

International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunication Engineering

Final Examination

Program: B.Sc (Engg)

Course Code: ETE-3629

Time: 2 Hours 30 mins

Semester: Spring, 2018

Course Title: Antenna and Propagation

Total Marks: 50

Group – A

[Answer *any two questions* from the following sets]

1. a) Compare between folded dipole and half-wave dipole antenna. 2
b) Point out the basic theory behind making the antenna broadband. 2
c) As an antenna engineer, you are given a choice to choose between Rhombic antenna and V antenna. Size of the antenna is of no concern. Antenna should be unidirectional and high directivity is required. Choose an antenna. Defend your choice with proper justification. 4
d) Design a 3 element Yagi Uda antenna to operate at a frequency of 172MHz. 2
2. a) Explain Babinet's principal. How do we analyze slot antenna with the help of Babinet principal? 4
b) Differentiate between E-Plane, H-Plane and Pyramidal Horn antenna. 2
c) Design a log periodic antenna to obtain a gain of 9dBi and to operate over a range of 125MHz-300MHz. ($\tau = 0.861$, $\sigma = 0.162$). 4
3. a) What are the problems associated with long wire antenna? 2
b) Discuss why Cassegrain feed for a parabolic reflector is better than other feeds. 2
c) Design a Microstrip Patch antenna to operate at a frequency of 2.4GHz. Use a material of your choice. [Calculate L, W and h] 4
d) Compile some applications of lens antenna. 2

Group - B

[Answer *any three questions* from the following sets]

4. a) Why does ground wave propagation normally use vertical polarization? Explain showing the equivalent circuit of earth. 3
b) Compile the sources of noises during wave propagation. Point out which of them are more important with respect to wave propagation. 3
c) If the critical frequency of an ionized layer is 1.5MHz. Find the electron density of the layer permittivity for that layer for an EM wave of 50MHz. 4
5. a) Briefly discuss the effects of earth's curvature, polarization, mountains and building on the field strength of space wave propagation. 5
b) Evaluate the value of surface impedance if $\sigma = 5 \times 10^{-5}$, $\epsilon_r = 15$, $\mu = \mu_0$ at (a) 5 kHz, 5

(b) 50 kHz, and (c) 500 kHz. Discuss what can you infer from the results obtained.

6. a) Even though there are ground wave and sky wave propagation, explain why we still need space wave propagation. 2
- b) Discuss the effects of imperfect earth on space wave propagation. 3
- c) Explain Tropospheric and Ionospheric scattering in brief. 3
- d) Determine the maximum distance at which signal from transmitting antenna with 144m height would be received by the receiving antenna of 25m height. 2
7. a) Explain the relation and difference between Critical Frequency and MUF. 4
- b) Differentiate between Skip Distance and Skip Zone. 2
- c) 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