

ANTENNA AND WAVE PROPAGATIONS

UNIT-1: ANTENNA BASICS

1. Antennas convert -----to -----[]

- a) Photons to electrons b) electrons to photons
- c) Both a and b d) none

2. Antennas are of -----types []

- a) Two b) four
- c) Infinite d) none

3. Which of the following is true []

- a) Time changing current radiates b) accelerated charges radiates
- c) Both a and b d) none

4. Radiation pattern is----- dimensional quantity []

- a) Two b) three
- c) Single d) none

5 ----- is also called as 3-dB bandwidth []

- a) FNBW b) HPBW
- c) Both a and b d) none

6. One steradian is equal to----- square degrees []

- a) 360 b) 180
- c) 3283 d) 41,253

7 -----is independent of distance []

- a) Poynting vector b) radiation intensity
- c) Both a and b d) none

8. The minimum value of the directivity of an antenna is []

- a) Unity b) zero
- c) Infinite d) none

9. Directivity is inversely proportional to..... []

- a) HPBW b) FNBW
- c) Beam area d) Beam width

10. Gain is always -----than directivity []

- a) Greater b) lesser
- c) Equal to d) none

11. Directivity and Resolution are ----- []

a) Different b) same

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c) Both a and b d) none

12. Effective aperture is always ----- than Physical aperture. []

a) Higher b) lower

c) Both a and b d) none

13----- Theorem can be applied to both circuit and field theories []

a) Equality of patterns b) Equality of impedance

c) Equality of effective lengths d) Reciprocity theorem

14. Antenna temperature considers ----- parameter into account []

a) Directivity b) gain

c) Beam area d) beam efficiency

15. Radiation resistance of antenna is ----- []

a) Physical resistance b) Virtual Resistance

c) Both a and b d) none

16. Antenna aperture is same as -----[]

a) Length b) width

c) Area d) volume

17. The source of scalar potential is []

a) Charge density b) Current density

c) Both a and b d) none

18. The source of vector potential is []

a) Charge density b) Current density

c) Both a and b d) none

19. R/v is called ----- []

a) Radiation to voltage ratio b) resistance to velocity ratio

c) Propagation delay d) none

20. Which condition makes coupled equations into uncoupled equations []

a) Retarded b) Helmholtz

c) Lorentz gauge d) none

Q. No.	ANSWER	Q. No.	ANSWER
1	C	11	B
2	C	12	B
3	C	13	D

4	B	14	B
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5	B	15	B
6	C	16	C
7	B	17	A
8	A	18	B
9	C	19	C
10	B	20	C

UNIT-2: THIN LINEAR WIRE ANTENNAS

1. Alternating current element is given by []

- a) $I dl$
- b) $I dl \cos \omega t$
- c) $I dl \sin \omega t$
- d) I

2. -----potential is used to find the field components of current element []

- a) Scalar Potential, V
- b) Vector Potential, A
- c) Both a and b
- d) None

3. ----- is basic building block for any practical antenna []

- a) Current element
- b) Monopole
- c) Dipole
- d) Loop

4. The H_{ϕ} Component will consists of ----- field. []

- a) Radiation
- b) Induction
- c) Both a and b
- d) All

5. The E_{θ} Component will consists of ----- []

- a) Radiation
- b) Induction
- c) Electro static
- d) All

6. The E_r Component will consists of ----- []

- a) Induction
- b) Electro static
- c) Both a and b
- d) All

7. The induction and radiation fields of current element are equal at distance of ----- []

- a) $\lambda/2$
- b) $\lambda/4$
- c) $\lambda/6$
- d) $\lambda/10$

8. The radiation resistance of current element is given by []

- a) $R_r = 80\pi^2(dl/\lambda)^2$
- b) $R_r = 20\pi^2(dl/\lambda)^2$
- c) $R_r = 10\pi^2(dl/\lambda)^2$
- d) None

9.The radiation resistance of short dipole is given by []

- a) $R_r = 80\pi^2(dl/\lambda)^2$ b) $R_r = 20\pi^2(dl/\lambda)^2$
c) $R_r = 10\pi^2(dl/\lambda)^2$ d) None

10. The radiation resistance of short monopole is given by []

- a) $R_r = 80\pi^2(dl/\lambda)^2$ b) $R_r = 20\pi^2(dl/\lambda)^2$
c) $R_r = 10\pi^2(dl/\lambda)^2$ d) None

TRUE OR FALSE QUESTIONS

11. The radiation resistance of current element is applicable to dipoles up to height of $\lambda/8$ only. []

12. The radiation resistance of current element is applicable to mono poles up to height of $\lambda/4$ only. []

13. The radiation resistance of current element is applicable to dipoles up to height of $\lambda/2$ only. []

14. The radiation resistance of $\lambda/2$ dipole is 36.5Ω []

15.The radiation resistance of $\lambda/4$ Monopole is 73Ω []

FILL IN THE BLANKS QUESTIONS

16. The E_θ Component of current element is given by-----

17. The E_r Component of current element is given by-----

18. The H_ϕ Component of current element is givenby-----

19. The main application of Loop Antenna is-----

20. The Directivity of Loop Antenna is -----

Q. No.	ANSWER	Q. No.	ANSWER
1	B	11	FALSE
2	B	12	FALSE
3	A	13	FALSE
4	C	14	FALSE
5	D	15	FALSE
6	C	16	$E_\theta = \frac{I dL \sin \theta}{4 \pi \epsilon} \left[\frac{-\omega \sin \omega t'}{v^2 r} + \frac{\cos \omega t'}{v r^2} + \frac{\sin \omega t'}{\omega r^3} \right]$

8. Which array is also called as Stone's array. []
 a) Broad side. b) End-fire.
 c) Increased End-Fire. d) Binomial.

9. Hansen-Wood yard array is a -----array []
 a) Linear. b) Non-Linear.
 c) Both a and b. d) None.

10. Stone's array is a -----array []
 a) Linear. b) Non-Linear.
 c) Both a and b. d) None.

TRUE OR FALSE QUESTIONS

**11. The radiation pattern of broad side is array is along the normal direction
 Of array axis.** []

12. The Binomial array is a linear array. []

13. All coefficients of elements in Binomial array are same []

14. Minor lobes will exist in Linear antennas. []

**15. In resultant or total radiation pattern The phases will be multiplied
 using
 Multiplication of patterns Principle.** []

FILL IN THE BLANKS QUESTIONS

16. Hansen-Wood yard Array is a -----array.

17. The currents in Non linear are -----

18. Binomial array was invented by-----

**19. The amplitudes will be -----in the resultant pattern using principle of multiplication of
 Patterns.**

**20. The phases will be -----in the resultant pattern using principle of multiplication of
 Patterns.**

Q. No.	ANSWER	Q. No.	ANSWER
1	A	11	TRUE

2	B	12	FALSE
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3	A	13	FALSE
4	B	14	TRUE
5	A	15	FALSE
6	A	16	LINEAR
7	C	17	Out of phase
8	D	18	Stone
9	A	19	Multiply
10	B	20	Addup

UNIT-4: VHF, UHF and MW ANTENNAS I

1. Microwave frequency range is-- []

- a) above 30MHZ b) above 300MHZ
 C) above 200MHZ d) above 2000MHZ.

2. Yagi-Uda antenna consists of--- []

- a) Folded Dipole b) Reflector
 C) Director d) All above

3. The radiation resistance of folded dipole of equal radii is----- []

- a) 657Ohms b) 292 Ohms
 C) 300 Ohms d) 277 Ohms

4. The radiation resistance of folded dipole of unequal radii ($r_2=2r_1$) is----- []

- a) 657Ohms b) 292 Ohms
 C) 300 Ohms d) 277 Ohms

5. The helix is having the geometry of ----- []

- a) straight wire b) circle
 C) cylinder d) All above.

6. The radiation pattern of helix in Axial mode is----- []

- a) Bi directional b) Uni directional
 C) 4 lobed d) Omni directional

7. The radiation pattern of helix in Normal mode is----- []
- a) Bi directional b) Uni directional
 C) 4 lobed d) Omni directional
8. In Normal mode of operation the length of the helix is----- []
- a) $>\lambda$ b) $<\lambda$
 C) $=\lambda$ d) none
9. In Axial mode of operation the length of the helix is----- []
- a) $>\lambda$ b) $<\lambda$
 C) $=\lambda$ d) none
10. Horn antennas used in the frequency range of----- []
- a) VHF b) UHF
 C) SHF d) MW

TRUE OR FALSE QUESTIONS

11. Yagi_Uda array is a parasitic array. []
12. The reflector is longer than the folded dipole in Yagi-Uda antenna. []
13. The director is shorter than the Folded dipole in Yagi-Uda antenna. []
14. Stone invented Helical Antenna. []
15. Mushaike invented Horn antenna. []

FILL IN THE BLANKS QUESTIONS

16. Radiation pattern of Yagi-Uda array is directional
17. Helical antenna was invented by-----
18. The path difference in horn antennas must be-----
19. The horn antennas are used in the frequency range of-----
20. The impedance of wave guides will be ---- than Transmission lines.

Q. No.	ANSWER	Q. No.	ANSWER
1	C	11	TRUE
2	D	12	TRUE
3	B	13	TRUE
4	A	14	FALSE
5	D	15	FALSE
6	B	16	Unidirectional
7	A	17	John.D.Kraus
8	B	18	small
9	C	19	MW
10	D	20	higher

UNIT-5: VHF, UHF and MW ANTENNAS-II

1. Micro strip antenna was first introduced by []

- A). Marconi
- B). Hertz
- C). Munson
- D). Cassegrain

2. The widely used shape for patch antennas is []

- A). Rectangular
- B). Circular
- C). Elliptical
- D). Parabolic

3. The efficiency of Micro strip antenna is []

- A). High
- B). Very high
- C). infinite
- D). Low

4. For square corner reflector the flaring angle is..... []

- A). 30 degrees
- B). 60 degrees
- C). 90 degrees
- D). 180 degrees

5. The no. of images formed for a square corner reflector, using method of images are... []

- A). 3
- B). 5
- C). 7
- D). 6

6. The no. of images formed for a 30 degrees corner reflector, using method of Images are..... []

- A). 3
- B). 5
- C). 7
- D). 6

7. The no. of images formed for a 60 degrees corner reflector, using method of images are..... []

- A). 3
- B). 5
- C). 7
- D). 6

8. A single narrow beam of radiation results in square corner reflector for spacing of $s=$ []

- A). 2λ
- B). λ
- C). $3\lambda/2$
- D). $\lambda/2$

9. Two narrow beams of radiation results in square corner reflector for spacing of $s=.....$ []

- A). 2λ
- B). λ
- C). $3\lambda/2$
- D). $\lambda/2$

10. Three narrow beams of radiation results in square corner reflector for spacing of $s=.....$ []

- A). 2λ
- B). λ
- C). $3\lambda/2$
- D). $\lambda/2$

TRUE OR FALSE

11. A parabola is a three dimensional curve. []

12. A paraboloid is a three dimensional curve. []

13. Fermat's principle must be followed to get a plane wave front from the dish antenna. []

14. In any dish antenna arrangement the parabolic reflector will acts as primary antenna []

15. In any dish antenna arrangement the parabolic reflector will acts as secondary antenna []

FILL IN THE BLANKS

16. The directivity of the paraboloid is-----

17. The generally used feed antenna for paraboloids is-----

18. The horn and hyperbola are used in ----- feed of dish antennas.

19. The disadvantage (draw back) of parabolic reflector is-----

20. The parabolic antenna operates in the frequency range of-----

Q. No.	ANSWER	Q. No.	ANSWER
1	C	11	FAL SE
2	A	12	TRUE
3	D	13	TRU E
4	C	14	FALSE
5	A	15	TRUE
6	C	16	$9.87(d/\lambda)^2$
7	B	17	HORN ANTENNA
8	D	18	CASSEG RAIN
9	B	19	SPILLO VER EFFECT
10	C	20	MW or GHZ

UNIT-6: Lens Antennas

- Electrical path length is increased in-----lens antennas. []
 - Fast
 - Delay.
 - Both a and b.
 - None.
- Electrical path length is decreased in ----lens antennas. []
 - Fast
 - Delay.
 - Both a and b.
 - None.
- E plane metal-plate lens are of -- type. []
 - Fast
 - Delay.

c) Both a and b.

d)None.

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4. H plane metal-plate lens are of---type. []

- a) Fast
- b)Delay.
- c) Both a and b.
- d)None.

5. The following is the example of dielectric material. []

- a) Lucite.
- b)Polystyrene.
- c) Both a and b.
- d)None.

6. All dielectric materials will have the refractive index of ----- []

- a) unity.
- b)Less than unity.
- c) Greater than unity.
- d)None.

7. The design equation of lens antennas is given by []

a) $R = \frac{(n - 1)L}{n \cos \theta - 1}$

b) $L = \frac{(n - 1) R}{n \cos \theta - 1}$

- c) Both a and b.
- d) None.

8. All metals will have the refractive index of --- []

--

- a) unity.
- b)Less than unity.
- c) Greater than unity.
- d)None.

9. By zoning the lens refractive index will..... []

- a) change.
- b) not change.
- c) Both a and b.
- d)None.

10. In dielectric lens, difference in electrical path length may be caused due to []

- a) Length.
- b)Width.
- c) Thickness.
- d)None.

TRUE OR FALSE QUESTIONS

11. All antenna measurements are accurate. []

12. All antenna measurements will be done in the far field []

13. Cylindrical coordinate system will be choosed for all antenna measurements. []

14. For better antenna measurements the tolerance value must be as large as possible. []
15. Anechoic chamber can be preferred for antenna measurements. []

FILL IN THE BLANKS QUESTIONS

16. Frii's transmission formula is.....
17. Comparison method for measurement of antenna gain is also called as.....
18. The formula for gain using comparison method is.....
19. In two antennas method the assumption is.....
20. In the case of circular or elliptical polarizations the the total antenna gain is given by G_{AUT}

Q. No.	ANSWE R	Q. No.	ANSWER
1	B	11	FAL SE
2	A	12	TRUE
3	A	13	FAL SE
4	B	14	FALSE
5	C	15	TRUE
6	C	16	$P_R = P_T G_T G_R (\lambda / 4\pi R)^2$
7	A	17	Gain-Transfer
8	B	18	$G_{AUT} = (P_{AUT} / P_{ref}) G_{ref}$
9	B	19	$G_R = G_T$
10	C	20	$G_H + G_V$

- 1) The troposphere is extends up to a height of ----- []
A) 5km B) 10km
C) 15km D) 20km
- 2) For small distances the earth can be considered as -----region []
A) flat B) curved
C) conductor D) dielectric
- 3) For large distances the earth can be considered as -----region []
A) flat B) curved
C) conductor D) dielectric
- 4) In general the earth will acts asa ----- []
A) leaky resistor B) leaky inductor
C) leaky capacitor D) leaky transistor
- 5) According to Rayleigh if $R > 10$, the reflecting surface will be considered as..... []
A) smooth region B) rough region
C) both a &b D) none
- 6) According to Rayleigh if $R < 0.1$, the reflecting surface will be considered as..... []
A) smooth region B) rough
C) both a &b D) none
- 7) The line of sight (LOS) distance is the distance travelled by the.....wave. []
A) diffracted B) scattered
C) reflected D) direct
- 8) The phenomenon of reduction of signal strength due to variation in refractive index is called..... []
A) wave tilting B) fading
C) diffraction D) scattering
- 9) The E-Layer of Ionosphere exists between []
A) 40 to 90 km B) 90 to 140 km
C) 140 to 250 km D) 250 to 400 km
- 10) The F2-Layer of Ionosphere exists []
between

- A) 40 to 90 km
- C) 140 to 250 km

- B) 90 to 140 km
- D) 250 to 400 km

TRUE OR FALSE QUESTIONS

- 11) Critical frequency is the lowest frequency that returns from Ionosphere at vertical frequency. []
- 12) Maximum Usable Frequency (MUF) is the highest frequency that returns from Ionosphere Other than vertical frequency.
- 13) The frequency below which the entire power gets absorbed is referred to as the Maximum Usable Frequency (MUF). []
- 14) The frequency at which there is optimum return of wave energy is called the Optimum Frequency (OF). []
- 15) Virtual height is always lesser than the Actual height. []

FILL IN THE BLANKS QUESTIONS

- 16) The horizon of the earth, d_0 is given by-----
- 17) In ground or surface wave propagation the electric field at the receiving point is given by is given by.....
- 18) In free space the power received is given by $P_r = \dots\dots\dots$
- 19) The basic path loss for general communication is given by.....
- 20) The relation between Critical Frequency and MUF is.....

Q. No.	ANSWER	Q. No.	ANSWER
1	C	11	
2	A	12	
3	B	13	
4	C	14	
5	B	15	

6	A	16	
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7	D	17	
8	B	18	
9	B	19	
10	D	20	

Q.NO.	ANSWER
16	$3.57(\sqrt{h_t} + \sqrt{h_r}) \text{Km}$
17	$\frac{4\pi h_t h_r E_0}{\lambda d^2}$
18	$P_r = (P_t G_t G_r \lambda^2) / (4\pi R)^2$
19	$P_i = 32.45 + 20 \log_{10} f + 20 \log_{10} d$
20	$f_{MUF} = f_c \sec \phi_i$

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