Code No: R05310403 **R05** **Set No. 2**

III B.Tech I Semester Examinations,November 2010
ANTENNAS AND WAVE PROPAGATION
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the formation of Ionosphere and the Sky wave propagation.
   (b) Explain the terms MUF, Skip Distance and Critical Frequency. [8+8]
2. (a) A paraboloid reflector is required to produce a beam width between first nulls equal to 3^0at a operating frequency of 2GHz. Find the mouth diameter and power gain.
   (b) Describe the operation of parabolic reflector with neat sketches. [8+8]
3. (a) Explain the significance of flat earth considerations for trophospheric wave propagation.
   (b) Explain how the range of a VHF is extended by
      i. Ducting.
      ii. Troposcatteric Scattering. [8+8]
4. (a) Derive an expression for field pattern of a 2 element array and draw the field pattern
      i. when d=$\lambda/2$ and α=0^0
      ii. when d=$\lambda/2$ and α=180^0.
   (b) Explain Dolph-Tchebyshelf distribution for linear broadside arrays. [10+6]
5. (a) What are EM horn antenna. Mention various types of horn antennas. How do these antennas compare with parabolic reflector antennas.
   (b) Find the power gain and directivity of horn antenna of dimension 10∗6cm operating at a frequency of 4GHz. [8+8]
6. (a) Show that for a slot in a conducting plane, the impedance Z_{slot} is given by Z_{dipole} Z_{slot}=$Z_0{}^2/4$ where Z_0 is the impedance of free space.
   (b) The radiation intensity of a particular antenna is given by $\emptyset(\theta, \emptyset) = \sin^2\theta$. Calculate the directivity of the antenna.
   (c) Define the effective aperture and calculate the effective aperture of 0.25λ dipole. [8+4+4]
7. (a) Define and Explain:
      i. Effective Aperture
      ii. Gain

iii. Directivity for an Antenna.

(b) An Antenna has a radiation resistance of 72 Ω and a power gain of 12dB. Find its radiation efficiency and directivity if its resistance is 4. Explain the relationships used. [6+10]

8. (a) A 16 turn helical beam antenna has a circumference of λ and turn spacing of $\lambda/4$. Calculate

i. HPBW

ii. Axial Ratio

iii. Gain

iv. Power pattern.

(b) Derive the field expressions for rhombic antenna using pattern multiplication with the element patterns those of long wire. [8+8]

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Code No: R05310403 **R05** **Set No. 4**

III B.Tech I Semester Examinations,November 2010
ANTENNAS AND WAVE PROPAGATION
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive an expression for field pattern of a 2 element array and draw the field pattern
   i. when d=$\lambda/2$ and α=0^0
   ii. when d=$\lambda/2$ and α=180^0.
   (b) Explain Dolph-Tchebyshelf distribution for linear broadside arrays. [10+6]
2. (a) Explain the significance of flat earth considerations for trophospheric wave propagation.
   (b) Explain how the range of a VHF is extended by
   i. Ducting.
   ii. Troposcatteric Scattering. [8+8]
3. (a) A paraboloid reflector is required to produce a beam width between first nulls equal to 3^0at a operating frequency of 2GHz. Find the mouth diameter and power gain.
   (b) Describe the operation of parabolic reflector with neat sketches. [8+8]
4. (a) Show that for a slot in a conducting plane, the impedance Z_{slot} is given by Z_{dipole} Z_{slot}=$Z_0{}^2/4$ where Z_0 is the impedance of free space.
   (b) The radiation intensity of a particular antenna is given by $\emptyset(\theta, \emptyset) = \sin^2\theta$. Calculate the directivity of the antenna.
   (c) Define the effective aperture and calculate the effective aperture of 0.25λ dipole. [8+4+4]
5. (a) What are EM horn antenna. Mention various types of horn antennas. How do these antennas compare with parabolic reflector antennas.
   (b) Find the power gain and directivity of horn antenna of dimension 10∗6cm operating at a frequency of 4GHz. [8+8]
6. (a) Define and Explain:
   i. Effective Aperture
   ii. Gain
   iii. Directivity for an Antenna.

(b) An Antenna has a radiation resistance of 72 Ω and a power gain of 12dB. Find its radiation efficiency and directivity if its resistance is 4. Explain the relationships used. [6+10]

7. (a) A 16 turn helical beam antenna has a circumference of λ and turn spacing of $\lambda/4$. Calculate
   i. HPBW
   ii. Axial Ratio
   iii. Gain
   iv. Power pattern.

   (b) Derive the field expressions for rhombic antenna using pattern multiplication with the element patterns those of long wire. [8+8]

8. (a) Discuss the formation of Ionosphere and the Sky wave propagation.

   (b) Explain the terms MUF, Skip Distance and Critical Frequency. [8+8]

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Code No: R05310403 **R05** **Set No. 1**

III B.Tech I Semester Examinations,November 2010
ANTENNAS AND WAVE PROPAGATION
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are EM horn antenna. Mention various types of horn antennas. How do these antennas compare with parabolic reflector antennas.
   (b) Find the power gain and directivity of horn antenna of dimension 10∗6cm operating at a frequency of 4GHz. [8+8]
2. (a) Show that for a slot in a conducting plane, the impedance Z_{slot} is given by Z_{dipole} $Z_{slot}={Z_0}^2/4$ where Z_0 is the impedance of free space.
   (b) The radiation intensity of a particular antenna is given by $\emptyset(\theta,\emptyset) = \sin^2\theta$. Calculate the directivity of the antenna.
   (c) Define the effective aperture and calculate the effective aperture of 0.25λ dipole. [8+4+4]
3. (a) A paraboloid reflector is required to produce a beam width between first nulls equal to 3^0at a operating frequency of 2GHz. Find the mouth diameter and power gain.
   (b) Describe the operation of parabolic reflector with neat sketches. [8+8]
4. (a) Discuss the formation of Ionosphere and the Sky wave propagation.
   (b) Explain the terms MUF, Skip Distance and Critical Frequency. [8+8]
5. (a) Derive an expression for field pattern of a 2 element array and draw the field pattern
      i. when d=$\lambda/2$ and $\alpha=0^0$
      ii. when d=$\lambda/2$ and $\alpha=180^0$.
   (b) Explain Dolph-Tchebyshelf distribution for linear broadside arrays. [10+6]
6. (a) Explain the significance of flat earth considerations for trophospheric wave propagation.
   (b) Explain how the range of a VHF is extended by
      i. Ducting.
      ii. Troposcatteric Scattering. [8+8]
7. (a) Define and Explain:
      i. Effective Aperture
      ii. Gain

iii. Directivity for an Antenna.

(b) An Antenna has a radiation resistance of 72 Ω and a power gain of 12dB. Find its radiation efficiency and directivity if its resistance is 4. Explain the relationships used. [6+10]

8. (a) A 16 turn helical beam antenna has a circumference of λ and turn spacing of $\lambda/4$. Calculate

i. HPBW

ii. Axial Ratio

iii. Gain

iv. Power pattern.

(b) Derive the field expressions for rhombic antenna using pattern multiplication with the element patterns those of long wire. [8+8]

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Code No: R05310403 **R05** **Set No. 3**

III B.Tech I Semester Examinations,November 2010
ANTENNAS AND WAVE PROPAGATION
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define and Explain:
   i. Effective Aperture
   ii. Gain
   iii. Directivity for an Antenna.
   (b) An Antenna has a radiation resistance of 72 Ω and a power gain of 12dB. Find its radiation efficiency and directivity if its resistance is 4. Explain the relationships used. [6+10]

2. (a) Explain the significance of flat earth considerations for trophospheric wave propagation.
   (b) Explain how the range of a VHF is extended by
   i. Ducting.
   ii. Troposcatteric Scattering. [8+8]

3. (a) A paraboloid reflector is required to produce a beam width between first nulls equal to 3^0at a operating frequency of 2GHz. Find the mouth diameter and power gain.
   (b) Describe the operation of parabolic reflector with neat sketches. [8+8]

4. (a) Show that for a slot in a conducting plane, the impedance Z_{slot} is given by Z_{dipole} Z_{slot}=$Z_0{}^2/4$ where Z_0 is the impedance of free space.
   (b) The radiation intensity of a particular antenna is given by $\emptyset(\theta, \emptyset) = \sin^2\theta$. Calculate the directivity of the antenna.
   (c) Define the effective aperture and calculate the effective aperture of 0.25λ dipole. [8+4+4]

5. (a) A 16 turn helical beam antenna has a circumference of λ and turn spacing of $\lambda/4$. Calculate
   i. HPBW
   ii. Axial Ratio
   iii. Gain
   iv. Power pattern.
   (b) Derive the field expressions for rhombic antenna using pattern multiplication with the element patterns those of long wire. [8+8]

6. (a) What are EM horn antenna. Mention various types of horn antennas. How do these antennas compare with parabolic reflector antennas.
   (b) Find the power gain and directivity of horn antenna of dimension 10∗6cm operating at a frequency of 4GHz. [8+8]

7. (a) Derive an expression for field pattern of a 2 element array and draw the field pattern
      i. when d=$\lambda/2$ and α=0^0
      ii. when d=$\lambda/2$ and α=180^0.
   (b) Explain Dolph-Tchebyshelf distribution for linear broadside arrays. [10+6]

8. (a) Discuss the formation of Ionosphere and the Sky wave propagation.
   (b) Explain the terms MUF, Skip Distance and Critical Frequency. [8+8]

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