PAPER ID-410706

Subject Code: KEC603

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM VI) THEORY EXAMINATION 2023-24

ANTENNA AND WAVE PROPAGATION

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a.	Illustrate the gradient of a vector in cylindrical coordinate system.	02
b.	Define irrotational fields	02
c.	Discuss electric field intensity.	02
d.	Illustrate Maxwell's equation for electric field.	02
e.	Discuss solid angle and beam area	02
f.	Describe the Beam Area of an Antenna and give the formula.	02
g.	Examine the major advantage of folded dipole antenna.	02
h.	Evaluate the maximum range of a tropospheric transmission for which the transmitting antenna height is 100ft and receiving antenna height is 50 ft.	02
i.	Determine critical frequency for reflection at vertical incidence if the maximum value of electron density is $1.24*10^{-6}cm^{-3}$?	02
j.	Evaluate the maximum electron concentration of the D layer and E layer has critical frequencies 2.5MHz and 8.4MHz respectively.	02

SECTION B

2. Attempt any *three* of the following: **3 x 10 = 30**

a.	Evaluate vector A= ρzsinϕaρ+ 3ρcosϕaϕ+ρsinϕcosϕ azinto Cartesian coordinate system.	10
b.	Demonstrate the magnetic field due to a finite line conductor having current I.	10
c.	Derive antenna temperature and its relationship with the signal to noise ratio (SNR) of the given antenna.	10
d.	Demonstrate vertical antenna and folded dipole antennas	10
e.	Demonstrate critical frequency, multihop propagation and skip distance for sky wave propagation	10

SECTION C

3. Attempt any *one* part of the following: **1 x 10 = 10**

a.	Define a differential length element in vector calculus and explain its significance.	10
b.	Evaluate divergence for P= yzax + 4xyay + yaz at point (1, -2, 3). Also evaluate curl for the same and compare results.	10

4. Attempt any *one* part of the following: **1 x 10 = 10**

a.	A circular ring of radius a carries a uniform charge ρ_L C/m and is placed on the xy-plane with axis the same as the z-axis. Demonstrate: (a) The electric field due to this ring at a height h along its axis. (b) What value of h gives the maximum value of electric field? If the total charge on the ring is Q. Find electric as radius of the ring tends to zero?	10
b.	Design a 3 elements yagi-uda Antenna. Demonstrate the length of elements and the distances between them.	10

5. Attempt any *one* part of the following: **1 x 10 = 10**

a.	Explain fields from oscillating dipoles. Describe directivity of an antenna and find the relationship between directivity and gain of antenna	10
b.	Illustrate effective aperture and effective height of an antenna. Also discuss antenna temperature.	10

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6. Attempt any *one* part of the following: 1 x 10 = 10

a.	Evaluate electric field due to array of two λ/2 driven element when current of equal amplitude and same phase is flowing in antennas	10
b.	Demonstrate the fields of a short dipole.	10

7. Attempt any *one* part of the following: 1 x 10 = 10

a.	Illustrate the skip distance for region between transmitter and receiver using sky wave propagation, when curvature of earth is taken into consideration	10
b.	Derive equation for maximum usable frequency for both flat and curved earth condition.	10