28-5-16 – AN

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Question Paper Code : 57298

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Electronics and Communication

EC 6602 – ANTENNA AND WAVE PROPAGATION

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define radiation resistance.
2. The radial component of the radiated power density of an antenna is given by $W_{rad} = a_r W_r = a_r A_o \sin\theta/r^2$ (W/m^2), where A_o is the peak value of the power density, θ is the usual spherical coordinate, and a_r is the radial unit vector. Determine the total radiated power.
3. Why antenna measurements are usually done in fraunhofer zone ?
4. The radiation resistance of an antenna is 72 Ω and the loss resistance is 8 Ω. What is the directivity (in dB), if the power gain is 15 ?
5. Define gain of an antenna. Bring out a relationship between gain and aperture of an antenna.
6. Draw the radiation pattern of an isotropic point sources of same amplitude and opposite phase that are λ/2 apart along X-axis symmetric with respect to origin.

7. On what principle slot antenna works ? Explain the principle.
8. State Rumsey principle on frequency independence.
9. Find the range of LOS system when the receive and transmit antenna heights are 10m and 100 m respectively.
10. What are the specific features of troposcatter propagation ?

PART – B (5 × 16 = 80 Marks)

11. (a) Derive the expression for the field quantities radiated from a λ/2 dipole and prove that the radiation resistance to be 73 Ω. **(16)**

OR

(b) Derive the expression for the field quantities (E and H) for a small oscillation current element. **(16)**

12. (a) Discuss the geometry of a parabolic reflector and the significance of f/D ratio. Explain its feed configurations. **(16)**

OR

(b) Discuss the construction and design of a yagi uda array. Show that the impedance of a folded dipole is 300 Ω. **(16)**

13. (a) Obtain the expression for the field and the radiation pattern produced by a N element array of infinitesimal with distance of Separation λ/2 and currents of unequal magnitude and phase shift 180 degree. **(16)**

OR

(b) (i) Using pattern multiplication determine the radiation pattern for 8 element array, separated by the distance λ/2. **(8)**

(ii) Write short notes on tapered array and phased array. **(8)**

14. (a) (i) Explain the design procedure for the construction of log periodic antenna. **(10)**

(ii) Discuss the construction equation for the helical antenna. **(6)**

OR

(b) Explain the measurement procedure for the measurement of VSWR and radiation pattern. **(16)**

15. (a) (i) In the ionospheric propagation, consider that the reflection takes place at a height of 400 km and that the maximum density in the ionosphere corresponds to a refractive index of 10 MHz. Determine the ground range for which this frequency is the MUF. Take earths curvature into consideration. **(6)**

(ii) Describe the structure of the atmosphere and explain each layer in detail. **(10)**

OR

(b) (i) Discuss the effects of earth's magnetic field on ionosphere radio wave propagation. **(8)**

(ii) Describe the troposphere and explain how ducts can be used for microwave propagation. **(8)**