



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

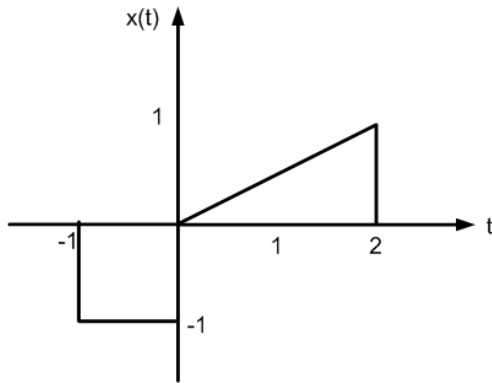
TIME: 11.00-1.00 PM

INSTRUCTIONS

Answer Question ONE and any other TWO Questions.

QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Define the following terms (4 marks)
- Signal
 - System
- b) Evaluate the following discrete-time convolution sums: (8 marks)
- $y(n) = u(n+3) * u(n-3)$
 - $2^n u(-n+3) * u(n-2)$
- 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)
- $x(t-2)$,
 - $x(-t)$ and
 - $x(2t)$
 - $x(1/2t)$,
- Draw the new signal of $x(t)$



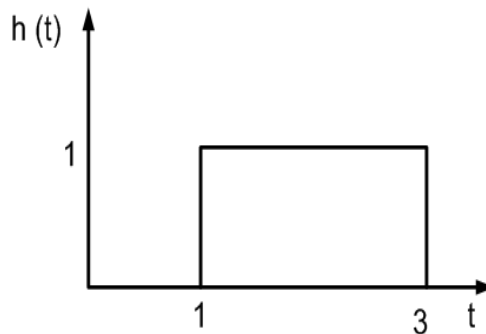
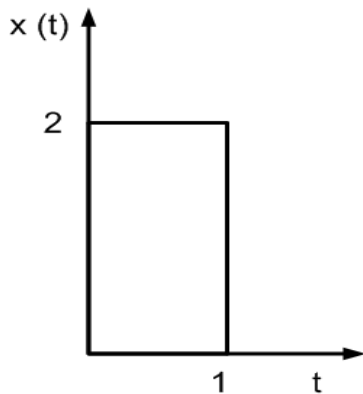
- e) Define modulation and explain the advantages it offers to communication (7 marks)

QUESTION TWO (20 MARKS)

- a) Differentiate between (8 marks)

- i. Continuous time signals and discrete time signals.
- ii. Periodic signal and non-periodic signal.
- iii. even and odd signal
- iv. 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
- i. unit pulse signal
 - ii. 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)

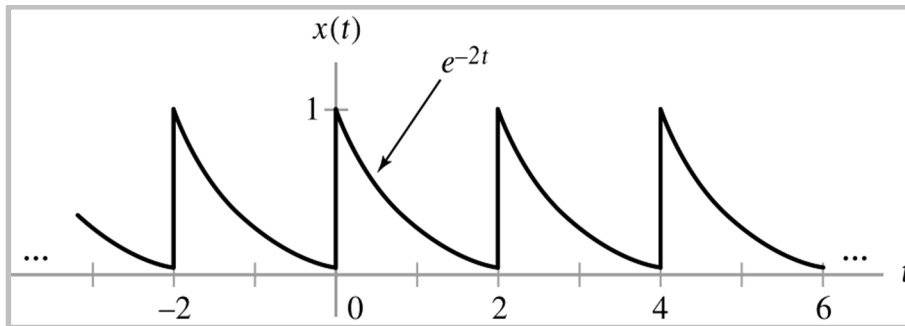
QUESTION FOUR (20 MARKS)

- 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)