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**Anna University End Semester Examinations May 2012**

**B.E.Electronics and Communication Engineering (Full Time ) V<sub>1</sub> SEM**

**EC-9354- ANTENNAS AND WAVE PROPAGATION**

**Time : 3 Hours**

**Answer All Questions**

**Max.marks : 100**

**Part A(10x2=20 Marks)**

1. Bring out the significance of Radiation resistance
2. What is the role of a folded dipole in yagi array. What is the value of its input impedance?
3. State the field equivalence principle and specify the type of antennas on which this can be applied
4. What is aperture blockage in parabolic reflector antennas. How can it be avoided
5. What are the different amplitude distributions used in the excitation of arrays. Specify their merits and demerits.
6. A uniform linear array is required to produce an endfire beam .It's operating frequency is 10GHz. It contains 50 radiators and are spaced at  $0.5 \lambda$ . Find the progressive phase shift required to produce the end fire beam. Find the array length.
7. Differentiate: Near field and Far field antenna measurements
8. How is the bandwidth of frequency dependant and frequency independent antennas specified
9. If the critical frequency of an ionised layer is 1.5 MHz, find the electron density of the layer?
10. What are the effects of curvature of earth on space wave propagation?

**PART-B(5x16 =80marks)**

11. Obtain expression for the field and power radiated by a current element and obtain the expression for its radiation resistance.

12.a) i) Explain the radiation mechanism of a slot antenna and show that it is a dual of dipole antenna (8)

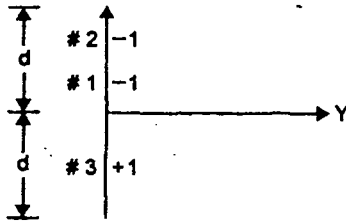
ii) Explain different types of feeding system of parabolic reflector antenna (8)

(OR)

12b)i) Explain Babinet's Principle with clear illustrations (8)

ii) Describe the radiation mechanism of a Microstrip patch antenna (8)

13a.i) A three element array of isotropic source has the phase and magnitude relationship shown. The spacing between the elements is  $d = \lambda/2$



Find the array factor, FNBW, HPBW (8)

ii) Draw the pattern of 10 element binomial array with spacing between the elements of  $3\lambda/4$  and  $\lambda/2$  (8)

(OR)

13 b) Derive the expression for the field strength of an N element uniform linear array and sketch the variation of E as a function of total phase difference.. Show that the first side lobe ratio for a uniform linear array is -13.5 dB.

14.a i) Design a log-periodic antenna to obtain a gain of 9 dB and to operate over a frequency range of 125 MHz – 1000MHz (Scaling factor is 0.861 and spacing factor is 0.162) (8)

ii) Describe an experiment set up for the measurement of VSWR. (8)

(OR)

14b)i) Describe the construction and working of a helical antenna. Specify its applications (8)

ii) Describe the three antenna method of gain measurement (8)

15. a) Write short notes on i) Fading ii) Gyro frequency iii) Skip distance iv) Multi hop propagation

(OR)

15b)i) Explain the characteristics of ionospheric layers and describe the mechanism of ionospheric propagation (10)

ii) Describe the troposcatter propagation (8)