

編號： 424 系所：電信管理研究所乙組

科目：通訊導論

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

1. The Fourier transform of a signal $x(t)$ is defined by $X(f) = \text{sinc}(f) = \sin(\pi f)/(\pi f)$. Find the autocorrelation function, $R(\tau)$, of the signal $x(t)$. (20%)
2. We want to transmit a video file with 100 Mbytes through a data communication channel. Assume 64-QAM modulation is adopted. If the baud rate of the transmission signal is 100kHz, please find the time required to transmit the video file. (20%)
3. A line has a signal-to-noise rate of 30dB and a bandwidth of 4MHz. What is the maximum data rate supported by this line? (20%)
4. A transmitter has an output of 50W at a carrier frequency of 3 GHz. Assume that the gain is 30 dB for transmitting antenna and 10 dB for receiving antenna.
 - (a) Calculate the EIRP of the transmitted signal in units of dBW. (10%)
 - (b) If the receiving antenna is located 80 km from the transmitting antenna over a free-space path, find the available signal power out of the receiving antenna in units of dBW. (10%)
5. A PCM system uses a uniform quantizer followed by a 7-bit binary encoder. The bit rate of the system is equal to 50×10^6 b/s. What is the maximum message bandwidth for which the system operates satisfactorily? (20%)

Note: $\log_{10}(2)=0.3010$, $\log_{10}(3)=0.4771$, $\log_{10}(5)=0.6990$, $\log_{10}(7)=0.8451$,

$\ln(2)=0.6931$, $\ln(3)=1.0986$, $\ln(5)=1.6094$, $\ln(7)=1.9459$,

$\log_{10}(e)=0.4343$, $\log_a(b)=\log_x(b)/\log_x(a)$