

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VI • EXAMINATION – WINTER 2013

Subject Code: 161003**Date: 02-12-2013****Subject Name: Antenna and 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.

- Q.1** (a) Explain the following: **07**
 (i) Radiation resistance
 (ii) directivity
 (iii) First Null Beam width
 (iv) Gain

- (b) Obtain the expressions of electric and magnetic fields of an oscillating dipole. **07**

- Q.2** (a) Prove that radiation resistance of a quadrature-wave monopole antenna is 36.5Ω . **07**
 (b) “Effective length of an antenna for receiving is equal to its effective length as a transmitting antenna.” – Prove. **07**

OR

- (b) (i) An antenna whose radiation resistance is 300Ω operates at a frequency of 1 GHz and with a current of 3 A. Find the radiated power. **01**
 (ii) What is the effective area of a half wave dipole operating at 500 MHz ? **03**
 (iii) Find the radiation resistance of a Hertzian dipole of length $\lambda/40$, $\lambda/60$, $\lambda/80$. **03**

- Q.3** (a) Obtain the beam width of broadside array and end-fire array. **07**
 (b) Draw the radiation pattern of 4 element linear array with spacing between elements $\lambda/2$ and the currents in phase. **07**

OR

- Q.3** (a) Derive the expression of transmission loss between transmitting and receiving antenna. **07**
 (b) Find the basic and actual transmission loss between 2 antennas separated by 30 m operating at 10 MHz when gain of each antenna is 1.65 dB. **07**

- Q.4** (a) Obtain the expressions of far fields of circular loop antenna. **07**
 (b) A circular loop antenna has a diameter of 1.5λ . Find its directivity and radiation resistance. **07**

OR

- Q.4** (a) Draw the geometry of a helical antenna and explain its physical parameters. **07**
 (b) A 16-turn helical beam antenna has a circumference of λ and turn spacing of $\lambda/4$. **07**
 Find (1) HPBW (2) Axial ratio (3) Power pattern

- Q.5** (a) Explain the Babinet's principle for slot antenna. **07**
(b) Write short notes on : **07**
(i) Reflector antenna
(ii) Lens antenna

OR

- Q.5** (a) Write short notes on : **07**
(i) Log periodic antenna
(ii) Phase Measurement methods
(b) Design a three element Yagi-Uda antenna to operate at a frequency of **07**
172 MHz.
