

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II Semester (Suppl.) Examination, December 2012

Subject: Antennas and Propagation

Time: 3 Hours

Max.Marks: 75

*Note : Answer all questions from Part A. Answer any Five questions from Part B.***PART – A (25 Marks)**

1. At what distance from the antenna the radiation and the induction fields of an alternating current element become equal. (2)
2. What is a Binomial array? (2)
3. Calculate the gain of a parabolic reflector antenna which has a diameter of 10 m operating at 10 GHz with an illumination efficiency of 55%. (3)
4. In a microwave link the antenna gains are 40 dB each at 10 GHz frequency. If the path length is 60 Kms, calculate the transmission path loss. (3)
5. List out the advantages and disadvantages of Lens antennas. (2)
6. Define the term Skip Distance with respect to Sky wave propagation. (2)
7. Two isotropic point sources are separated by a distance of $\lambda/4$. The phase difference between the currents feeding the point sources is -90 degrees. Draw the resulting radiation pattern. (3)
8. What are the applications of a Rhombic antenna. (2)
9. The components of a time varying electric field are given by $\tilde{E}_x = -A \cos \omega t$, $\tilde{E}_y = -B \sin \omega t$. Determine the polarization of the field. (3)
10. What is the maximum effective aperture of a microwave antenna which has a directivity of 1.84. (3)

PART – B (50 Marks)

- 11.(a) Derive expression for the total electric field intensity of a uniform linear array with 'n' number of elements. Derive the conditions for the Broadside and End fire arrays. (5)
- (b) Show that the first secondary maximum is 13.5 dB below the principal maximum. (5)
12. Briefly describe about the space wave propagation. Show that the strength of the space wave signal at the receiver is $E_R = \frac{88.14 \sqrt{P_t} h_t h_r}{\lambda d^2}$
Where P_t is the transmitted power, h_t , h_r are the heights of the transmitting and receiving antennas, ' λ ' is the operating wavelength and 'd' is the distance between the antennas. (10)
13. Derive expression for the radiation resistance of the Half wave dipole. (10)
14. Describe the methods of measuring the impedance of an antenna using the Impedance Bridge Method and the Slotted Section Method. (10)
15. Define the terms Directive Gain, Directivity, Effective length and Effective area of an antenna. Derive the relation between Gain and Max. effective area of an antenna. (10)
16. Explain the working principle of Rhombic antenna and Yagi-Uda antenna. (10)
17. Write short notes on the following: (10)
 - (a) Wide band characteristics of Helical Antenna
 - (b) Principle of pattern multiplication.
