P4574

[5669]-108

T.E. (E & TC) (Semester - II)
ANTENNA & WAVE PROPAGATION
(2012 Pattern)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Answer any one Questions out of Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q No.7or 8.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Assume suitable data if necessary.*

   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

Q1) a)   Explain line of sight propagation. Derive expression between transmitting and receiving antenna in terms of antenna height. **[6]**

    b)   Solve the lossy dielectric wave equation and show that electromagnetic waves are travelling waves. **[5]**

    c)   Define & explain following Antenna parameters **[9]**

        i)   Half power beam width

        ii)   Radiation Resistance

        iii) Directive Gain

OR

Q2) a)   Calculate the skip distance for flat earth with MUF of 10MHz, if a wave is reflected from a height of 300km where maximum value of refractive index is 0.8. **[6]**

    b)   What do you understand by Poynting vector? Derive the expressions for instantaneous and average Poynting vectors for an uniform plane wave.**[8]**

    c)   Define antenna polarization and explain different type of polarization with relevant diagram. **[6]**

Q3) a)   Derive expression of radiation resistance of infinitesimal or Hertzian dipole.**[8]**

    b)   What is the total power radiated by a small circular loop of radius 0.5m carrying a current 10A at 15MHz? **[4]**

    c)   Draw current distribution for small and half wave dipole wire antenna. Write expression for power radiated by small antenna. **[4]**

OR   *P.T.O.*

Q4) a) Explain important features of loop antenna. Describe radio direction finding. **[6]**

b) Write the expression for field quantities of half wave dipole and hence derive power radiated by half wave dipole. Draw the radiation pattern of half wave dipole. **[10]**

Q5) a) Explain design equations for Yagi Uda antenna. Design of 3 element Yagi Uda antenna with dimensions, inter-element spacing for 600MHz. **[8]**

b) Draw radiation pattern of broadside antenna array for 8 element and spacing between elements is $\lambda/4$. Find HPBW for same antenna. **[8]**

OR

Q6) a) Design four element Dolph-Chebysheff array of $\lambda/2$ spacing between the elements. The pattern is to be optimum with a side level 19dB down the main lobe level. **[8]**

b) Write short notes following: **[8]**
   i) Pattern Multiplication
   ii) Binomial Array

Q7) a) Explain with diagram working principal of parabolic reflector. Also explain various feed system with diagrams for the same. State application of Dish antenna. **[9]**

b) Explain V antenna with its structure, working, application, advantages & disadvantages. Compare V antenna with Rhombic antenna. **[9]**

OR

Q8) a) Write short note on following with respect to structural detail, radiation pattern, detailed diagrams & features; **[12]**
   i) Horn Antenna
   ii) Turnstile Antenna
   iii) Patch Microstrip Antenna

b) Calculate input impedance and half power beam width for a helical antenna if directivity 14dB at 2.4GHz. Assume circumference $C = \lambda$ and spacing $S = \lambda/4$. **[6]**

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