电子科技大学 2019 -2020 学年第 2 学期　期末（B）　试卷

考试科目：信号与系统　考试形式：一页纸开卷　考试日期：2020 年 9 月 日

本试卷由 八 部分构成，共 8 页。考试时长：120 分钟

成绩构成比例：平时成绩 50 %，期末成绩 50 %

题号	一	二	三	四	五	六	七	八	合计
得分									

得 分

一、计算题（10 分）

For an LTI system, its unit step response is given in Figure 1.

(a) Please sketch its unit impulse response.

(b) If the system input is shown in Figure 2, please determine the system response.

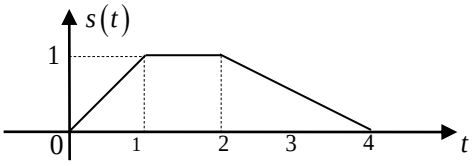

Figure 1

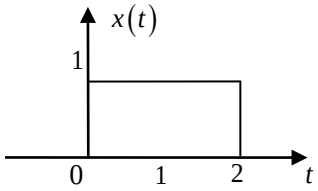

Figure 2

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得 分	二、计算题（10 分）

Determine the output of the system in Figure 3，the input $x[n]=u[n]$**,**

and $h_1[n]=2\delta[n-2]-3\delta[n+1]$, $h_2[n]=\delta[n-1]+2\delta[n+2]$

$h_3[n]=6\delta[n+3]\ +2\delta[n-1]-2\delta[n-3]$

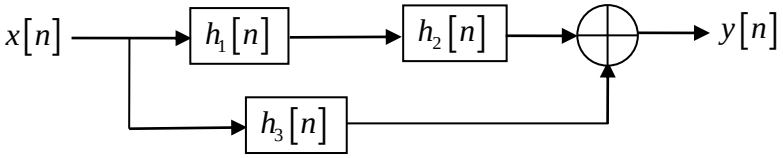

Figure 3

得 分

三、计算题（10 分）

Consider a continous-time system with input $x(t)$ and output $y(t)$ related by $y(t)=\int_{-\infty}^{2t} x(\tau-2)d\tau$, is this system

(a)Linear? (b) Time-invariant? (c) Memoryless? (d) Causal? (e) Stable?

得 分

四、计算题（12 分）

Given a system as shown in Figure 4.

(a) Determine the frequency response $H(j\omega)$ of this system;

(b) Determine the unit impulse response $h(t)$ of this system and sketch $h(t)$.

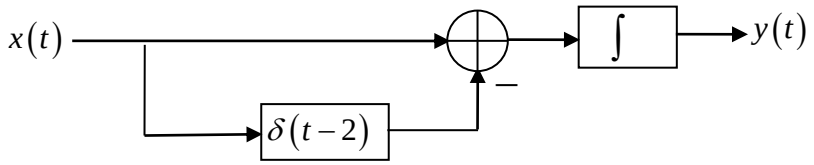

Figure 4

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得 分

五、计算题（12 分）

(a) Let $x(t)=2\dfrac{\sin^2(t)}{\pi t}$ **,Compute its spectrum** $X(j\omega)$ **and sketch the amplitude** $|X(j\omega)|$ **and the phase** $\measuredangle X(j\omega)$.

(b) Let $y(t)=\dfrac{dx(t)}{dt}$ **,Compute the energy** $E_y=\int_{-\infty}^{+\infty}|y(t)|^2dt$ **.**

得 分

六、计算题（14 分）

As shown in Figure 5, the Fourier transform of the input $x(t)$ is $X(j\omega)$. Determine and stekch the spetrum at place A, B, C and D. Determine the relationship between the input $x(t)$ and the output $y(t)$.

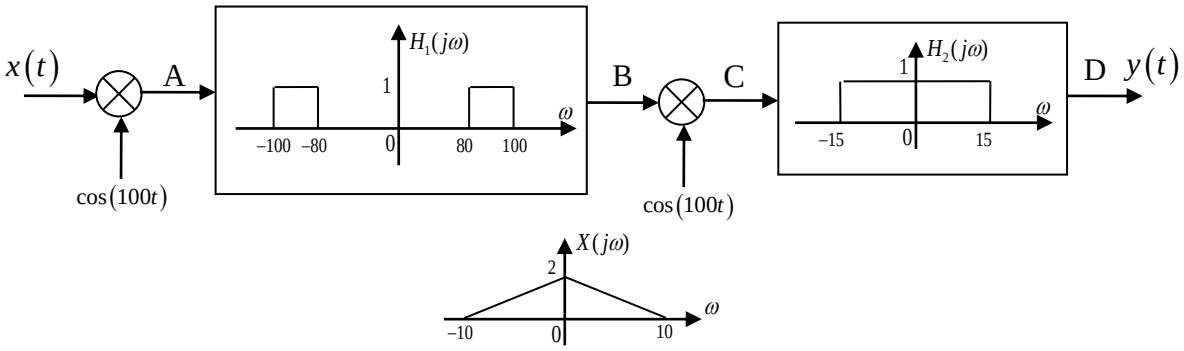

Figure 5

得 分

七、计算题（16 分）

In the circuit shown in Figure 6, $x(t)$ is the input voltage. The voltage across the capacitor C is considered to be the system output $y(t)$.

(a) Determine the differential equation relating $x(t)$ and $y(t)$. Is it a LTI system?

(b) Determine the system function $H(s)$, and plot its pole-zero pattern.

(c) Is the system a highpass or lowpass or bandpass filter?

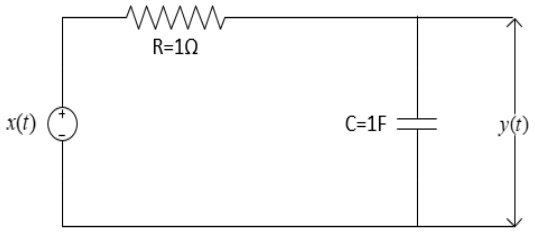

Figure 6

得 分	

八、计算题（16 分）

The input $x[n]$ and output $y[n]$ of a causal system are related through the block-diagram representation shown in Figure 7.

(a) Find the system function $H(z)$.

(b) Draw the pole-zero diagram.

(c) Compute the output of this system, if the input signal is $x[n]=2+2\sin(\frac{\pi n}{6})$

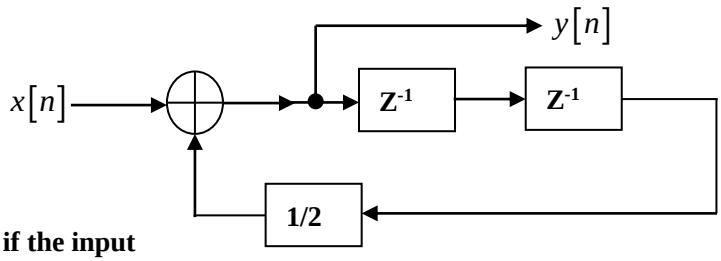

Figure 7