R2023 B.E ECE VAC ANTENNA DESIGN USING EM SIMULATOR

**MCQ Question Paper - SET A Name:**

**Course Code:** 23VA1015 **Reg.no & Roll.no:**

**Subject:** Antenna Design Using EM Simulator **Regulation:** R2023

**Branch:** Electronics and Communication Engineering

**Time:** 1 Hours

**Max Marks:** 100

**Total Questions:** 50 **Instructions:**

Each question carries 2 marks

Choose the most appropriate answer from the four options given

No negative marking

1. The Q-factor of patch antennas is generally: A Very low

B Moderate C High

D Infinite

1. In a Yagi antenna, the reflector length is: A Shorter than driven element

B Longer than driven element C Equal to driven element

D Not important

1. The main disadvantage of patch antennas is: A High profile

B Complex feeding C Narrow bandwidth D High cost

1. PEC boundary condition represents:

A Perfect Electric Conductor B Perfect Electric Current

C Partial Electric Contact D Phase Electric Coupling

1. The current distribution on a half-wave dipole is:

A Uniform B Linear

C Sinusoidal D Exponential

1. The radiation efficiency of an antenna is:

A Prad/Pin B Pin/Prad C Prad × Pin D Pin - Prad

1. The null points in a dipole radiation pattern occur:

A Perpendicular to the antenna B Along the antenna axis

C At 45° from axis

D Randomly distributed

1. Circular polarization is achieved when E-field components are: A In phase, equal amplitude

B 90° out of phase, equal amplitude C 180° out of phase

D Random phase

1. End-fire arrays radiate maximum power:

A Perpendicular to array axis B Along the array axis

C At 45° to array axis

D In all directions equally

1. A microstrip patch antenna resonates when its length is approximately: A λ/4

B λ/2 C λ D 2λ

1. The directivity of a short dipole is:

A 1.5

B 1.64

C 2.15

D 3.0

1. CST Studio Suite includes which solver types?

A Only time domain

B Only frequency domain

C Both time and frequency domain D Only eigenmode solver

1. The gain of an antenna is related to directivity by:

A G D × efficiency B G D/efficiency

C G D + efficiency D G D - efficiency

1. A large loop antenna (circumference ≈ λ) has:

A Very low radiation resistance B High radiation resistance

C No radiation

D Infinite impedance

1. The bandwidth of Yagi antenna with increasing number of elements:

A Increases B Decreases

C Remains constant D Becomes infinite

1. Probe feeding of patch antennas provides: A Low impedance

B Variable impedance by position C Only 75Ω impedance

D Infinite impedance

1. The unit of antenna directivity is:

A) dB

B Watts

C Dimensionless (numeric ratio) D Ohms

1. A small loop antenna (circumference << λ) acts as:

A Electric dipole

B Magnetic dipole C Slot antenna

D Traveling wave antenna

1. Log-Periodic Dipole Array LPDA) provides: A Narrow bandwidth

B Wide bandwidth with constant performance C High efficiency

D Omnidirectional pattern

1. Adaptive meshing in EM simulators:

A Uses fixed mesh throughout

B Refines mesh automatically for convergence C Only works in 2D

D Requires manual intervention

1. Input impedance of an antenna consists of: A Only resistance

B Only reactance

C Resistance + reactance D Admittance

1. Top loading of a monopole antenna:

A Increases frequency

B Decreases effective height C Increases effective height D Has no effect

1. The boom-to-element ratio in Yagi design affects: A Only gain

B Only bandwidth

C Both gain and bandwidth D Only impedance

1. L-shaped slots in patch antennas enable: A Single band operation

B Dual-band operation C No radiation

D Only circular polarization

1. The convergence criterion in HFSS is typically based on:

A Mesh size

B S-parameter variation C Field distribution

D Memory usage

1. The effective dielectric constant of microstrip is: A Equal to substrate εr

B Always 1

C Between 1 and εr D Greater than εr

1. E-plane pattern is the plane containing:

A Magnetic field vector B Electric field vector

C Both E and H vectors D Current distribution

1. A quarter-wave monopole antenna requires:

A No ground plane

B Infinite ground plane

C Ground plane for proper operation D Dielectric substrate

1. Array factor represents:

A Individual element pattern B Effect of array geometry C Material properties

D Frequency response

1. U-slot in patch antennas is used to:

A Reduce size

B Increase bandwidth significantly C Change polarization

D Reduce efficiency

1. HFSS primarily uses which numerical method?

A Method of Moments B Finite Element Method

C Finite Difference Time Domain D Boundary Element Method

1. The radiation resistance of a short dipole (l << λ) is proportional to:

A (l/λ) B (l/λ)² C (l/λ)³ D (l/λ)⁴

1. Directors in Yagi antenna are:

A Longer than driven element B Shorter than driven element C Equal length

D Random length

1. A slot antenna is complementary to:

A Patch antenna B Dipole antenna C Loop antenna

D Monopole antenna

1. Wave port excitation is typically used for:

A Free space radiation

B Guided wave structures C Current sources

D Magnetic sources

1. The effective area of an antenna is related to directivity by: A Ae = Dλ²/4π

B Ae = 4πD/λ² C Ae = λ²/ 4πD)

D) Ae = πD/λ²

1. For wire antenna modeling in EM simulators, the segment length should be: A λ/2

B λ/4

C λ/10 to λ/20 D λ

1. A 5-element Yagi antenna typically provides gain of approximately: A 6 dBi

B 9 dBi

C 12 dBi

D 18 dBi

1. The bandwidth of a patch antenna can be increased by:

A Decreasing substrate height B Increasing substrate height

C Using high dielectric constant D Reducing patch size

1. Method of Moments MoM) is most efficient for: A Dielectric bodies

B Metallic conductors in homogeneous media C Layered media

D Nonlinear materials

1. A half-wave dipole has a radiation resistance of approximately: A 36.5 Ω

B 73 Ω

C 50 Ω

D 300 Ω

1. Ground plane size affects monopole antenna: A Only aesthetically

B Pattern and efficiency C Only frequency

D Only impedance

1. For LPDA, typical values of spacing factor σ are: A 0.01 0.03

B 0.05 0.15 C 0.2 0.5 D 0.6 0.9

1. Aperture coupling in patch antennas provides: A Direct connection

B Electromagnetic coupling through slot C Capacitive coupling

D Inductive coupling only

1. FDTD Finite Difference Time Domain) method works in: A Frequency domain only

B Time domain only

C Both domains simultaneously D S-parameter domain

1. VSWR of 1 1 indicates:

A Maximum mismatch

B Perfect impedance matching C High reflection

D Infinite impedance

1. The input impedance of a quarter-wave monopole is approximately: A 73 Ω

B 36.5 Ω

C 50 Ω

D 300 Ω

1. The scale factor τ in LPDA design is:

A τ = Ln/Ln+1 B τ = Ln+1/Ln C τ = dn/Ln D τ = Ln × dn

1. Cross-polarization in patch antennas can be reduced by: A Increasing size

B Using slots or proper feeding C Reducing substrate height

D Using higher frequency

1. Radiation boundary conditions in EM simulation: A Reflect all waves back

B Absorb outgoing waves C Generate new waves

D Block all fields