

FACULTY OF ENGINEERING

B.E. 3 / 4 (ECE.) II Semester (Supplementary) Examination, December 2006

Subject : **Antennas and Propagation**

Time : 3 Hours}

{Max. Marks : 75

Note : Answer All questions of Part – A and Answer any five questions from Part-B.

PART – A (25 Marks)

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1. What is the directivity of half wave dipole and if it is 90 % efficient , calculate gain. (2)
2. What is the first side lobe level of a uniform linear array and sketch the radiation pattern ? (2)
3. An antenna receives $2 \mu w$ of power when the incident wave has an associated electric field of 20 mv/m rms. Find the aperture area. (3)
4. Define antenna efficiency. Given $R_L = 36.5 \Omega$ find efficiency of quarter wave monopole. (2)
5. What is the radio horizon distance for standard atmosphere in kilometers ? (2)
6. Define vertical height of ionospheric layer and skip distance of ionospheric layer . (3)
7. What is the impedance of reflector in Yagi – uda antenna. Compare with director elements. (3)
8. Find the null-to-null beam width of 2m paraboloid reflector used at 5 GHz. (2)
9. Draw a typical non-radiating slot in the rectangular wave guide. Why it is non-radiating slot ? (3)
10. How do you increase the radiation resistance by folding the dipole ? What is radiation resistance of folded dipole? (3)

PART – A (50 Marks)

- 11.(a) Define field strength and power patterns of antenna. (4)
- (b) Derive an expression for the radiated power of half-wave dipole. (6)
- 12.(a) Explain the salient features of uniform linear arrays. (6)
- (b) Find out the basic transmission loss between a ground based on antenna and air bone antenna when the distance between the antennas are 16 and 160 km at $f = 0.3$ GHz. (4)
- 13.(a) Draw a typical log-periodic antenna and explain its design methodology. (5)
- (b) Design a log-periodic antenna to obtain a gain of 9 dB to operate over a frequency range of 125 MHz – 500 MHz (Assume $T = 0.861$ $\sigma = 0.162$). (5)
- 14.(a) Explain the salient features of horn antenna . (2)
- (b) State Babinet's principle and explain. (5)
- (c) A parabolic reflector with a mouth diameter of 22 m operates at $f = 5$ GHz. If has an illumination efficiency of 0.6 . Find the power gain. (3)

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- 15.(a) Bring out the differences between indoor and outdoor ranges. (4)
- (b) Describe a method of measurement of antenna impedance. (6)
- 16.(a) What is a Troposphere. Derive the expression for the field strength at a point due to space wave. (6)
- (b) A communication system is to be established at a frequency of 60 MHz with a transmitter of 1.0 kw . The field strength of the directive antenna is 3 times that of a half-wave antenna. $H_t = 50$ m, $h_r = 5$ m,. A field strength of 80 v/m is required to give satisfactory reception. Find the range of the system. (4)
17. Write short notes on the following : (3+3+4)
- (a) Fading
- (b) Ground Wave Propagation
- (c) Binomial array

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