Final Exam(T181) EE423 19/8/1418

Solve five (5) questions only

Q.1

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

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

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

Four)Define the critical frequency in sky wave propagation.

Q.2

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

Two)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 .

Q.3

One)Acommunication link between moon and earth at f=2GHz uses 2m and 20m diameter paraboloidal reflector antennas, respectively, both with illumination efficiency 0.54 if the moon-based transmitter radiate Pt=100W and the propagation path is 400,000 Km long, what power is available at the matched receiver.

Two)What are the magnitudes of the maximum usable frequency MUF and the optimum Working Frequency OWF associated with an HF radio link extending over 2500 Km via reflection from the F2 layer for the summer and winter seasons at noon time and for the maximum and minimum sunspots. Estimate the path loss for the first case in (a) at height of 300Km, assuming R_{12}=100 F_H=1.25 MHz, latitude =50 and x=65^o .

Q.4

One)What should be the distance d between two element broadside array in order to get a null at 30^o from broadside.

Two)Two half wave dipoles in broad =side array, separated by $d=0.2\lambda$ are each supplied with 4W when $V_1=V_2$ What current is supplied to each dipole? What is the field strength at distance r=1 Km in direction $\theta=45$ from the array broad side direction.

Q.5

One)what is the basic idea of the monopulse radar.

Two)If you have a radar transmitter of peak power of 300KW, the unambiguous range is 500Km, the transmitter BW=1MHz what is the average power, what is the range resolution

Three)A radar system operating at 3GHz with Gt=Gr=10dB. The maximum detection range is 100Km. Find the minimum detectable target cross-section if the minimum detectable signal strength is 1pw.

Q.6

One)Explain how a radar system can be used to detect moving targets over a large clutter.

Two)Explain the effect of pulse integration in a pulse radar system, i.e., how can it increase signal to noise ration of the return signal. What is the difference between coherent and non coherent integration.

Three)A carrier-wave Doppler radar at 1GHz is used to measure the velocity v of an oncoming vehicle. It is required to operate with $0<v<150$mph. What is the highest Doppler frequency shift it will need to process.

One)A carrier-wave Doppler radar at 1GHz is used to measure the velocity v of an oncoming vehicle. It is required to operate with $0<v<150$mph. What is the highest Doppler frequency shift it will need to process. What is the sensitivity of the device in terms of f_d per mph why is f_t=10Ghz better for this particular application.

An air plane uses a radar to monitor its speed and height. The radar is in the air plane front, its beam make 45^o with the horizon find an equation relating the Doppler frequency to the airplane speed

Drive the radar equation