a) Explain Gain measurement and impedance measurement of antenna along with the experimental set-up. **07**

- (b) What are the different modes of propagation? Explain: i) critical frequency, ii) MUF, iii) virtual height. **07**

OR

- Q.5** (a) Explain : i) skip distance, ii) duct propagation **07**
(b) Write short notes on i) Horn antenna, ii) Microstrip antenna. **07**
