Code No: RR310402 | RR | SET-1

B. Tech III Year I Semester Examinations, December-2011
ANTENNA AND WAVE PROPAGATION
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

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

Answer any five questions
All questions carry equal marks

1.a) Define and list out the expressions for –
i) retarded potentials, ii) Helmholtz theorem, and iii) Lorentz Gauge Condition, as applicable for antennas.

b) Starting from the source current expression, obtain the final expression for the far field component of H_ϕ of a short vertical dipole. List out the assumptions involved, and write the corresponding far field (electric) term expression. [16]

2.a) List out the expressions for the far fields of a half – wave dipole, and hence obtain the relations for the radiation resistance of $\lambda/2$ dipole and $\lambda/4$ monopole. Sketch their current distributions.

b) Distinguish between the terms:
i) Beam Width , Beam Area and Beam Efficiency,
ii) Gain, Directivity and Resolution. [16]

3. Describe the requirements, performance characteristics and applications of –
i) Yagi–Uda Array Antenna, ii) 5 element Binomial Array, with neat schematics. [16]

4.a) Derive and sketch the radiation pattern of a 2 element array, with half - wavelength spacing, equal amplitude and opposite phase excitations.

b) Obtain an expression for the BWFN of a Broadside Array, and compare the same with that of an End Fire Array. [16]

5.a) Sketch the geometry of a helical antenna, and explain the principle of working in normal mode. When is axial mode used, and what are their applications?

b) Compare the performance characteristics of standing wave radiators and traveling wave antennas. [16]

6.a) With a neat block diagram, explain the method of measurement of radiation pattern for a pyramidal horn antenna, in Horizontal Plane.

b) Estimate the curvature profile for a parabolic reflector antenna, and hence define the terms: Aperture Blocking, Focal Length to Diameter Ratio. [16]

7.a) Define and explain the terms: Critical Frequency and MUF, Optical and Radio Horizon, Virtual Height and Skip Distance, as applicable for wave propagation.

b) With neat illustrations, explain the structure and formation of ionospheric layers, and the corresponding frequencies of propagation. [16]

8. Write short notes on any **TWO**:
a) Duct Propagation b) Dielectric Lens antennas c) Small loop antenna. [16]

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Code No: RR310402 | RR | SET-2

B. Tech III Year I Semester Examinations, December-2011
ANTENNA AND WAVE PROPAGATION
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

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

Answer any five questions
All questions carry equal marks

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1. Describe the requirements, performance characteristics and applications of – i) Yagi–Uda Array Antenna, ii) 5 element Binomial Array, with neat schematics. [16]

2.a) Derive and sketch the radiation pattern of a 2 element array, with half - wavelength spacing, equal amplitude and opposite phase excitations.
b) Obtain an expression for the BWFN of a Broadside Array, and compare the same with that of an End Fire Array. [16]

3.a) Sketch the geometry of a helical antenna, and explain the principle of working in normal mode. When is axial mode used, and what are their applications?
b) Compare the performance characteristics of standing wave radiators and traveling wave antennas. [16]

4.a) With a neat block diagram, explain the method of measurement of radiation pattern for a pyramidal horn antenna, in Horizontal Plane.
b) Estimate the curvature profile for a parabolic reflector antenna, and hence define the terms: Aperture Blocking, Focal Length to Diameter Ratio. [16]

5.a) Define and explain the terms: Critical Frequency and MUF, Optical and Radio Horizon, Virtual Height and Skip Distance, as applicable for wave propagation.
b) With neat illustrations, explain the structure and formation of ionospheric layers, and the corresponding frequencies of propagation. [16]

6. Write short notes on any **TWO**:
a) Duct Propagation b) Dielectric Lens antennas c) Small loop antenna. [16]

7.a) Define and list out the expressions for –
i) Retarded potentials, ii) Helmholtz theorem, and
iii) Lorentz Gauge Condition, as applicable for antennas.
b) Starting from the source current expression, obtain the final expression for the far field component of H_ϕ of a short vertical dipole. List out the assumptions involved, and write the corresponding far field (electric) term expression. [16]

8.a) List out the expressions for the far fields of a half – wave dipole, and hence obtain the relations for the radiation resistance of $\lambda/2$ dipole and $\lambda/4$ monopole. Sketch their current distributions.
b) Distinguish between the terms:
i) Beam Width, Beam Area and Beam Efficiency,
ii) Gain, Directivity and Resolution. [16]

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Code No: RR310402 | RR | SET-3

B. Tech III Year I Semester Examinations, December-2011
ANTENNA AND WAVE PROPAGATION
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

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

Answer any five questions
All questions carry equal marks

1.a) Sketch the geometry of a helical antenna, and explain the principle of working in normal mode. When is axial mode used, and what are their applications?
b) Compare the performance characteristics of standing wave radiators and traveling wave antennas. [16]

2.a) With a neat block diagram, explain the method of measurement of radiation pattern for a pyramidal horn antenna, in Horizontal Plane.
b) Estimate the curvature profile for a parabolic reflector antenna, and hence define the terms: Aperture Blocking, Focal Length to Diameter Ratio. [16]

3.a) Define and explain the terms: Critical Frequency and MUF, Optical and Radio Horizon, Virtual Height and Skip Distance, as applicable for wave propagation.
b) With neat illustrations, explain the structure and formation of ionospheric layers, and the corresponding frequencies of propagation. [16]

4. Write short notes on any **TWO**:
a) Duct Propagation b) Dielectric Lens antennas c) Small loop antenna. [16]

5.a) Define and list out the expressions for –
i) retarded potentials, ii) Helmholtz theorem, and
iii) Lorentz Gauge Condition, as applicable for antennas.
b) Starting from the source current expression, obtain the final expression for the far field component of H_ϕ of a short vertical dipole. List out the assumptions involved, and write the corresponding far field (electric) term expression. [16]

6.a) List out the expressions for the far fields of a half – wave dipole, and hence obtain the relations for the radiation resistance of $\lambda/2$ dipole and $\lambda/4$ monopole. Sketch their current distributions.
b) Distinguish between the terms:
i) Beam Width, Beam Area and Beam Efficiency,
ii) Gain, Directivity and Resolution. [16]

7. Describe the requirements, performance characteristics and applications of i)Yagi–Uda Array Antenna, ii) 5 element Binomial Array, with neat schematics. [16]

8.a) Derive and sketch the radiation pattern of a 2 element array, with half-wavelength spacing, equal amplitude and opposite phase excitations.
b) Obtain an expression for the BWFN of a Broadside Array, and compare the same with that of an End Fire Array. [16]

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Code No: RR310402 | RR | SET-4

B. Tech III Year I Semester Examinations, December-2011
ANTENNA AND WAVE PROPAGATION
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

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

Answer any five questions
All questions carry equal marks

1.a) Define and explain the terms: Critical Frequency and MUF, Optical and Radio Horizon, Virtual Height and Skip Distance, as applicable for wave propagation.
b) With neat illustrations, explain the structure and formation of ionospheric layers, and the corresponding frequencies of propagation. [16]

2. Write short notes on any **TWO**:
a) Duct Propagation b) Dielectric Lens antennas c) Small loop antenna. [16]

3.a) Define and list out the expressions for –
i) retarded potentials, ii) Helmholtz theorem, and
iii) Lorentz Gauge Condition, as applicable for antennas.
b) Starting from the source current expression, obtain the final expression for the far field component of H_ϕ of a short vertical dipole. List out the assumptions involved, and write the corresponding far field (electric) term expression. [16]

4.a) List out the expressions for the far fields of a half – wave dipole, and hence obtain the relations for the radiation resistance of $\lambda/2$ dipole and $\lambda/4$ monopole. Sketch their current distributions.
b) Distinguish between the terms: i) Beam Width , Beam Area and Beam Efficiency, ii) Gain, Directivity and Resolution. [16]

5. Describe the requirements, performance characteristics and applications of – i) Yagi–Uda Array Antenna, ii) 5 element Binomial Array, with neat schematics. [16]

6.a) Derive and sketch the radiation pattern of a 2 element array, with half - wavelength spacing, equal amplitude and opposite phase excitations.
b) Obtain an expression for the BWFN of a Broadside Array, and compare the same with that of an End Fire Array. [16]

7.a) Sketch the geometry of a helical antenna, and explain the principle of working in normal mode. When is axial mode used, and what are their applications?
b) Compare the performance characteristics of standing wave radiators and traveling wave antennas. [16]

8.a) With a neat block diagram, explain the method of measurement of radiation pattern for a pyramidal horn antenna, in Horizontal Plane.
b) Estimate the curvature profile for a parabolic reflector antenna, and hence define the terms: Aperture Blocking, Focal Length to Diameter Ratio. [16]

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