Time: 3 hrs.   Full Marks:70

Answer any **Five** questions

(All questions carry equal marks)

1. a) Derive Friis transmission equation for free space. Express the equation in decibel. How would you find the field strength at a receiving antenna in free space propagation conditions?

   b) Calculate the open-circuit voltage induced in a ½ λ dipole when 10 W at 150 MHz is radiated from another ½ λ dipole 50 Km. distant. The antennas are positioned for optimum transmission and reception.   10+4=14

2. a) Find the expression for Electric field at a receiving antenna in terms of height of the transmitting & receiving antenna and separation distance between them while considering its operation in the tropospheric region.

   b) What do you mean by Radio Horizon? Calculate the maximum range for a tropospheric transmission for which the antenna heights are 330m and 180m.   [8+6]

3. a) Discuss the three basic propagation mechanisms which impact propagation in a mobile communication system..

   b) Explain the factors which influence small scale fading. Discuss typical types of Small scale fading. in the light of Multipath time delay spread and Doppler spread.   3+4+7

4. a) Explain networking as resource allocation with a three layered model for wireless & wirelined network. Discuss briefly the taxonomy of current practice of the wireless networks with suitable exhibits.

   b) List the common technical elements whose efficient realization constitutes the area of wireless networking.   12+2

5. a) What do you mean by coherence time and coherence bandwidth? Discuss Okumara model for Outdoor propagation. How Hata Model can be developed from this model?

   b) Find the mean path loss using Okumara model for d=50 km transmitting and receiving antenna height 100m and 10m in a suburban environment. If the base station transmitter radiates an EIRP of 1 KW at a center frequency of 900MHz, find the EIRP (dBm) and the power at the receiver where gain at receiving antenna is 10dB.   · 10+4

6. a) Deduce modified Radar equation taking receiver noise into consideration.
   b) Briefly discuss on the system losses of a radar. How it can be reduced?
   c) What do you mean by RCS ?   [6+6+2]

7. What is the Telemetry system of a satellite? How telemetry data are sent to a satellite? Explain with necessary diagrams, the telemetry, tracking, command and monitoring system at a controlling earth station for a satellite .What types of antennas are used in satellite?

3+3+5+3

8. Write short notes on the followings (any two):
   a) INTELSAT V communication system
   b) Satellite Link Design
   c) MTI Radar
   d) Orbit, Look angle, orbital velocity and azimuth & orbital   inclination.
   e) Wireless Application Protocol