

Multiple Choice Questions and Answers on Antenna & Wave Propagation

1) What is the wavelength of Super high frequency (SHF) especially used in Radar & satellite communication?

- a. 1 m – 10 m
- b. 1 cm – 10 cm
- c. 10 cm – 1 m
- d. 0.1 cm – 1 cm

ANSWER: 1 cm – 10 cm

2) Which among the following is an application of high frequency?

- a. SONAR
- b. Subsurface communication
- c. Radio navigation
- d. Facsimile

ANSWER: Facsimile

3) Wave front is basically a locus of points acquiring similar _____

- a. Phase
- b. Frequency
- c. Amplitude
- d. Wave equation

ANSWER: Phase

4) In which kind of waveform is the phase velocity defined?

- a. Sinusoidal
- b. Rectangular
- c. Square
- d. Triangular

ANSWER: Sinusoidal

5) Which among the following is/are not present in free space?

- a. Solid bodies
- b. Ionized particles
- c. Interference of normal radiation & radio wave propagation
- d. All of the above

ANSWER: All of the above

6) Power density is basically termed as _____ power per unit area

- a. Reflected
- b. Refracted
- c. Radiated
- d. Diffracted

ANSWER: Radiated

7) If the path difference of two waves with single source traveling by different paths to arrive at the same point, is $\lambda/2$, what would be the phase difference between them?

- a. $\beta \times (\lambda/2)$
- b. $\beta / (\lambda/2)$
- c. $\beta + (\lambda/2)$
- d. $\beta - (\lambda/2)$

ANSWER: $\beta \times (\lambda/2)$

8) Which ionization layer exists during day time & usually vanishes at night due to highest recombination rate?

- a. D-region
- b. Normal E-region
- c. Sporadic E-region
- d. Appleton region

ANSWER: D-region

9) What is the possible range of height for the occurrence of sporadic E-region with respect to normal E-region?

- a. 20 km – 50 km
- b. 45 km – 85 km
- c. 90 km – 130 km
- d. 140 km – 200 km

ANSWER: 90 km – 130 km

10) F₂ layer of appleton region acts as a significant reflecting medium for _____ frequency radio waves

- a. Low
- b. Moderate

- c. High
- d. All of the above

ANSWER: High

11) The knowledge of which parameter is sufficient for deriving the time varying electromagnetic field?

- a. Electric field intensity
- b. Magnetic field intensity
- c. Current density
- d. Power density

ANSWER: Current density

12) According to Webster's dictionary, what is an antenna?

- a. Impedance matching device
- b. Sensor of electromagnetic waves
- c. Transducer between guided wave & free space wave
- d. Metallic device for radiating or receiving radio waves

ANSWER: Metallic device for radiating or receiving radio waves

13) Under which conditions of charge does the radiation occur through wire antenna?

- a. For a charge with no motion
- b. For a charge moving with uniform velocity with straight & infinite wire
- c. For a charge oscillating in time motion
- d. All of the above

ANSWER: For a charge oscillating in time motion

14) In a non-isotropic directional antenna, which radiating lobe axis makes an angle of 180° w.r.t. major beam of an antenna?

- a. Minor lobe
- b. Side lobe
- c. Back lobe
- d. None of the above

ANSWER: Back lobe

15) At which angles does the front to back ratio specify an antenna gain?

- a. 0° & 180°
- b. 90° & 180°
- c. 180° & 270°
- d. 180° & 360°

ANSWER: 0° & 180°

16) Which among the following defines the angular distance between two points on each side of major lobe especially when the radiation drops to zero?

- a. Half power beam width (HPBW)
- b. First null beam width (FNBW)
- c. Side lobe level (SLL)
- d. Front to back ratio (FBR)

ANSWER: First null beam width (FNBW)

17) If an observation point is closely located to the source, then the field is termed as

-
- a. Induced
 - b. Radiated
 - c. Reflected
 - d. Far-field

ANSWER: Induced

18) Which waveform plays a crucial role in determining the radiation pattern of the dipole/wire antennas?

- a. Current
- b. Voltage
- c. Frequency
- d. Phase

ANSWER: Current

19) How are the infinitesimal dipoles represented in terms of antenna length and signal wavelength?

- a. $l \leq (\lambda / 50)$
- b. $(\lambda / 50) < l \leq (\lambda / 10)$
- c. $l = \lambda / 2$
- d. None of the above

ANSWER: $l \leq (\lambda / 50)$

20) In flared transmission line, the radiation phenomenon increases due to _____ in flaring

- a. Increase
- b. Decrease
- c. Stability
- d. None of the above

ANSWER: Increase

21) Which pattern is generated due to plotting of square of amplitude of an electric field?

- a. Field Pattern
- b. Voltage Pattern
- c. Power Pattern
- d. All of the above

ANSWER: Power Pattern

22) In an electrically small loops, the overall length of the loop is _____ one-tenth of a wavelength.

- a. Less than
- b. Equal to
- c. Greater than
- d. None of the above

ANSWER: Less than

23) On which factor/s do/does the radiation field of a small loop depend?

- a. Shape
- b. Area
- c. Both a and b
- d. None of the above

ANSWER: Area

24) From the radiation point of view, small loops are _____ radiators

- a. Poor
- b. Good
- c. Better
- d. Excellent

ANSWER: Poor

25) According to the directivity of a small loop, which value of 'θ' contributes to achieve the maximum value of radiation intensity (U_{\max})?

- a. 0°
- b. 90°
- c. 180°
- d. 270°

ANSWER: 90°

26) In which kind of array configuration, the element locations must deviate or adjust to some nonplaner surface like an aircraft or missile?

- a. Linear
- b. Planer
- c. Conformal
- d. All of the above

ANSWER: Conformal

27) What is the nature of radiation pattern of an isotropic antenna?

- a. Spherical
- b. Dough-nut
- c. Elliptical
- d. Hyperbolic

ANSWER: Spherical

28) In broadside array, all the elements in the array should have similar _____ excitation along with similar amplitude excitation for maximum radiation.

- a. Phase
- b. Frequency
- c. Current
- d. Voltage

ANSWER: Phase

29) Which among the following is regarded as a condition of an ordinary endfire array?

- a. $\alpha < \beta d$
- b. $\alpha > \beta d$

- c. $\alpha = \pm\beta d$
- d. $\alpha \neq \pm\beta d$

ANSWER: $\alpha = \pm\beta d$

30) Which mode of propagation is adopted in HF antennas?

- a. Ionospheric
- b. Ground wave
- c. Tropospheric
- d. All of the above

ANSWER: Ionospheric

31) For which band/s is the space wave propagation suitable over 30 MHz?

- a. VHF
- b. SHF
- c. UHF
- d. All of the above

ANSWER: All of the above

32) If the tower antenna is not grounded, which method of excitation is/are applicable for it?

- a. Series
- b. Shunt
- c. Both a and b
- d. None of the above

ANSWER: Series

33) In ungrounded antennas, if an excitation is applied directly across the base insulator, then on which factor/s would the voltage across the insulator depend?

- a. Power delivered to antenna
- b. Power factor of impedance
- c. Both a and b
- d. None of the above

ANSWER: Both a and b

34) Which among the following exhibits perpendicular nature in TEM wave?

- a. Electric field
- b. Magnetic field
- c. Direction of propagation
- d. All of the above

ANSWER: All of the above

35) Which equations are regarded as wave equations in frequency domain for lossless media?

- a. Maxwell's
- b. Lorentz
- c. Helmholtz
- d. Poisson's

ANSWER: Helmholtz

36) If the magnetic field component of a plane wave in a lossless dielectric is $H = 50 \sin(2\pi \times 10^6 t - 6x) \mathbf{a}_z$ mA/m, what will be the wave velocity?

- a. 1.047×10^6 m/s
- b. 1.257×10^6 m/s
- c. 2.50×10^6 m/s
- d. 3×10^6 m/s

ANSWER: 1.047×10^6 m/s

37) In an electrical circuit, which nature of impedance causes the current & voltages in phase?

- a. Reactive
- b. Resistive
- c. Capacitive
- d. Inductive

ANSWER: Resistive

38) Which type of ground wave travels over the earth surface by acquiring direct path through air from transmitting to receiving antennas?

- a. Surface wave
- b. Space wave
- c. Both a & b
- d. None of the above

ANSWER: Space wave

39) After which phenomenon/phenomena do the waves arrive at the receiving antenna in ionospheric propagation?

- a. Reflection or Scattering
- b. Refraction
- c. Defraction
- d. All of the above

ANSWER: Reflection or Scattering

40) By which name/s is an ionospheric propagation, also known as?

- a. Sea wave propagation
- b. Ground wave propagation
- c. Sky wave propagation
- d. All of the above

ANSWER: Sky wave propagation

41) According to Snell's law in optics, if a ray travels from dense media to rarer media, what would be its direction w.r.t the normal?

- a. Towards
- b. Away
- c. Across
- d. Beside

ANSWER: Away

42) Which mechanism/s is/are likely to occur in mid-frequency operation corresponding to ionospheric region?

- a. Only Reflection
- b. Only Refraction
- c. Partial reflection & refraction
- d. None of the above

ANSWER: Partial reflection & refraction

43) Which among the following plays a primary role in generation of conduction current in an ionosphere due to presence of electric field?

- a. Ions
- b. Motion of electrons
- c. Neutral molecules
- d. None of the above

ANSWER: Motion of electrons

44) Which type of wire antennas are also known as dipoles?

- a. Linear
- b. Loop
- c. Helical
- d. All of the above

ANSWER: Linear

45) Which antennas are renowned as patch antennas especially adopted for space craft applications?

- a. Aperture
- b. Microstrip
- c. Array
- d. Lens

ANSWER: Microstrip

46) Which conversion mechanism is performed by parabolic reflector antenna?

- a. Plane to spherical wave
- b. Spherical to plane wave
- c. Both a and b
- d. None of the above

ANSWER: Spherical to plane wave

47) Which antenna radiating region/s has/have independent nature of angular field distribution over the distance from the antenna?

- a. Reactive near-field region
- b. Fresnel region
- c. Fraunhofer region
- d. All of the above

ANSWER: Fraunhofer region

48) Steradian is a measurement unit of _____

- a. Point angle
- b. Linear angle
- c. Plane angle
- d. Solid angle

ANSWER: Solid angle

49) According to the geometry, how many steradians are present in a full sphere?

- a. $\pi/2$
- b. π
- c. 2π
- d. 4π

ANSWER: 4π

50) The vector magnetic potential shows the inverse relationship with its _____

- a. Source
- b. Distance of point from the source (R)
- c. Both a and b
- d. None of the above

ANSWER: Distance of point from the source (R)

51) In retarded potentials, what factor of time delay is generally introduced in A & V equations?

- a. $R + c$
- b. $R - c$
- c. R/c
- d. $R \times c$

ANSWER: R/c

52) In the solutions of inhomogeneous vector potential wave equation, which component exists if the source is at origin and the points are removed from the source ($J_z = 0$)?

- a. Inward
- b. Outward
- c. Both a and b
- d. None of the above

ANSWER: Outward

53) If a half-wave dipole operates at 300 MHz with $\lambda = 0.5\text{m}$ & $D_0 = 1.643$, what will be its effective area?

- a. 0.032 m^2
- b. 0.047 m^2

- c. 0.65 m^2
- d. 0.99 m^2

ANSWER: 0.032 m^2

54) Dipole antenna is symmetrical in nature where the two ends are at equal potentials with respect to _____ point

- a. Initial
- b. Eventual
- c. Mid
- d. None of the above

ANSWER: Mid

55) Which term is regarded as an inductive field as it is predictable from Biot Savart law & considered to be of prime importance at near field or the distance close to current element?

- a. $1/r$
- b. $1/r^2$
- c. $1/r^3$
- d. $1/r^4$

ANSWER: $1/r^2$

56) What is the nature of current distribution over the small dipoles?

- a. Spherical
- b. Rectangular
- c. Triangular
- d. Square

ANSWER: Triangular

57) For receiving a particular frequency signal, which tuning component must be used by the loop to form a resonant circuit for tuning to that frequency?

- a. Capacitor
- b. Inductor
- c. Resistor
- d. Gyrator

ANSWER: Capacitor

58) If the radius of loop is $\lambda/20$ in a free space medium, what will be the radiation resistance of 8-turn small circular loop?

- a. 0.7883 Ω
- b. 50.45 Ω
- c. 123.17 Ω
- d. 190.01 Ω

ANSWER: 123.17 Ω

59) What is the far-field position of an electric short dipole?

- a. Along x-axis
- b. Along y-axis
- c. Along z-axis
- d. Along xy plane

ANSWER: Along z-axis

60) What would happen if the rms value of induced emf in loop acquires an angle $\theta = 90^\circ$?

- a. Wave is incident in direction of plane of the loop with induced maximum voltage
- b. Wave is incident normal to plane of the loop with no induced voltage
- c. Wave is incident in opposite direction of plane of the loop with minimum voltage
- d. None of the above

ANSWER: Wave is incident normal to plane of the loop with no induced voltage

61) If a linear uniform array consists of 9 isotropic elements separated by $\lambda/4$, what would be the directivity of a broadside array in dB?

- a. 6.53 dB
- b. 7.99 dB
- c. 8.55 dB
- d. 9.02 dB

ANSWER: 6.53 dB

62) If the elements of a binomial array are separated by $\lambda/4$, how many shape patterns are generated with no minor lobes?

- a. 2
- b. 4
- c. 8
- d. 16

ANSWER: 8

63) What kind of beamwidth is/are produced by Chebyshev arrays for given side lobe level (SLL)?

- a. Widest
- b. Narrowest
- c. Both a and b
- d. None of the above

ANSWER: Narrowest

64) If the length of elements of an array is greater than $\lambda/2$, which will be the operating region of an array?

- a. Transmission line region
- b. Active region
- c. Reflective region
- d. All of the above

ANSWER: Reflective region

65) Which angle of rhombic antenna represents one half of included angle of two legs of one wire?

- a. Apex angle
- b. Tilt angle
- c. Both a and b
- d. None of the above

ANSWER: Tilt angle

66) Which among the following is not a disadvantage of rhombic antenna?

- a. Requirement of large space
- b. Reduced transmission efficiency
- c. Maximum radiated power along main axis
- d. Wastage of power in terminating resistor

ANSWER: Maximum radiated power along main axis

67) Why are beverage antennas not used as transmitting antenna?

- a. Low radiation resistance
- b. Low radiation efficiency

- c. Both a and b
- d. None of the above

ANSWER: Both a and b

68) Which kind of polarization is provided by helical antennas?

- a. Plane
- b. Elliptical
- c. Circular
- d. All of the above

ANSWER: Circular

69) According to depth of penetration, what is the percentage proportion of attenuated wave w.r.t its original value?

- a. 17%
- b. 27%
- c. 37%
- d. 57%

ANSWER: 37%

70) Linear polarization can be obtained only if the wave consists of _____

- a. E_x
- b. E_y
- c. Both E_x & E_y & in phase
- d. Both E_x & E_y & out of phase

ANSWER: Both E_x & E_y & in phase

71) When an electromagnetic wave travels from transmitter to receiver, which factor/s affect/s the propagation level?

- a. Curvature of earth
- b. Roughness of earth
- c. Magnetic field of earth
- d. All of the above

ANSWER: All of the above

72) For avoiding ground losses, better is the surface conductivity, less is the _____

- a. Attenuation
- b. Phase velocity
- c. Propagation constant
- d. Tilt angle

ANSWER: Attenuation

73) On which factors of earth does the magnitude of tilt angle depend in surface wave?

- A. Permittivity**
- B. Conductivity**
- C. Resistivity**
- D. Reflectivity**

- a. A & B
- b. C & D
- c. A & C
- d. B & D

ANSWER: A & B

74) What is the direction of varying orientation of polarized surface wave at the earth surface in a wave tilt mechanism?

- a. Horizontal
- b. Vertical
- c. Diagonal
- d. Opposite

ANSWER: Vertical

75) Which layer has the atmospheric conditions exactly opposite to that of standard atmosphere?

- a. Depression layer
- b. Regression layer
- c. Inversion layer
- d. Invasion layer

ANSWER: Inversion layer

76) If the maximum electron density for F-layer in ionosphere is 4×10^6 electrons/cm³, then what will be the critical frequency of EM wave for F-layer?

- a. 4 MHz
- b. 9 MHz
- c. 18 MHz
- d. 25 MHz

ANSWER: 18 MHz

77) According to Secant law, which frequency is greater than critical frequency by a factor of $\sec\theta_i$?

- a. MUF
- b. LUF
- c. OWF
- d. UHF

ANSWER: MUF

78) How is the effect of selective fading reduced?

- A. By high carrier reception**
- B. By low carrier reception**
- C. By single side band system**
- D. By double side band system**

- a. A & C
- b. B & D
- c. A & D
- d. B & C

ANSWER: A & C

79) In lens antenna, what kind of wave energy is transformed into plane waves?

- a. Convergent
- b. Divergent
- c. Contingent
- d. Congruent

ANSWER: Divergent

80) What is the functioning role of an antenna in receiving mode?

- a. Radiator
- b. Converter
- c. Sensor
- d. Inverter

ANSWER: Sensor

81) In radio communication link, what is the shape/nature of waves generated by transmitting antenna?

- a. Spherical
- b. Plane
- c. Triangular
- d. Square

ANSWER: Spherical

82) Which among the following elucidate the generation of electromagnetic waves?

- A. Ampere's law
- B. Faraday's law
- C. Gauss's law
- D. Kirchoff's law

- a. A & B
- b. B & C
- c. A & C
- d. B & D

ANSWER: A & B

83) If an antenna draws 12 A current and radiates 4 kW, then what will be its radiation resistance?

- a. 22.22 ohm
- b. 27.77 ohm
- c. 33.33 ohm
- d. 39.77 ohm

ANSWER: 27.77 ohm

84) Under which conditions of two unit vectors, the polarization loss factor (PLF) is equal to unity?

- a. Perpendicular
- b. Perfectly aligned
- c. Angle inclination (Ψ_p)
- d. All of the above

ANSWER: Perfectly aligned

85) Which property/ies of antenna is/are likely to be evidenced in accordance to Reciprocity theorem?

- a. Equality of impedances
- b. Equality of directional patterns
- c. Equality of effective lengths
- d. All of the above

ANSWER: All of the above

86) Self impedance of an antenna is basically _____

- a. Its input impedance during the removal of all other antennas
- b. Its impedance by taking into consideration the consequences of other antennas
- c. Both a and b
- d. None of the above

ANSWER: Its input impedance during the removal of all other antennas

87) In solution evaluation process of inhomogeneous vector potential wave equation, if points are completely removed from the source, then by which factor does the time varying field & static solution differ?

- a. e^{-jkr}
- b. e^{jkr}
- c. $e^{-jk/r}$
- d. $e^{(jk + r)}$

ANSWER: e^{-jkr}

88) The concept of magnetic vector potential finds its major application in deriving expression of magnetic field intensity especially for _____

- a. Real fields
- b. Imaginary fields
- c. Complex fields
- d. None of the above

ANSWER: Complex fields

89) A dipole carries r.m.s. current of about 300A across the radiation resistance 2Ω . What would be the power radiated by an antenna?

- a. 90 kW
- b. 135 kW

- c. 180 kW
- d. 200 kW

ANSWER: 180 kW

90) What is/are the major applications of an infinitesimal dipole that contribute/s to its analysis?

- a. Field pattern estimation due to any length of antenna
- b. Improvement in radiation resistance by increasing dipole length
- c. Both a and b
- d. None of the above

ANSWER: Both a and b

91) What is /are the advantages of using ferrite loops?

- A. Increase in Magnetic field intensity
- B. Increase in radiation resistance
- C. Decrease in Magnetic field intensity
- D. Decrease in radiation resistance

- a. A & B
- b. C & D
- c. A & D
- d. B & C

ANSWER: A & B

92) In an electrically large loop, an overall length of the loop is equal to _____

- a. $\lambda/2$
- b. λ
- c. $\lambda/10$
- d. $\lambda/50$

ANSWER: λ

93) How do the elements of an active region behave?

- a. Inductive
- b. Capacitive
- c. Resistive
- d. None of the above

ANSWER: Resistive

94) By how many times is an input impedance of a folded dipole at resonance greater than that of an isolated dipole with same length as one of its sides?

- a. 2
- b. 3
- c. 4
- d. 6

ANSWER: 4

95) Which mode of radiation occurs in an helical antenna due to smaller dimensions of helix as compared to a wavelength?

- a. Normal
- b. Axial
- c. Both a and b
- d. None of the above

ANSWER: Normal

96) A rectangular horn antenna operating at 4GHz has the wavelength of 0.075m and gain of about 13dBi. What will be its required capture area?

- a. 0.0149 m²
- b. 0.0475 m²
- c. 0.5521 m²
- d. 0.9732 m²

ANSWER: 0.0149 m²

98) What is the nature of radiation pattern of an isotropic antenna?

- a. Spherical
- b. Dough-nut
- c. Elliptical
- d. Hyperbolic

ANSWER: Spherical

99) In broadside array, all the elements in the array should have similar _____ excitation along with similar amplitude excitation for maximum radiation.

- a. Phase
- b. Frequency
- c. Current
- d. Voltage

ANSWER: Phase

100) Which among the following is regarded as a condition of an ordinary endfire array?

- a. $\alpha < \beta d$
- b. $\alpha > \beta d$
- c. $\alpha = \pm\beta d$
- d. $\alpha \neq \pm\beta d$

ANSWER: $\alpha = \pm\beta d$

101) Which mode of propagation is adopted in HF antennas?

- a. Ionospheric
- b. Ground wave
- c. Tropospheric
- d. All of the above

ANSWER: Ionospheric

102) For which band/s is the space wave propagation suitable over 30 MHz?

- a. VHF
- b. SHF
- c. UHF
- d. All of the above

ANSWER: All of the above

103) If the tower antenna is not grounded, which method of excitation is/are applicable for it?

- a. Series
- b. Shunt
- c. Both a and b
- d. None of the above

ANSWER: Series

104) In ungrounded antennas, if an excitation is applied directly across the base insulator, then on which factor/s would the voltage across the insulator depend?

- a. Power delivered to antenna
- b. Power factor of impedance
- c. Both a and b
- d. None of the above

ANSWER: Both a and b

105) Which among the following exhibits perpendicular nature in TEM wave?

- a. Electric field
- b. Magnetic field
- c. Direction of propagation
- d. All of the above

ANSWER: All of the above

106) Which equations are regarded as wave equations in frequency domain for lossless media?

- a. Maxwell's
- b. Lorentz
- c. Helmholtz

d. Poisson's

ANSWER: Helmholtz

107) Which type of ground wave travels over the earth surface by acquiring direct path through air from transmitting to receiving antennas?

- a. Surface wave
- b. Space wave
- c. Both a & b
- d. None of the above

ANSWER: Space wave

108) After which phenomenon/phenomena do the waves arrive at the receiving antenna in ionospheric propagation?

- a. Reflection or Scattering
- b. Refraction
- c. Defraction
- d. All of the above

ANSWER: Reflection or Scattering

109) According to Snell's law in optics, if a ray travels from dense media to rarer media, what would be its direction w.r.t the normal?

- a. Towards
- b. Away
- c. Across
- d. Beside

ANSWER: Away

110) Which mechanism/s is/are likely to occur in mid-frequency operation corresponding to ionospheric region?

- a. Only Reflection
- b. Only Refraction
- c. Partial reflection & refraction
- d. None of the above

ANSWER: Partial reflection & refraction

111) Which among the following plays a primary role in generation of conduction current in an ionosphere due to presence of electric field?

- a. Ions
- b. Motion of electrons
- c. Neutral molecules
- d. None of the above

ANSWER: Motion of electrons

112) Which type of wire antennas are also known as dipoles?

- a. Linear
- b. Loop
- c. Helical

d. All of the above

ANSWER: Linear

113) Which antennas are renowned as patch antennas especially adopted for space craft applications?

- a. Aperture
- b. Microstrip
- c. Array
- d. Lens

ANSWER: Microstrip

114) Which conversion mechanism is performed by parabolic reflector antenna?

- a. Plane to spherical wave
- b. Spherical to plane wave
- c. Both a and b
- d. None of the above

ANSWER: Spherical to plane wave

115) Which antenna radiating region/s has/have independent nature of angular field distribution over the distance from the antenna?

- a. Reactive near-field region
- b. Fresnel region
- c. Fraunhofer region
- d. All of the above

ANSWER: Fraunhofer region

116) The vector magnetic potential shows the inverse relationship with its _____

- a. Source
- b. Distance of point from the source (R)
- c. Both a and b
- d. None of the above

ANSWER: Distance of point from the source (R)

117) In the solutions of inhomogeneous vector potential wave equation, which component exists if the source is at origin and the points are removed from the source ($J_z = 0$)?

- a. Inward
- b. Outward
- c. Both a and b
- d. None of the above

ANSWER: Outward

118) If a half-wave dipole operates at 300 MHz with $\lambda = 0.5\text{m}$ & $D_0 = 1.643$, what will be its effective area?

- a. 0.032 m²
- b. 0.047 m²
- c. 0.65 m²

d. 0.99 m²

ANSWER: 0.032 m²

119) What is the nature of current distribution over the small dipoles?

- a. Spherical
- b. Rectangular
- c. Triangular
- d. Square

ANSWER: Triangular

120) For receiving a particular frequency signal, which tuning component must be used by the loop to form a resonant circuit for tuning to that frequency?

- a. Capacitor
- b. Inductor
- c. Resistor
- d. Gyrator

ANSWER: Capacitor

121) If the radius of loop is $\lambda/20$ in a free space medium, what will be the radiation resistance of 8-turn small circular loop?

- a. 0.7883 Ω
- b. 50.45 Ω
- c. 123.17 Ω
- d. 190.01 Ω

ANSWER: 123.17 Ω

122) What is the far-field position of an electric short dipole?

- a. Along x-axis
- b. Along y-axis
- c. Along z-axis
- d. Along xy plane

ANSWER: Along z-axis

123) What would happen if the rms value of induced emf in loop acquires an angle $\theta = 90^\circ$?

- a. Wave is incident in direction of plane of the loop with induced maximum voltage
- b. Wave is incident normal to plane of the loop with no induced voltage
- c. Wave is incident in opposite direction of plane of the loop with minimum voltage
- d. None of the above

ANSWER: Wave is incident normal to plane of the loop with no induced voltage

124) If a linear uniform array consists of 9 isotropic elements separated by $\lambda/4$, what would be the directivity of a broadside array in dB?

- a. 6.53 dB
- b. 7.99 dB
- c. 8.55 dB
- d. 9.02 dB

ANSWER: 6.53 dB

125) If the elements of a binomial array are separated by $\lambda/4$, how many shape patterns are generated with no minor lobes?

- a. 2
- b. 4
- c. 8
- d. 16

ANSWER: 8

126) What kind of beamwidth is/are produced by Chebyshev arrays for given side lobe level (SLL)?

- a. Widest
- b. Narrowest
- c. Both a and b
- d. None of the above

ANSWER: Narrowest

127) If the length of elements of an array is greater than $\lambda/2$, which will be the operating region of an array?

- a. Transmission line region
- b. Active region
- c. Reflective region
- d. All of the above

ANSWER: Reflective region

128) According to Siegel and Labus, antennas can be treated as

- (A) Earthed transmission line
- (B) Closed transmission line
- (C) Opened out transmission line
- (D) Shorted transmission line

ANSWER: Opened out transmission line

129) Triatics are

- (A) Supports for antenna conductors
- (B) Small height antennas directly mounted on ship, jeeps etc.
- (C) The towers or masts, which are used as radiators
- (D) The towers or masts, which are not used as radiators

ANSWER: The towers or masts, which are not used as radiators

130) Which one of the following statement is true for log periodic antenna?

- (A) Frequency dependent antenna
- (B) Frequency independent antenna
- (C) Directional antenna
- (D) None of the above

ANSWER: Frequency independent antenna

131) Let the directivity of a microwave antenna be 900. The maximum effective aperture will be

- (A) $716.19 \lambda^2$
- (B) $71.619 \lambda^2$
- (C) $7.1619 \lambda^2$
- (D) $71619 \lambda^2$

ANSWER: $71.619 \lambda^2$

132) Circular polarization is formed in

- (A) Helical antenna
- (B) Yagi-Uda antenna
- (C) Parabolic antenna
- (D) Dipole antenna

ANSWER: Helical antenna

133) Consider a vertical earthed antenna. This antenna will be resonant when its physical height will be

- (A) $\lambda / 4$
- (B) λ
- (C) $\lambda / 2$
- (D) 2λ

ANSWER: $\lambda / 4$

134) In loop antennas the radiation pattern formed is

- (A) Semicircle
- (B) Circle
- (C) Cardioid
- (D) None of the above

ANSWER: Cardioid

135) Which of the following statement is true for bandwidth of an antenna?

- (A) Inversely proportional to $1 / Q^2$
- (B) Directly proportional to Q^2
- (C) Directly proportional to Q
- (D) Inversely proportional to Q

ANSWER: Inversely proportional to Q

136) What should be the height of an antenna in order to consider it to be in free space?

- (A) 2λ
- (B) $> 5\lambda$
- (C) $< 3\lambda$
- (D) λ

ANSWER: $> 5\lambda$

137) Radiation efficiency of an antenna is given by

- (A) Directivity / Maximum power gain
- (B) Maximum power gain / Directivity
- (C) Radiation resistance / Antenna resistance
- (D) Antenna resistance / Radiation resistance

ANSWER: Radiation resistance / Antenna resistance

138) For Yagi-Uda array the term that is not applicable is

- (A) Good bandwidth
- (B) High gain
- (C) Folded dipole
- (D) Parasitic elements

ANSWER: High gain

139) Consider a pyramidal horn antenna whose mouth height is 10λ . Horn is fed by a rectangular waveguide with TE_{10} mode. The length of an antenna will be

- (A) 62.5λ
- (B) 12.5λ
- (C) 5λ
- (D) 42.5λ

ANSWER: 62.5λ

140) The crossed dipoles in a turnstile antenna are excited with voltages

- (A) In phase with each other
- (B) 180° out of phase with each other
- (C) 120° out of phase with each other
- (D) 90° out of phase with each other

ANSWER: 90° out of phase with each other

141) The effect of skip distance in frequency is

- (A) It decreases with increase in frequency
- (B) It increases with increase in frequency
- (C) It increases with decrease in frequency
- (D) It decreases with decrease in frequency

ANSWER: It increases with increase in frequency

142) The electromagnetic waves get absorbed in the atmosphere. The absorption of electromagnetic waves mainly depends on

- (A) Distance from the transmitter
- (B) The polarization of waves
- (C) The frequency in use
- (D) All of the above

ANSWER: The frequency in use

143) The critical frequency of a wave is 30 MHz and departing angle is 60° . The MUF is given to be

- (A) 60 MHz
- (B) 15 MHz
- (C) 120 MHz
- (D) 30 MHz

ANSWER: 60 MHz

144) The frequency for satellite communication should be

- (A) More than the critical frequency
- (B) Less than the critical frequency
- (C) Equal to the critical frequency
- (D) None of the above

ANSWER: More than the critical frequency

145) The fluctuation in the received signal strength at the receiver or a random variation in the received signal is known as

- (A) Absorption
- (B) Cycling
- (C) Fluctuation
- (D) Fading

ANSWER: Fading

146) _____ is not between F2 layer and D layer

- (A) G region
- (B) E layer
- (C) F1 layer
- (D) All of the above

ANSWER: G region

147) The abnormal variation in ionosphere is

- (A) Ionospheric storm
- (B) Seasonal variation
- (C) Diurnal variation
- (D) All of the above

ANSWER: Ionospheric storm

148) As one moves away from the transmitter, the ground waves eventually disappears because of

- (A) Maximum single hop distance limitation
- (B) Loss of line-of-sight condition
- (C) Tilting
- (D) Interference from the sky waves

ANSWER: Tilting

149) If an observation point is closely located to the source, then the field is termed as

- a. Induced
- b. Radiated
- c. Reflected
- d. Far-field

ANSWER: Induced

150) Which auxiliary functions assist in solving the radiation problem by evaluation of E & H using sources J & M?

- a. Scalar potentials
- b. Vector potentials
- c. Gradient potentials
- d. Divergence potentials

ANSWER: Vector potentials

ECE-SAEC