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**MTECH**  
**(SEM I) THEORY EXAMINATION 2023-24**  
**ANTENNA THEORY AND DESIGN**

TIME: 3HRS

M.MARKS: 70

**Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define divergence.
b.	Write the major advantage of folded dipole antenna.
c.	List the various parameter of principle radiation pattern.
d.	Define directivity and gain of an antenna?
e.	Explain mutual coupling.
f.	Discuss solid angle and beam area.
g.	Sketch radiation pattern of helical antenna.

**SECTION B**

2. Attempt any *three* of the following: 7 x 3 = 21

a.	Explain broadband antenna in detail with example and how it differ from resonant antenna.
b.	Explain the operation & design of log periodic antenna in detail.
c.	List the important features of a Yagi-Uda antenna. Discuss any two feeding for Microstrip antenna.
d.	Explain low sidelobe narrow main beam methods for antenna synthesis.
e.	Demonstrate the fields of a short dipole.

**SECTION C**

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain multidimensional array and how it differs from phased array.
(b)	Explain radiation efficiency in detail. A thin dipole antenna of directivity 100 is $\lambda/20$ long. Its efficiency is 90% and wavelength of operation is 1 meter. What are its radiation resistance and loss resistance?

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain non uniformly excited equally spaced linear array in detail with mathematical expression.
(b)	Explain the working of a parabolic reflector antenna with the help of diagrams.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain the radiation mechanism of reflector antenna & their feed system.
(b)	Explain Dolph Chebyshev linear array for antenna synthesis.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain dual reflector antenna & calculate gain for reflector antenna.
(b)	Derive the expression for array factor of a linear array of four isotropic element spaced $\lambda/2$ a part fed with signal of equal amplitude and phase. Obtain the direction of maxima and minima.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain horn antenna in detail with radiation pattern and how it differ from helical antenna.
(b)	Derive antenna temperature and its relation with the signal to noise ratio (SNR) of the given antenna.