2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

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

NOVEMBER 2005

TIME – 3 HOUR
MARK – 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Starting from the complete expressions for electric field and magnetic field due to a small current element, distinguish between Induction and radiation fields. Hence define the boundary between far field and near fields of the antenna.

(b) Obtain the simplified relations for electric and magnetic fields in far field and hence find the value of medium impedance and the radiated power.   [10+6]

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.   [16]

3. (a) What are the "Broadside" and "Endfire" antenna arrays.

(b) Determine the expression for the gain and beam width of the broadside array of 'n' elements and compare with that of endfire one.   [6+10]

4. (a) What are the advantages of Rhombic antenna over a single wire antenna.

(b) What is a parasitic element? Where are they used?   [8+8]

5. (a) Sketch and explain the constructional features of a helical antenna. Distinguish between axial and normal modes of helix radiations and list out their requirements.

(b) Explain the characteristics of an active square corner reflector with the help of image principle.   [8+8]

6. (a) Explain the nature of field distribution on the surface of a parabolic reflector. Hence describe its characteristics and feed requirements.

(b) A C-band radar operating at 6 GHz, has a reflector antenna of 1.8m radius. Calculate its gain, HPBW and BWFN, assuming an aperture efficiency of 65%.   [10+6]

7. Explain the microwave bench set-up suitable for antenna measurements. What are the special precautions necessary to minimize errors in the above measurements?   [16]

8. Both very long waves and short waves can be used for world wide radio commu- nication. Give general account of the propagation phenomena involved in the two cases and discuss the advantages and disadvantages of the two systems.   [16]