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International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunications Engineering

Final Examination

Program: B.Sc (Engg.)

Course Code: ETE- 3629

Time: 2 Hours 30 mins

Semester: Spring, 2019

Course Title: Antenna and Propagation

Total Marks: 50

[Symbols used in the question carry their usual meanings]

Group – A

[Answer any two questions of the following sets]

1. a) Explain the necessity of Folded Dipole antenna. 2
b) Point out the basic theory behind making the antenna broadband. 2
c) Explain how unidirectional and bidirectional patterns can be achieved by V-Antenna. 4
d) Design a 3 element Yagi Uda antenna to operate at a frequency of 172MHz. 2
2. a) Explain how different design parameters of Microstrip Patch Antenna control different output parameters. 4
b) Point out the differences between Half Wave Dipole and Slot Antenna. 2
c) Explain how a Lens Antenna operates. 2
d) For a Paraboloid Reflector Antenna with 1m diameter operating at 2GHz, Determine the power gain in dB. 2
3. a) Design a Rhombic Antenna to operate at a frequency of 30MHz, with the angle of elevation of 30° with respect to ground. 3
b) Design Yagi-Uda antenna of six elements to provide a gain of 12dBi if the operating frequency is 200MHz. 3
c) Design a log periodic antenna to obtain a gain of 9dB and to operate over a frequency range of 125MHz – 500MHz. [Assume $\tau = 0.861$, $\sigma = 0.162$] 4

Group - B

[Answer any three questions of the following sets]

4. a) List the different bands of Radio frequency with Band names and Frequency range. 3
b) Point out the principal parameters of any medium that affect the propagation of EM wave through that medium. 2
c) Differentiate between: 3
I. Standing Wave and Travelling Wave
II. Uniform Plane Wave and Non Uniform Plane Wave
d) List the sources of External Noise of Radio Wave Propagation. 2
5. a) Explain the impact of Finite Conductivity of earth on the Vertical Radiation Pattern of the Vertical Dipole. 3
b) Explain why waves for ground wave propagation are normally vertically polarized. 2
c) Evaluate the value of surface impedance if $\sigma = 5 \times 10^{-5}$, $\epsilon_r = 15$, $\mu = \mu_0$ at (a) 5 kHz, (b) 50 5

kHz, and (c) 500 kHz. Discuss what can you infer from the results obtained.

6. a) Discuss the effects of imperfect earth on space wave propagation. 3
 - b) By plotting the Refractive Index Profiles with respect to height, explain under which circumstances are Surface and Elevated Ducts created. 5
 - c) The transmitting and receiving antennas with respective heights of 49m and 25m are installed to establish communication at 100 MHz with a transmitted power of 100 watts. Determine the LOS distance. 2
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7. a) Deriving an equation for refractive index of different layers of Ionosphere, explain the mechanism of bending of radio wave in Ionosphere. 6
 - b) A sky wave is incident on D layer at an angle of 30° . Determine the angle of refraction if the frequency of the transmitted wave is 50MHz. 4