

Code: R7310405

R7

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Define and explain about following antenna parameters:
(i) Radiation pattern. (ii) Radian and Steradian.
(iii) Radiation power density. (iv) Radiation Intensity.
(b) Calculate the power gain of a half wave dipole whose ohmic losses and directive gain are 7Ω and 1.64 respectively.
- 2 (a) Define term directivity. Determine the directivity of loop antenna.
(b) Discuss the behavior of loop antenna and sketch its field pattern.
- 3 (a) Derive an expression for radiated power of end fire array with n -isotropic radiator. Plot the radiation pattern for EFA of 4-isotropic radiator.
(b) Calculate the HPBW for the broadside as well as end fire array consisting 8-isotropic elements separated by $\lambda/4$ distance.
- 4 (a) Explain about multiple unit steerable antennas.
(b) For a 20 turn helical antenna operating at 3 GHz with circumference of 10 cm and spacing between the turns 0.3λ is operating at 3 GHz. Calculate the directivity and HPBW.
- 5 (a) Define the parabola and explain how waves are collimated by a parabola.
(b) A circular parabolic reflector having the directivity of 20 dB, frequency of 10 MHz and effective aperture 2 m. Calculate the mouth diameter and illumination efficiency.
- 6 (a) Explain the constructional features of lens antenna.
(b) A pyramidal horn antenna having the flare angles $\theta_E = 5^\circ$, $\theta_H = 8^\circ$, length $(L) = 50\lambda$. Find out the dimensions of the mouth, directivity and power gain.
- 7 (a) Explain the mechanism of sky wave propagation through the ionosphere.
(b) Calculate the transmission path distance for an ionospheric transmission that uses a D-layer of height 200 km. The angle of elevation of the antenna is 20° . Assume the earth's radius is 6370 km.
- 8 (a) With the help of neat diagram derive the expression for the electric field strength at the receiving point due to the space wave propagation.
(b) List out the disadvantages of space wave propagation.
