FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
ELECTRICAL/ELECTRONIC ENGINEERING DEPARTMENT
COE 318- COMMUNICATION PRINCIPLES. TIME 3:00HRS
RAIN SEMESTER 2012/2013 EXAMINATIONS
INSTRUCTION: ANSWER ANY 5 QUESTIONS

1a. Why digital modulation?

1b. A computer terminal is connected to a computer through a voice-grade telephone line having a bandwidth of 3000Hz and an output signal-to-noise ratio of 10dB. Assume that the terminal has 128 characters and uses a binary scheme. Find the channel capacity in character per second using Shannon's equation. Also determine the signalling level and the number of bits necessary to produce the required possible condition or signalling level.

2a. What advantage do OOK has over ASK?

2b.Typically in digital telephony where PCM is widely used, the sampling rate is 8KHz (higher than the voice baud) and quantization uses 256 levels (i.e. each sample is mapped into an 8-bit PCM code). Show all the values and the binary sequence for the first five values assume the sampling rate is reduced to 3 KHz. What is the consequence of this assumption?

3a. Define the term critical frequency and maximum useable frequency. How does M.U.F relate to critical frequency and angle of incidence?

3b. Write briefly on sky wave propagation.

3c. A space wave propagation has an antenna of height 120m above ground. The transmitting signal is 10MHz.The receiving antenna is 10km away from the transmitter and 100m high. If the transmitted field strength is 15000V/m. Calculate the total received signal strength.

3d. Calculate the maximum useable frequency of a sky wave link if the angle of incidence is 45° and the maximum electron density of the layer used is 4×10^{11} electrons/m^2

4a. Explain the following terms used in antenna operations: (i) polarization (ii) radiation pattern (iii) isotropic radiation (iv) front-to-back ratio (v) parasitic element

4b. A parabolic reflector is to have a gain of 1000. Calculate the diameter required if the operation is at (i) 3GHz (ii) 300MHz. (iii) Comment on your answer and (iv) Determine the near and far fields of this antenna at the given frequencies.

4c. Briefly describe a pyramidal type Horn antenna

5a. Differentiate between Broadside and End-fire array antennas

5b. Show the current and voltage distribution of a half-wave dipole antenna. Sketch the radiation pattern of this antenna (i) in a vertical plane, if a reflector element is included and (ii) in a horizontal plane if both director and reflector elements are present. What is the most important consideration that determines the selection of this antenna's feed point?