Total No. of Questions : 8]

SEAT No :

P2581

[Total No. of Pages :2

[5153]-557
T.E. (E & TC)
ANTENNA & WAVE PROPAGATION
(2012 Pattern) (End-Semester) (Semester-II)

Time : 2½ Hours *Max. Marks :70*

Instructions to candidates:

1) ***All questions are compulsory***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) A uniform plane wave of frequency 5MHz has average poynting vector 1.5W/m^2. If the medium is lossless with relative permeability $\mu r=2$ and relative permittivity $\varepsilon r=3$. Determine velocity of propagation, wavelength, intrinsic impedance of a medium and r.m.s. value of electric field. **[8]**

b) Explain the following characteristics of wireless channel **[6]**
   i) Coherence band width.
   ii) Coherence time and.
   iii) Fading.

c) Derive vector potential A for an magnetic current source J. **[6]**

OR

Q2) a) What is polarization of wave? Explain linear and circular polarization of wave. **[6]**

b) Write a short note on **[6]**
   i) Virtual height.
   ii) Multihope Propagation.

c) The power radiated by a lossless antenna is 10 watts. The radiation intensity of this antenna is U = Bocos$^3\theta$ (W/Sr) $0 \le \theta \le \pi/2 \;\; 0 \le \Phi \le 2\pi$. Find. **[8]**
   i) The maximum power density in (W/m^2) at a distance of 1000 meter (assume for field distance) specify the angle where this occurs.
   ii) Directivity
   iii) Gain of the antenna.

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Q3) a) Derive the equation for input impendance and directivity of half wave dipole. **[8]**

b) Show the current distribution on small dipole and derive the equation for its input impedance. **[8]**

OR

Q4) a) Find the radiation efficiency of a single turn and eight -turn small circular loop at f=100MHz. the radius of the loop is $\lambda/25$, the radius of the wire is $10^{-4}\lambda$ and the turns are spaced $4x10^{-4}\lambda$ apart. Assume the wire is copper with a conductivity of $5.7x10^{7}$ (S/m) and antenna is radiating into free space.(Where ohmic resistance per unit length/ohmic skin effect resistance per unit length=0.38). **[10]**

b) Give the comparison of far fields of small loop and short dipole. **[6]**

Q5) a) For two element array consisting identical radiators carrying equal curents in phase, obtain positions of maxima and minima of the radiation pattern if the distance of separation $d=\lambda$ **[8]**

b) Derive antenna array factor for N-element linear array taking the centre element as reference for N is odd and even. **[8]**

OR

Q6) a) Draw and explain the radiation pattern of an endfire array. **[8]**

b) Explain in brief Dolph - Tchbyscheff distribution. What is the need for Tchbyscheff distribution? **[8]**

Q7) Explain the following antennas with its structural details dimensions, radiation pattern, diagram, specifications, features and applications. **[18]**

a) Micro strip antenna
b) Lens antenna.
c) Biconical antenna

OR

Q8) a) Explain the working of Rhombic antenna in detail. **[8]**

b) With the help of suitable diagram explain the operating principle of **[10]**
i) Super turnstile
ii) Slot antenna.

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