King Saud University
College of Engineering
Electrical Engineering department

First Mid Term Exam EE423 7/1/1418

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1) State and briefly explain three different categories of radio wave propagation.

2) Explain how ground and sky wave interference can occur. What are the different regions associated with this situation.

3) If you are to chose a frequency for a communication link , what factors will be for choosing VLF (3-30KHz) and what factors will be against that. What frequency will you chose for a two way radio over 100 Km range.

4) A satellite to earth communication link at F=4GHz uses 1m and 4m diameter paraboloidal reflector antennas respectively, with illumination efficiency of 0.54 for each. If the satellite antenna transmit 2 W and the distance is 36000 KM find the available power at the matched receiver. What is the electric field intensity at the receiving antenna.

5) One vertical monopole is 100m high. It is supplied with 100 A (rms) base current. Find the radiated power and the unattenuated field at 1km. a) f=300 kHz b) f= 1MHz .

6) A ground wave propagation path consist of 150 Km of land with (σ=10mS/m, ε =4) followed by 100 km of sea (σ =4000 mS/m, ε=80). F=700KHz and E_1= 4500 mV/m. Find the electric field strength at the receiver

7) Find the path loss, the received power , field strength at receiver and signal to noise ratio for a sky wave radio link with : P_r=40 dBW, f=10 MHz, d= 2500 Km, h=300 Km. R_{12}=110, F_H=1.25, latitude φ=50 , time= December noon with χ = 77, transmitting and receiving antenna gains are 10 dB. Bandwidth of the channel is 3.4 kHz. and F_{am}=33 dB. Also Define F_{am}.

Determine the electric field strength at distance d=10 Km a land with conductivity of 1 mS/m and relative permitivity of 7. At F=3MHz and E_1= 1500mV/m.

1) What is the effect of the complex dielectric constant on the wave passing through the ionosphere.

Define the skip distance

What does the term " required protection ratio is 200:1 " mean. Explain by an example.

P 1.6

Define the critical frequency in sky wave propagation and drive its expression.

Define MUF and OUF

What part of wave parameters defines its polarization. Describe a simple method of generating or Receiving a circularly polarized wave.