

Index Number: UE20016518 Programme: Bsc. COMP. ENG.



UNIVERSITY OF ENERGY AND NATURAL RESOURCES, SUNYANI, GHANA

SCHOOL OF ENGINEERING

DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING

LEVEL 200: END OF SECOND SEMESTER EXAMINATION, 2017/2018

Bachelor of Science (Electrical and Electronics and Computer Engineering)

ELNG 222: Signals and Systems

May, 2018

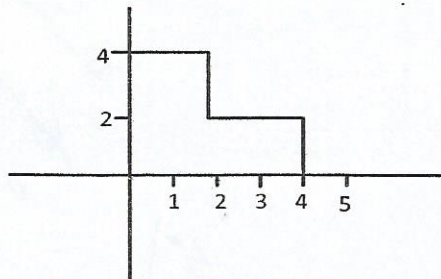
Time: 2 hours

Materials required: Non-programmable calculator

Instructions: Answer all questions.

Question 1 [15 marks]

- Define Energy and power signal. [2 marks]
- Briefly explain the major classifications of a signal. [2 marks]
- Determine the energy of the signal $x(t) = e^{-3t}u(t)$. [5 marks]
- Determine the energy and power of the signal in figure 1 hence state whether it is energy, power signal or neither energy nor power signal. [6 marks]



$0 < t < 2$

Figure 1

Question 2 [15 marks]

- Express the signals shown in Figure 2 in terms of unit step functions. [3 marks]

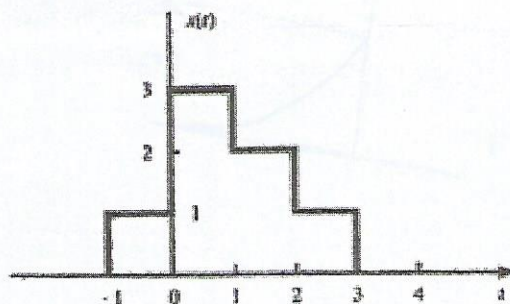


Figure 2

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- b. Compute the output $y(t)$ for a continuous-time LTI system whose impulse response $h(t)$ and the input $x(t)$ are given by

$$h(t) = e^{-iat}u(t) \quad x(t) = e^{iat}u(-t) \quad \alpha > 0 \quad [6 \text{ marks}]$$

- c. Find the z-transform from $D(s)$ given below with a sampling time of 0.25 seconds [6 marks]

$$D(s) = \frac{6}{s^2 + 5s + 6}$$

Question 3 [15 marks]

- a. What is the use of Laplace transform?
b. Derive the Laplace transform of the following signals.

- i. $\delta(t) = 1$
ii. $tu(t) = \frac{1}{s^2}$
iii. $e^{-at}u(t) = \frac{1}{s-a}$
iv. $te^{-at}u(t) = \frac{1}{(s+a)^2}$

- c. State the properties of convolution?

Question 4 [15 marks]

Consider the system shown in Figure 3. Determine whether it is

- a. memoryless,
b. causal,
c. linear,
d. time-invariant,
e. Stable.

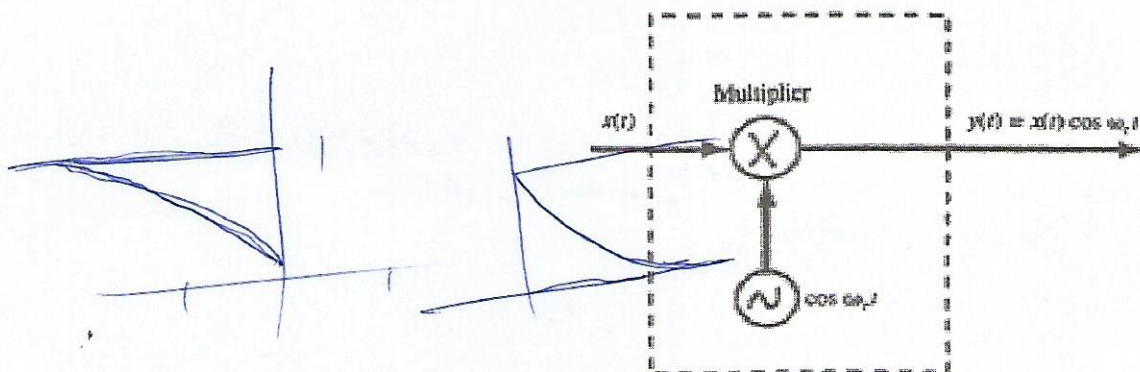


Figure 3