R2023 B.E ECE VAC ANTENNA DESIGN USING EM SIMULATOR

**MCQ Question Paper - SET B 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 Mark your answers clearly in the OMR sheet

No negative marking

1. Circular polarization in patch antennas can be achieved by: A Circular patch shape

B Dual orthogonal feeds with 90° phase C Single diagonal feed

D Increasing substrate height

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

B S-parameter variation C Field distribution

D Memory usage

1. A folded dipole has approximately times the impedance of a simple dipole:

A 2

B 3

C 4

D 6

1. Mutual coupling in antenna arrays causes:

A Only impedance changes B Only pattern changes

C Both impedance and pattern changes D No effects

1. Perfectly Matched Layer PML) is used as:

A Conductive boundary

B Absorbing boundary condition C Reflective surface

D Dielectric interface

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. Antenna temperature is measured in:

A Celsius

B Fahrenheit C Kelvin

D) dB

1. A helical antenna with circumference ≈ λ operates in: A Normal mode

B Axial mode C Mixed mode

D No radiation mode

1. Smart antennas use:

A Fixed patterns

B Adaptive pattern control C Only diversity

D Single element

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

B λ/2 C λ D 2λ

1. Return loss of 10 dB corresponds to VSWR of approximately:

A 1.5

B 1.92

C 2.5

D 3.0

1. The radiation pattern of a vertical monopole over ground plane is: A Omnidirectional in all planes

B Omnidirectional in horizontal plane C Directional in all planes

D Null in all directions

1. The active region in LPDA operates around frequency where: A All elements resonate

B Only few elements near resonance are active C No elements resonate

D First element resonates

1. Microstrip antennas are also called:

A Wire antennas

B Printed antennas C Loop antennas D Horn antennas

1. S-parameters in antenna simulation represent: A Scattering parameters

B Surface parameters

C Substrate parameters D Symmetry parameters

1. The radiation pattern of an antenna is defined as: A Power distribution in near field

B Mathematical function of radiation properties vs angular position C Current distribution on antenna surface

D Impedance variation with frequency

1. Sleeve antenna is a type of: A Loop antenna

B Dipole antenna

C Monopole antenna D Helical antenna

1. Phased arrays can provide:

A Fixed beam direction

B Electronically steerable beam C Only omnidirectional pattern D No beam control

1. E-shaped patch antennas provide:

A Narrow bandwidth B Wide bandwidth

C High cross-polarization D Low gain

1. Mesh density should be highest in regions of:

A Low field values

B High field gradients C Constant fields

D No fields

1. The reciprocity theorem states that:

A Transmitting and receiving patterns are identical B Input = Output

C E H fields

D Power is conserved

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. Array tapering is used to:

A Increase gain

B Reduce sidelobe levels C Increase bandwidth

D Reduce size

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

B Moderate C High

D Infinite

1. FEKO software primarily uses:

A FEM method only B FDTD method only

C Method of Moments D All numerical methods

1. Antenna polarization refers to:

A Current direction

B Electric field orientation C Magnetic field direction D Power flow direction

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. 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. Parasitic patches in array configuration can: A Only increase gain

B Only change impedance

C Improve bandwidth and reduce coupling D Reduce efficiency

1. Far-field calculation requires:

A Only near-field data

B Current distribution data

C Both near-field and surface currents D Only impedance data

1. The half-power beamwidth is measured at: A Maximum radiation point

B 3 dB points from maximum C 6 dB points from maximum D Null points

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

A Electric dipole

B Magnetic dipole C Slot antenna

D Traveling wave antenna

1. Directors in Yagi antenna are:

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

D Random length

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

A Reduce size

B Increase bandwidth significantly C Change polarization

D Reduce efficiency

1. The main advantage of IE Integral Equation) solvers is: A No meshing required

B Only surface meshing needed C Faster than all methods

D Works for all materials

1. VSWR of 1 1 indicates:

A Maximum mismatch

B Perfect impedance matching C High reflection

D Infinite impedance

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

B Pattern and efficiency C Only frequency

D Only impedance

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

B Wide bandwidth with constant performance C High efficiency

D Omnidirectional pattern

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 unit of antenna directivity is:

A) dB

B Watts

C Dimensionless (numeric ratio) D Ohms

1. A large loop antenna (circumference ≈ λ) has: A Very low radiation resistance

B High radiation resistance C No radiation

D Infinite impedance

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. 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. HFSS primarily uses which numerical method?

A Method of Moments B Finite Element Method

C Finite Difference Time Domain D Boundary Element Method

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

B 9 dBi

C 12 dBi

D 18 dBi

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

B Electromagnetic coupling through slot C Capacitive coupling

D Inductive coupling only

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 **END OF QUESTION PAPER SET B**