THE INTERNATINONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY – HCMC

Final Examination

Date: Jan. , 2019

Duration: 120 minutes

SUBJECT: Principles of EE2	
Dean of School of Electrical Engineering Signature: Full name: Mai Linh	Lecturer Signature: Full name: Tran Van Su

INTRODUCTIONS:

1. This is an open book examination. Computers and communication devices are prohibited.
2. Answer all questions

Scanned with CamScanner

Question 1 (15 Marks)

Find f(t) for each of the following function:

a. $F(s)=\dfrac{8s^2+37s+38}{(s+1)(s+2)(s+4)}$ (8 Marks)

b. $F(s)=\dfrac{20s^2+16s+12}{(s+1)(s^2+2s+5)}$ (7 Marks)

Question 2 (15 Marks)

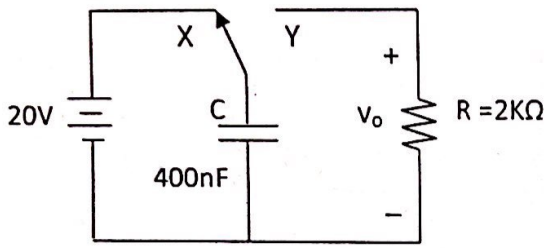

Fig. 1

The switch in the circuit in Fig. 1 has been in position X for a long time. At t = 0, the switch moves instantaneously to position Y

a. Construct an S-domain circuit for t >0. (5 Marks)
b. Find $V_o(s)$. (5 Marks)
c. Find $v_o(t)$. (5 Marks)

Question 3 (15 Marks)

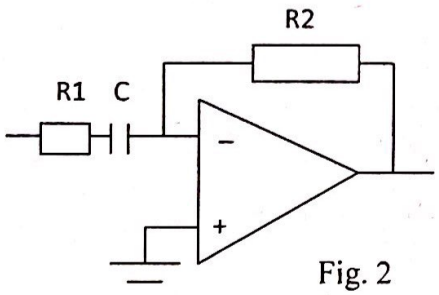

Fig. 2

Design an op-amp based HPF with a cutoff frequency of 5 Khz and a passband gain of 10 using a 200nF capacitor

a. Label the component values in Fig. 2. (10 Marks)
b. If the value of the feedback resistor is changed but the value of the resistor in the forward path is unchanged. What characteristic of the filter is changed. (5 Marks)

Quesstion 4 (15 Marks)

a) Using 1kΩ resistors and ideal op-amp, design a circuit that will implement the low pass Butterworth filter specified as follows: n = 2, f_c = 2000 Hz, gain in the passband of 5. (10 Marks)
b) Construct the circuit diagram and label all component values. (5 Marks)

Question 5 (15 Marks)

For the periodic function in Fig. 3, specify

a. ω_o (5 Marks)
b. a_v (5 Marks)
c. a_k and b_k (5 Marks).

Scanned with CamScanner

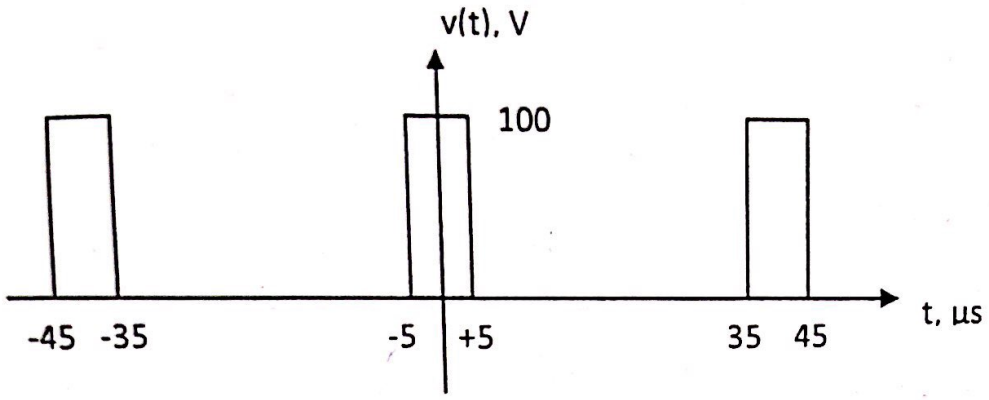

Fig. 3

Question 6 (10 Marks)

The following measurements were made on a resistive two-port network that is symmetric and reciprocal. With port 2 open, $V_1 = 90V$, $I_1 = 1A$. With a short circuit across port 2, $V_1 = 150V$ and $I_2 = -2A$. Determine the z-parameters of two-port network.

Question 7 (15 Marks)

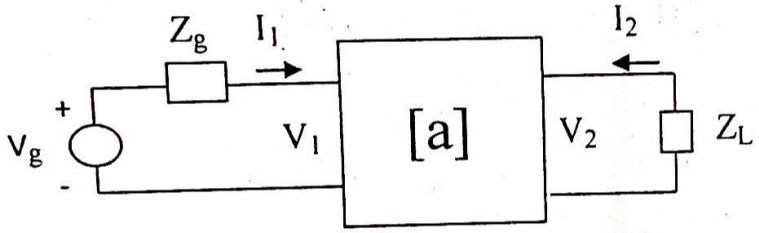

Fig. 4

A two-port network has a-parameters as follows:

$a_{11} = 2x10^{-3}$, $a_{12} = 10\ \Omega$

$a_{21} = 2x10^{-5}S$, $a_{22} = -10^{-2}$

V_g is sinusoid with amplitude of 150mV and internal impedance of 50Ω, $Z_L = 1k\Omega$.

a. Calculate the average power delivered to the load resistor. (9 Marks)
b. Calculate Thevenin equivalent impedance at port 2 of the network. (6 Marks)

Scanned with CamScanner