

**2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS  
**ANTENNA AND WAVE PROPAGATION**  
 (ELECTRONICS & COMMUNICATION ENGINEERING)

APRIL/MAY 2005

TIME – 3 HOUR  
 MARK – 70

**Answer any FIVE Questions**  
**All Questions carry equal marks**

1. Starting with the expression  $I dl$  for a current element, show that the phasor expression for vector potential and field strengths will be

$$A_z = \mu I dl$$

$$\frac{4\pi r e^{-jr}}{r^2}$$

$$H' = I dl \sin \theta \frac{e^{-jr}}{r^2}$$

$$\frac{4\pi r (j + 1)}{r^2}$$

$$r)$$

$$E_\theta = \theta I dl \sin \theta \frac{e^{-jr}}{r^2}$$

$$\frac{4\pi r (j + 1)}{r^2}$$

$$r + 1$$

$$jr^2)$$

$$E_r = \theta I dl \cos \theta \frac{e^{-jr}}{r^2}$$

$$\frac{4\pi r \theta^2}{r^2}$$

$$r + 2$$

$$jr^2)$$

$$\text{Where } \theta = \frac{1}{n} = \frac{2\theta}{\theta}, \theta = p\mu/2$$

2. (a) Explain the term Antenna terminal impedance and give the RLC equivalent circuit of it.

(b) Derive an expression for the terminal impedance as a function of frequency and hence define its Bandwidth.

3. (a) Derive the conditions for the linear array of  $N$  isotropic elements to radiate in end fire and broad side modes.

(b) What is a uniform linear array and what are its applications?

4. (a) Explain how the radiation pattern of folded dipole will be modified with the addition of a reflector and two directors parasitic elements.

(b) Explain the effect of ground on Rhombic antenna.

5. (a) List out the differences between the active and passive corner reflectors. What are retro reflectors.

(b) Sketch the far field patterns of loops of  $0.1\lambda$ ,  $\lambda$  and  $3\lambda/2$  diameter. What is the effect of the shape of the small loop on its far field pattern.

6. (a) Explain the basic principles of operation in lens antennas. Hence distinguish between the different types of lens antennas used in practice.

(b) With a neat sketch, explain the constructional features of a parabolic reflector and obtain an expression for its curved profile.

7. (a) Explain the method of measurement of radiation pattern and beam width of an antenna experimentally with the help of a neat block diagram.

(b) Explain clearly VSWR method of measuring antenna impedance.

8. Write explanatory notes on the following:

(a) Multi hop propagation

(b) Ionospheric abnormalities.

(c) Wave tilt

(d) Super refraction

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