[5460]-157

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

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. 7 or Q. No. 8.*
  2) *Neat diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*
  4) *Assume suitable data, if necessary.*

Q1) a) Explain in detail the sky wave propagation. What are the frequency range is used for sky wave propagation? For which application sky wave propagation is used. **[6]**

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

  c) A free space microwave link operating at 10Ghz consists of transmitting and receiving antenna each having gain of 25dB. The distance between the two antennas is 30km and the power radiated by transmit antenna is 10W. Calculate the received power and path loss. **[8]**

OR

Q2) a) Define and explain the following antenna terminologies: **[6]**
  i) Radiation pattern
  ii) Directivity of antenna
  iii) Halh power beam width

  b) An antenna has radiation resistance of 72 Ω, a loss resistance of 18 Ω and power gain of 12 dB. Determine antenna efficiency and its directivity. **[4]**

  c) State the poynting theorem? Derive expression for power radiated by antenna using poynting theorem. **[10]**

Q3) a) Derive power density and radiation resistance with respect to infinitesimal dipole. **[8]**

  b) Draw current distribution and radiation pattern of 0.5λ and 1.5 λ dipole.**[4]**

  c) Find the directivity of half dipole. **[4]**

OR

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

b) Draw and explain radiation pattern of 0.5 λ, λ, 1.5 λ length dipole antenna. **[6]**

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

Q5) a) Explain design equations for Yagi Uda antenna. Sketch modern version of 4-element Yagi Uda antenna with dimensions, inter-element spacing. **[8]**

b) Explain steps to design Binomial array. **[8]**

OR

Q6) a) Draw radiation pattern of Broadside antenna array for 4 element and spacing between elements is $\lambda/4$. Find HPBW for same antenna. **[10]**

b) Derive the expression for directivity of end fire array. **[6]**

Q7) a) What are electromagnetic horn antennas? What are the various types of horns? What are their practical applications? Compare these antennas with paraboloidal reflector antennas. **[9]**

b) Calculate input impedance and half power beam width for a helical antenna if directivity 14dB at 2.4Ghz. Assume circumference C = λ and spacing S = $\lambda/4$. **[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) Explain V antenna with its structure, working, application, advantages & disadvantages. Compare V antenna with Rhombic antenna. **[6]**

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