一、 If $x(t)$ is a periodic signal, please prove Parseval theorem; that is, $P(t)=\frac{1}{T_0}\int_{T_0}|x(t)|^2dt=\sum_{n=-\infty}^{n=\infty}|X_n|^2$, where X_n is the Fourier coefficient. (20%)

二、 Consider the low-pass RC filter shown in Fig. 1. Find its transfer function and 3 dB bandwidth. (20%)

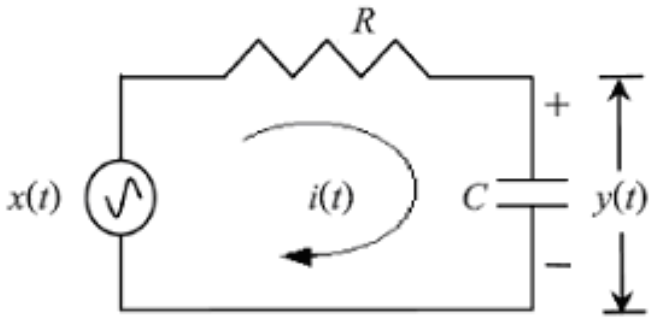

Fig.1

三、 Explain the following terms:

1. DSB (double side band)
2. Image frequency
3. sampling theorem
4. AWGN (additive white Gaussian noise)
5. PSD (power spectral density)

(30%)

四、 Please illustrate a block diagram of superheterodyne (超外差) receiver, and explain its functionality. (15%)

五、 Please illustrate a block diagram of a digital transmission system; both transmitter and receiver. (15%)