

FACULTY OF ENGINEERING
B.E. 3/4 (ECE) II – Semester (Main) Examination, June 2014

Subject: Antennas and Wave 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 Describe the differences between directivity and gain. Are they the same in any case? (2)
- 2 Calculate the maximum effective aperture of an antenna which is operating at a wavelength of 2 mt. and has a directivity of 100. (3)
- 3 What are the advantages of loop antenna over monopole antenna? (2)
- 4 Draw the merit between helical antennas with infinite and finite ground planes. (3)
- 5 How would you represent pattern multiplication? (2)
- 6 A broadside array has 20 sources of equal amplitudes that are spaced $\frac{\lambda}{2}$ apart. Calculate the BWFN and the HPBW. (3)
- 7 What do you mean by stacking in Yagi-uda Antenna? (3)
- 8 Why is Test Antenna preferred for use in receivers? (2)
- 9 What is the skip zone of a radio wave? (2)
- 10 What factors must be considered in the transmission of a surface wave to reduce attenuation? (3)

PART – B (50 Marks)

- 11 (a) With the help of a neat diagram, describe the radiation mechanism of an antenna. (5)
 (b) Calculate the maximum effective aperture of the Hertzian dipole for an incident linearly polarized uniform wave. (5)
- 12 Show that the power radiated by centerfed half wave dipole is $73 I_{eff}^2$. (10)
- 13 Describe the characteristics of 3-turn helical antenna with reference to circular polarization with a suitable example. (10)
- 14 Draw the radiation pattern of 4-isotropic sources of equal amplitudes and phases in broad side and end-fire arrays. (10)
- 15 (a) Comment on the “radiation mechanism of horn antenna”. (5)
 (b) A parabolic reflector antenna is circular in cross section with a diameter of 1.22 m. If the maximum effective aperture equals 55 percent of the physical aperture. Compute the gain of the antenna in decibels at 20 GHz ($\lambda = 15\text{mm}$). (5)
- 16 (a) What are the advantages and application of Rhombic antenna. (5)
 (b) Describe the radiation mechanism of a patch antenna. (5)
- 17 (a) Explain how troposphere ducts are formed. (3)
 (b) Describe the ionosphere reflection of radio waves. Derive an expression for critical frequency of a reflecting layer in terms of its ionization density. (7)