Roll No .....

EC - 604

B.E. VI Semester

Examination, June 2015

Antenna And Wave Propagation

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) What is meant by radiation pattern?
   b) Define antenna efficiency?
   c) The radiation resistance of an antenna is 72Ω and loss resistance is 2Ω. What would be the directivity in dB; if the power gain is 16?
   d) Explain the radiation from two wire.

   OR

   Derive the expressions for electric field in case of short current element and hence obtain the conditions for the field to be in fraunhofer region.

2. a) Design a broadside linear array of $\lambda/2$ dipole elements for a gain of 12 dB. Draw the approximate radiation pattern.
   b) What is meant by reciprocity theorem?
   c) Differentiate between broadside and endfire array.

   d) A linear broadside array consist of 4 identical equal in phase point source with $\lambda/3$ spacing. Calculate and plot the field pattern. Also find the directivity and beam width.

   OR

   Explain the effect of earth on vertical patterns.

3. a) What is the condition for an antenna to be frequency independent?
   b) What are the different regions in log periodic antenna and how are they differentiated?
   c) Calculate in dB, the directivity of 20 turn helical antenna, having $\alpha = 12°$ circum ference equal to one wavelength.
   d) Derive an expression for the gain of a paraboloidal antenna.

   OR

   Explain the radiation from a travelling wave on a wire.

4. a) Explain the use of weighting functions in array synthesis.
   b) Write different forms of linear arrays.
   c) Explain schelkunoff unit circle.
   d) Explain Dolph-Chebyshev method of antenna array synthesis.

   OR

   The z-plane array factor of an array of isotropic elements placed along the z-axis is given by
   $Af = z(z^4 - 1)$
   Determine the number of elements of the array. If these are any elements with zero excitation coefficients (null elements), so indicate.

5. a) What is inverse and multi path fading?
   b) Define maximum usable frequency.
   c) Explain structural details of the ionosphere.
   d) Derive an expression for the refractive index of the ionosphere in terms of the electron number density and frequency.

   OR

   Explain the ground wave propagation.

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