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International Islamic University Chittagong (IIUC)
Department of Electronic and Telecommunications Engineering
Mid Term Examination

Program: B.Sc (Engg)

Course Code: ETE- 3649

Time: 1 Hour 30 mins

Semester: Spring 2022

Course Title: Antenna and Propagation

Total Marks: 30

[Answer any three questions of the following sets]
[Symbols used in the questions carry their usual meanings]

1. a) Draw the 2D view of radiation pattern of an isotropic antenna. CO1 2
b) Two antenna have their field patterns given by $E(\theta) = \cos^2\theta$ and $E(\theta) = \sin^2\theta$ respectively for $0 \leq \theta \leq 90^\circ$. Estimate: CO1 5
 1. Half Power Beamwidth (HPBW) of each antenna.
 2. The pattern that have more directivity.
- c) Defining directivity, estimate the directivity of an antenna whose radiation pattern if half of a sphere. CO1 3
2. a) Derive equations of E_θ and H_ϕ for an Alternating Current Element.. CO2 6
b) Explain how radiation pattern and input impedance changes with the length of a dipole antenna. CO2 4
3. a) Differentiate between Uniform Linear Array, Dolph Chebyshev Array and Binomial Array with respect to Directivity and Side Lobe CO2 3
b) Derive the resultant electric field for two isotropic point sources with same amplitude and opposite phase that are separated by a distance of $\lambda/2$. CO2 3
c) Derive the normalized Electric Field for N element array and show that its maximum value depends on the number of array elements. CO2 4
4. a) Assume that we have three scenarios, (a) Charge is static, (b) Charge is moving with a constant velocity and (c) Charge is accelerated through a straight wire. Select the scenario(s) that have the potential of causing radiation. CO1 1
b) Differentiate between Total Efficiency and Antenna Efficiency. CO1 2
c) Evaluate polarization loss for the following polarization scenarios: CO1 4
 - i. Tx – Horizontal, Rx – Horizontal
 - ii. Tx – Vertical, Rx – Circular
 - iii. Tx – Horizontal, Rx – Circular
 - iv. Tx – Horizontal, Rx – Vertical.
- d) Evaluate Two advantages and Two disadvantages of using higher frequency in wireless communication. CO1 3