1. The input signal to a telecommunications receiver consists of $100\,\mu w$ of signal power and $1\,\mu w$ of noise power. The receiver contributes an additional $100\,\mu w$ of noise, N_R, and has a power gain of 20dB. compute (1)the input SNR,(2) the output SNR.   (10%)

2. Write the equation for an AM waveform (sine-wave modulation) in its entirely, and identify the upper-and lower-sideband and Carrier frequency components.   (10%)

3. Depict Manchester encoding technique to describe the self-clocking codes.   (10%)

4. Assume that a subscriber loop has a total DC resistance of $960\,\Omega$. This includes a telephone resistance of $130\,\Omega$. compute the following(assume68°F)：

   (1) subscriber loop current.

   (2) Off-hook DC potential measured at the telephone.   (10%)

5. What are the three classifications of multiplexing? Briefly define their differences.   (10%)

6. What are the three switching technologies utilized by the PSTN for data transmission.   (10%)

7. In Ethernet LAN, define CSMA/CD as access control method.   (10%)

8. For ISDN, describe the Basic Rate Interface(BRI) and primary Rate Interface(PRI). (10%)

9. Draw the B8ZS transmitted bit stream for a string of eight consecutive 0s assuming that the pulse preceding the eight Os is a positive 1 pulse. (10%)

10. Describe the Quadrature Amplitude Modulation(QAM) technique which is employed in high-speed modems. (10%)