



MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONICS ENGINEERING)

EEE 410: SIGNAL AND SYSTEMS

DATE: 21/5/2019

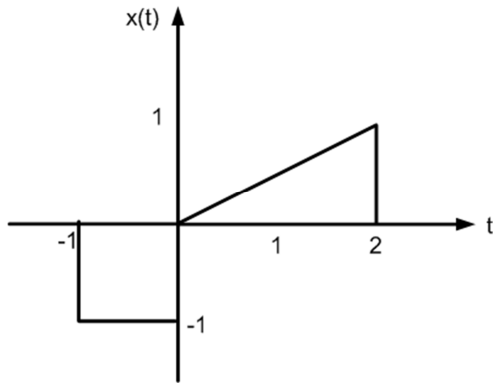
TIME: 11.00-1.00 PM

INSTRUCTIONS

Answer Question ONE and any other TWO Questions.

QUESTION ONE (30 MARKS) (COMPULSORY)

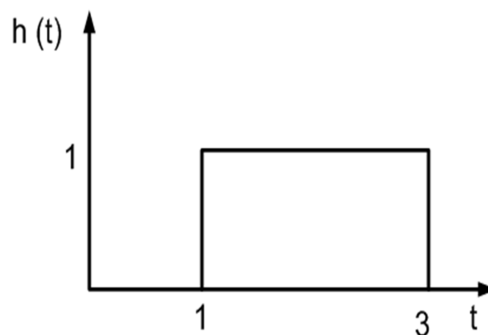
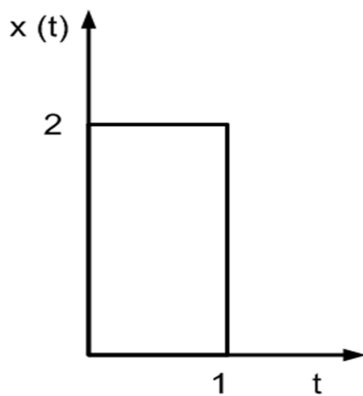
- a) Define the following terms (4 marks)
- i. Signal
 - ii. System
- b) Evaluate the following discrete-time convolution sums: (8 marks)
- i. $y(n) = u(n+3) * u(n-3)$
 - ii. $2^n u(-n+3) * u(n-2)$
- c) State the BIBO criterion for stability (3 marks)
- d) Given the signal of $x(t)$ as below. If $x(t)$ is transformed into these functions of (8 marks)
- i. $x(t-2)$,
 - ii. $x(-t)$ and
 - iii. $x(2t)$
 - iv. $x(1/2t)$,
- Draw the new signal of $x(t)$



- e) Define modulation and explain the advantages it offers to communication (7 marks)

QUESTION TWO (20 MARKS)

- a) Differentiate between (8 marks)
- Continuous time signals and discrete time signals.
 - Periodic signal and non-periodic signal.
 - even and odd signal
 - Define Energy and power signal.
- b) Perform the graphical convolution of $x(t)$ and $h(t)$ below to produce the output of $y(t)$ (12 marks)



QUESTION THREE (20 MARKS)

- a) Using suitable illustrations and mathematical relations, define the following signals
- unit pulse signal
 - continuous time complex exponential signal

iii. Continuous time real exponential signal. (9 marks)

b) Find the Fourier Transform (FT) of $x(t) = e^{-at} u(t)$ and hence sketch the phase and amplitude spectrum of the same (11 marks)

QUESTION FOUR (20 MARKS)

a) Define mathematically three properties of convolution (6 marks)

b) Draw the block diagram representation of the integral equation given by (8 marks)

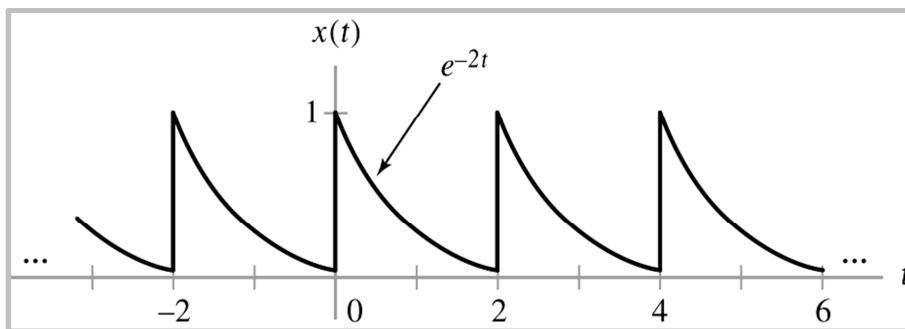
$$y(t) = -a_1 y^{(1)}(t) - a_0 y^{(2)}(t) + b_2 x(t) + b_1 x^{(1)}(t) + b_0 x^{(2)}(t)$$

c) Determine the inverse Laplace transform of, (6 marks)

$$F(s) = 1 + \frac{3}{s+4} - \frac{5s}{s^2+4}$$

QUESTION FIVE (20 MARKS)

a) Find the Fourier series coefficients of the waveform below and hence sketch the phase and amplitude spectrum (12 marks)



b) Using suitable illustrations, explain the 3 types of analogue modulation (8 marks)