MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

FIRST YEAR **SECOND** SEMESTER EXAMINATION FOR BACHELOR OF TECHNOLOGY IN ELECTRIC AND ELECTRONIC ENGINEERING

EET104: CICUIT THEORY AND NETWORK ANALYSIS II

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer Question one and any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Distinguish between the following concepts as applied in circuit network

i) Non-linear and bilateral networks

ii) Passive and distributed networks (4marks)

b) i. Explain Kirchhoffs laws with respect to electrical network analysis (2marks)

ii. Determine the current thought regitor (Rl) using therein theoem shown in figure I

_____

c) Explain foster's 1 realization theorem as applied to analysis of canonical driving point impedance. (2marks)

d) Figure 2 shows a capacitor initially charged at 8×10^{-3}V above 5(five) time constants that of the network. Evaluate the time 't' when $V_{c(t)}$ = OV, if the steps changes level at t=0 seconds and ____=20mV (7marks)

_____

e) Obtain the Norton equivalent network for the external section to resistor (R) 852 figure 3.

_____

f) Determine the poles and Zeros for a system response function given by (5marks)

_____

SECTION TWO: ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

a) Outline the systematic steps considered when analysing circuit networks using therein theorem (5marks)

b) i. Explain superposition theorem as applied in circuit networks analysis. (2marks)

ii. Figure $ shows an RLC circuit configulation supplied from two sources. Apply superposition theorem to obtain the current through the 4s2 resistor.

_____

c) An electrical system was supplied from a unit ramp input source. If the system transfer function expression was provided as

_____ and the parameters of 'R' and 'C' were 2Ks2 and 1UF respectively, determine the system response (5marks)

QUESTION THREE (20 MARKS)

a) i. Explain the term initial condition with respect to a circuit containing capacitive and inductive elements (3marks)

ii. Using laplace transform, determine the time response of the point voltages V1 and V2 shown in figure 5 with initial conditions V=1.5V, L=0.4 henries, C=0.5F and G= 0.8_____

_____

b) A parallel R_2 – L circuit components section was connected in series with R_1. The entire network was then supplied from a single source E_1 as shown in fig. Determine, the expression for 2_1 and 2_2 if switch 's' was closed at 5=0(Hint apply kirchhoffs law (9marks)

_____

QUESTION FOUR (20 MARKS)

a) i. Explain poles and zeros as applied in network signal stability (2marks)

ii. Construct a routh's arry for the following system function s6 + $3s^5+3s^4+3s^3+3s^2+3s+2$ (2marks)

b) Determine the impedance for the maximum power transfer for the network of figure 7

_____

c) i. Outline the steps applied to analyse complex networks using Nortons theorem (4marks)

ii. Explain therenin theorem in a.e. sinusoidal networks (2marks)

iii. The impedance function of a system network was experimentally obtained as

Obtain foster's 1 realization (4marks)

_____