

銘傳大學 97 學年度研究所碩士班招生考試

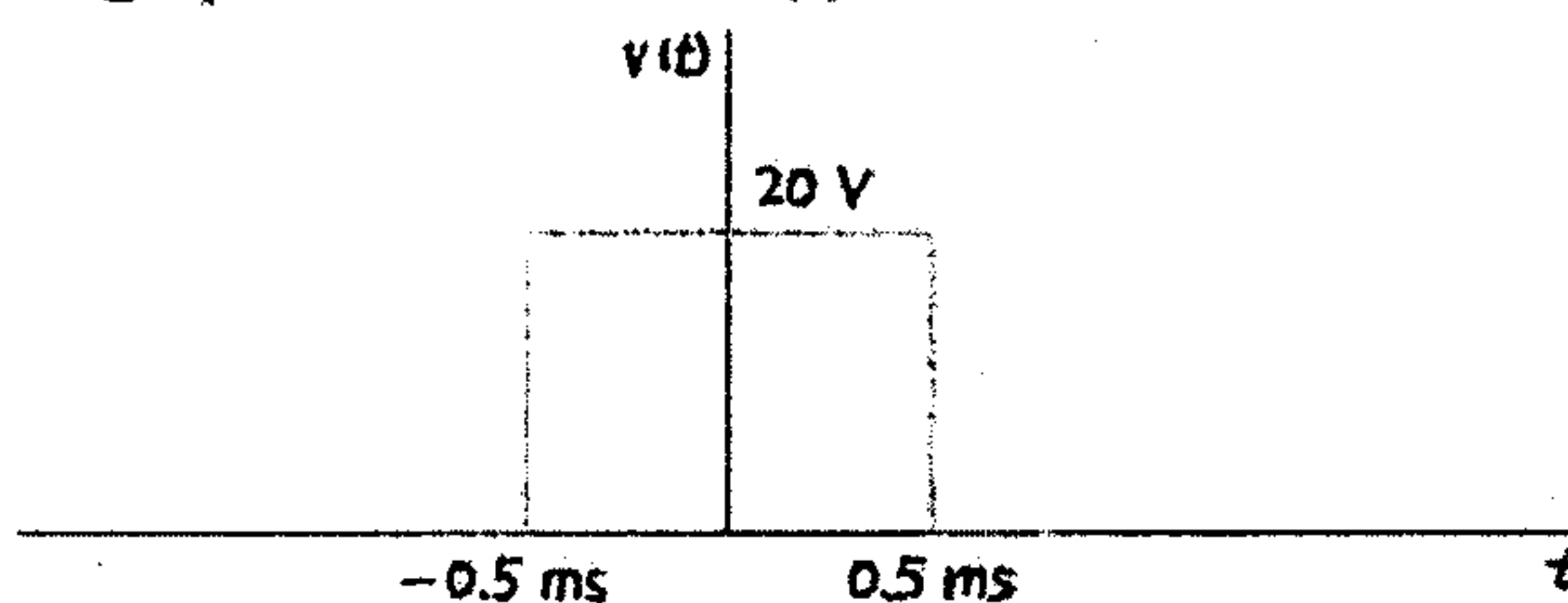
電腦與通訊工程學系碩士班

通訊概論試題(第三節)

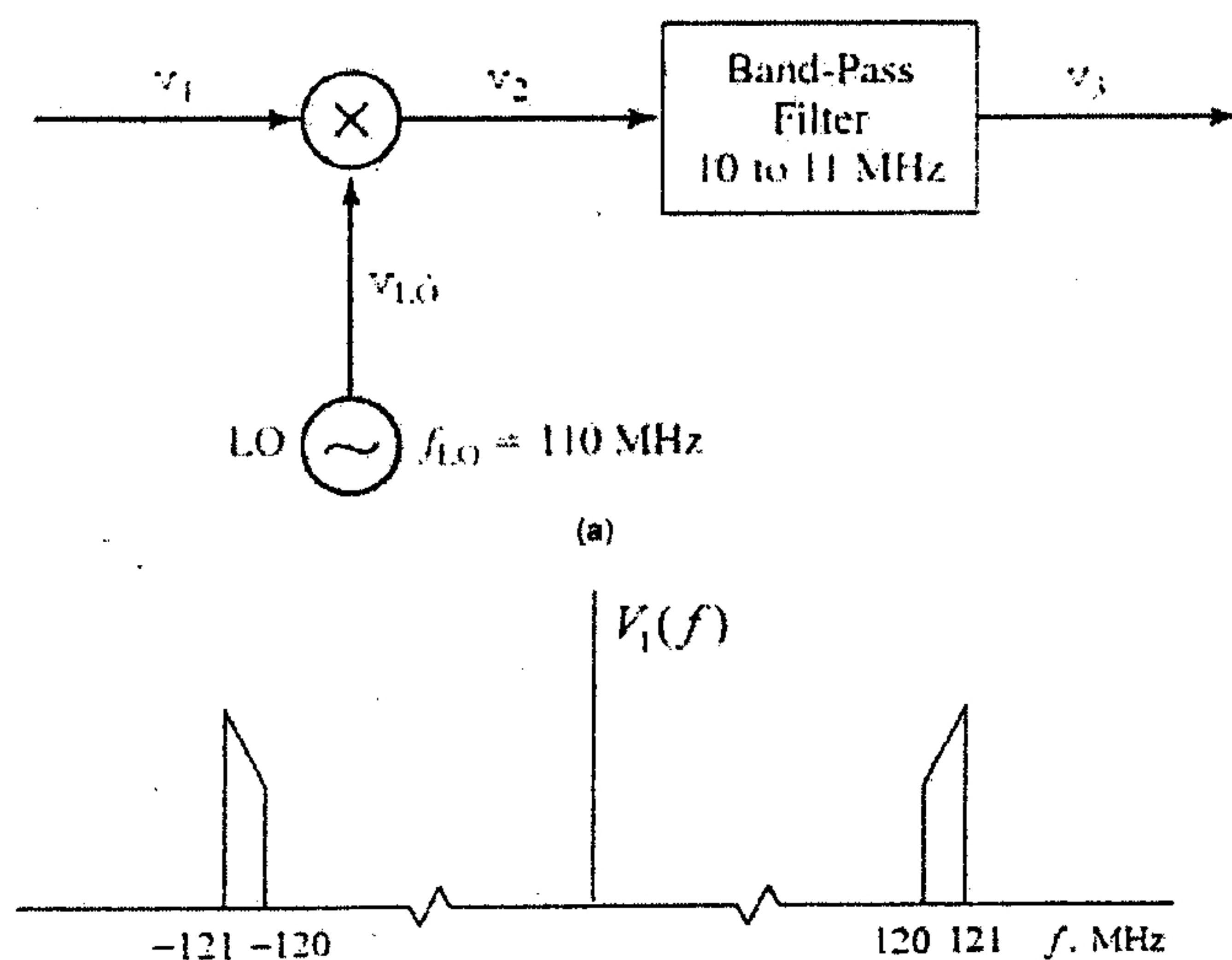
(第 1 頁共 2 頁) (限用答案本作答)

☒ 可使用計算機 ☐ 不可使用計算機

1. (a) If  $x(t) = 20\cos(2\pi ft + \theta)$  indicates the voltage (in volts) across a  $1\Omega$  resistor, what is the power represented by dBW and dBm? (10%)
- (b) If the signal  $x(t)$  is amplified with a gain 10, what is the output power (represented by dBW and dBm) of amplifier? (10%)
2. Refer to the nonperiodic voltage pulse waveform  $v(t)$  shown below.



- (a) Find the Fourier transform  $V(f)$ . (10%)
- (b) Determine the amplitude spectrum at the following values of  $f$ : 0, 500 Hz, and 1 kHz (That is, find  $V(0)$ ,  $V(500)$ , and  $V(1000)$ ). (15%)
3. A frequency conversion system is shown in the following, and the spectrum of the input signal is also shown.



- (a) For a local oscillator (LO) frequency of 110 MHz, sketch the spectra at the output of the mixer ( $v_2$ ). (5%)
- (b) Sketch the spectra at the output of the band-pass filter ( $v_3$ ). (5%)

本試題兩面印刷



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通訊概論試題(第三節)

(第 2 頁共 2 頁) (限用答案本作答)

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4. A single-conversion superheterodyne receiver is tuned to an RF frequency of 40 MHz, and the IF frequency is 5 MHz. If the LO frequency is higher than the RF frequency, determine (a) the LO frequency, and (b) the image frequency. (10%)

5. A single-tone angle-modulated signal is given by

$$v(t) = 80 \cos[2\pi \times 10^8 t + 20 \sin(2\pi \times 10^3 t)]$$

Assume the signal is an FM signal. Determine the (a) unmodulated carrier frequency, (b) modulating frequency, (c) modulating index, and (d) maximum frequency deviation. (e) Determine the average power dissipated in a 50-Ω resistor. (25%)

6. A digital communication system is being designed with the goal of transmitting 160 kb/s over a baseband channel having a bandwidth of 20 kHz. Determine (a) the number of encoding levels required and (b) the minimum signal-to-noise ratio required in the channel. (10%)

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