

حلقة تامة صيدوع

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Menoufia University
Faculty of Electronic Engineering
Industrial Elec. and Control Eng. Dept.
Mid-Term Exam, for 3rd year



Digital Control Systems (ACE323)
Time Allowed: 1 H
06 April 2019
Total marks: 20 marks

الإسم : _____ الفصل : _____ الدرجة : _____

Answer the following two questions:-

1-a) Draw a block diagram for a general configuration of digital control system.

[4 marks]

2-b) Find the output $C(z)$ for the cascade of the following two analog systems with a sampled unit ramp input, if the systems are separated by a sampler.

$$G_1(s) = \frac{1}{s}$$

$$G_2(s) = \frac{10}{s+6}$$

[4 marks]

Best wishes,
Dr. Mohamed Hamdy

1-b) Find the difference equation for the system shown in Fig. 1, where the input $u(k) = \begin{cases} 1, & k = 2, 3, \dots \\ 0, & \text{otherwise} \end{cases}$ and the output $y(k) = \begin{cases} 2(k) - 2(0.5)^k, & k \geq 0 \\ 0, & k < 0 \end{cases}$. Assume all the initial conditions are equal zero.

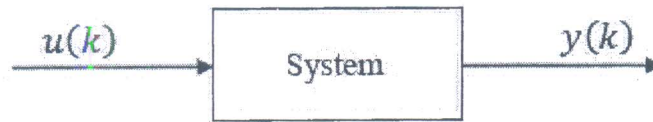


Fig. 1

[6 marks]

2-a) Consider the following linear difference equation:

$$y(k + 2) + 0.7 y(k + 1) + 0.06 y(k) = u(k), \quad \text{for } k \geq 0$$

where $y(k)$ is the output with initial conditions $y(0) = 0$ and $y(1) = 2$ and where $u(k)$ represents a unit impulse input.

- a) Determine the output $y(k)$.
- b) Find the final value $y(\infty)$.

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