M18002079

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **M.TECH**

M.TECH 2ND SEMESTER REGULAR EXAMINATIONS, MAY 2018
ANTENNA DESIGN & SIMULATION
Branch: EC, Subject Code:MECPE2032
Time: 3 Hours
Max Marks : 70

PART-A (10 X 2=20 MARKS)

1. Answer the following questions.

a) Draw the radiation pattern of: (i) Directional antenna. (ii) Isotropic antenna. **(CO3)**
b) Explain effective height of an antenna. **(CO2)**
c) What is the maximum effective aperture of a microwave antenna which has a directivity of 900? **(CO3)**
d) Mention the factors on which the resultant pattern of array depends. **(CO1)**
e) What is Duct propagation? **(CO4)**
f) Define Maximum usable frequency. **(CO2)**
g) Define Antenna temperature. **(CO1)**
h) What is the role of ground plane in microstrip patch antenna? **(CO4)**
i) Write the equation which relates the dielectric constant and effective dielectric constant in microstrip patch antenna. **(CO2)**
j) Give three examples of the dielectric materials with their relative permittivity . **(CO1)**

PART-B (5 X 10=50 MARKS)

Answer any five questions from the following.

2.a) Briefly explain characteristics of different ionized layers in ionospheric propagation. **[5](CO2)**
b) Calculate the critical frequency for a medium at which the wave reflects if the maximum electron density is 1.24 X 10^6electrons/cm^3**.** **[5] (CO3)**

3.a) Write about the Duality theorem and it's applications. **[5](CO4)**
b) Explain the following and derive the relevant expressions: **[5] (CO3)**
i. Critical frequency. ii. Maximum usable frequency.
iii. Virtual height. iv. Skip distance

4.a) An uniform linear array consists of 16 isotropic sources with a spacing of $\lambda/4$ & phase difference $\varphi = -90^0$ Calculate HPBW & effective aperture. **[5](CO2)**
b) Explain the cavity model of microstrip patch antenna. **[5](CO1)**

5. a)Explain about the Reciprocity theorem . Write the difference between the self impedance and mutual impedance. **[5](CO2)**
b) What are Hertzian dipoles? Derive the electric and magnetic field quantities of Infinitesimal dipole and radiation pattern**.** **[5](CO1)**

6.a)Explain the following terms with respect to antenna **[5](CO3)**

i) Polarization
ii) Beam solid angle
iii)Gain
iv)Bandwidth
v) Radiation pattern

b) Explain the principle of pattern multiplication. **[5](CO4)**

7. a)Explain about the general structure of phased array . **[5](CO2)**

b)A microstrip antenna with overall dimensions of L = 0.906 cm (0.357 inches) and W = 1.186 cm (0.467 inches), substrate with height h = 0.1588 cm (0.0625 inches) and dielectric constant of 2.2, is operating at 10 GHz. Find; **[5] (CO3)**

i. The input impedance.
ii. The position of the inset feed point where the input impedance is 50 ohms.

8. Write short notes on
a) Reflector antenna [5] **(CO2)**
b)Antenna parameters [5] **(CO3)**

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