Question Paper

Exam Date & Time: 01-Mar-2021 (09:00 AM - 12:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B.TECH(ELECTRONICS AND INSTRUMENTATION ENGG) DEGREE END SEMESTER EXAMINATIONS, MARCH 2021

NETWORK ANALYSIS AND SIGNALS [ICE 2154]

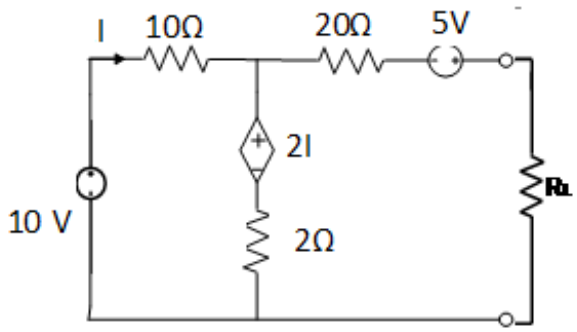
Marks: 50 **Duration: 180 mins.**

A

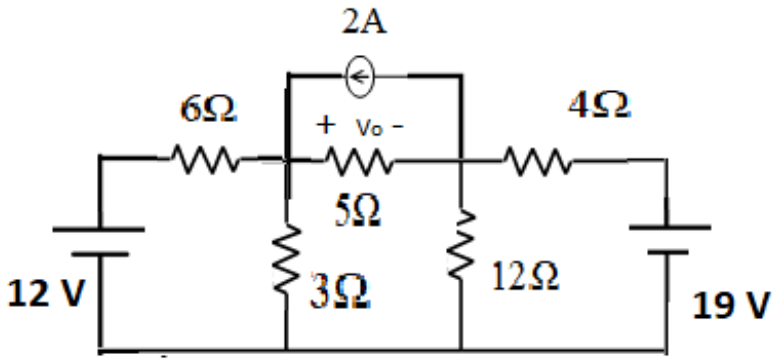
Answer all the questions.

1) In the circuit shown in figure below, R_L is a variable resistance. Find R_L for maximum power delivery to it and determine the power. (5)

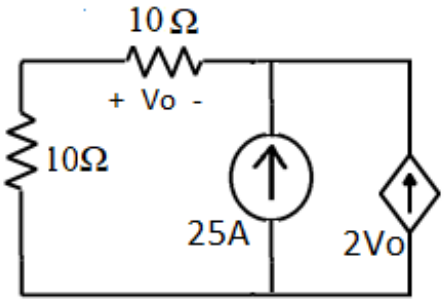
A)



B) For the circuit shown in figure below, determine Vo using superposition theorem. (3)

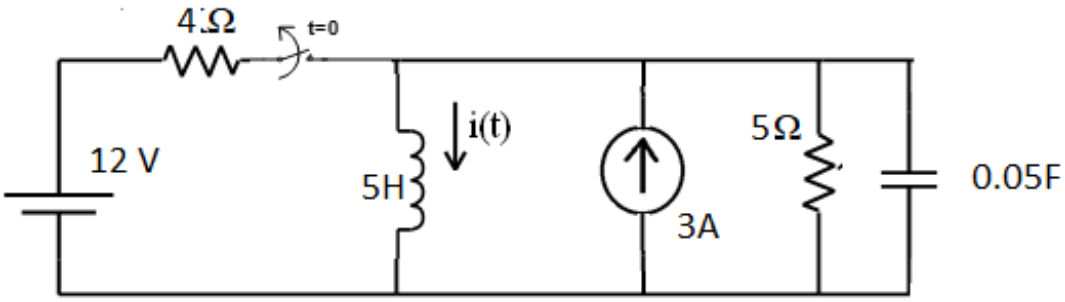


C) Calculate the power dissipated by the controlled source in the circuit shown below. (2)



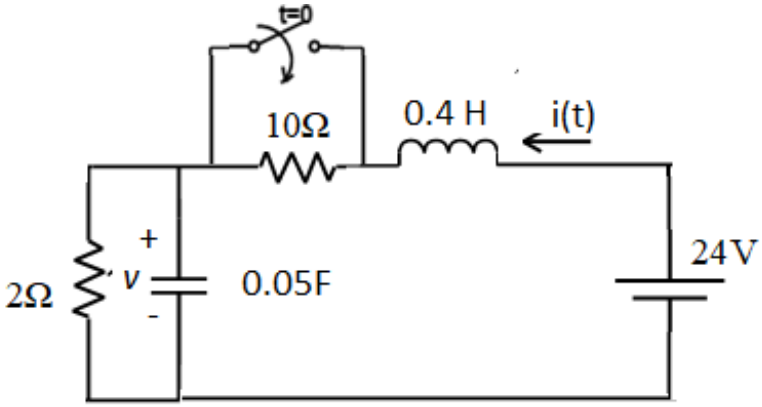
2) In the circuit shown in figure below switch is opened at t = 0, before which steady state has been reached. Find the current i (t) for t ≥ 0. (5)

A)

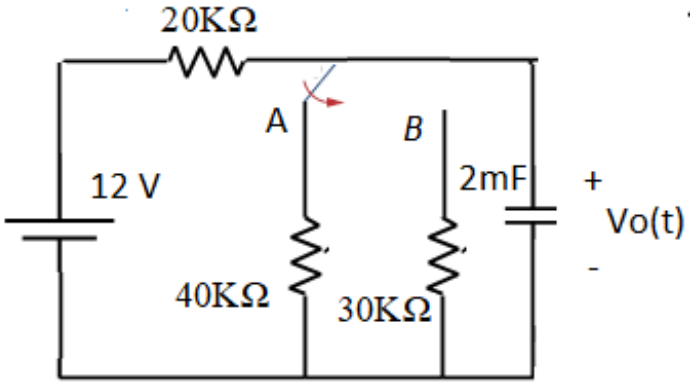


B) The switch in figure below was open for long time but closed at t = 0. Determine (a) ***i(0+) ,v(0+)*** (3)

(b) ***di(0+)/dt. dv(0+)/dt*** (c) ***i(∞), v(∞)***.

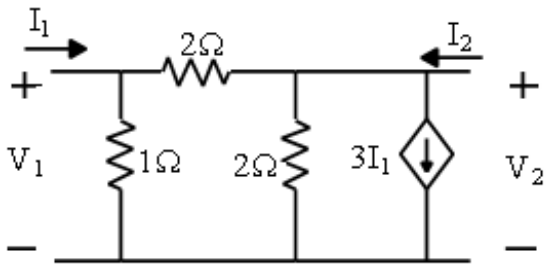


C) Assuming that the switch shown in figure below has been in position A for a long time is moved to position B at t = 0. Find Vo(t) for t ≥ 0. (2)

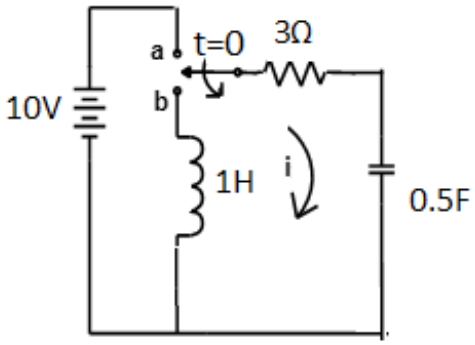


3) Find the Z and Y parameters of the network shown in figure below. (5)

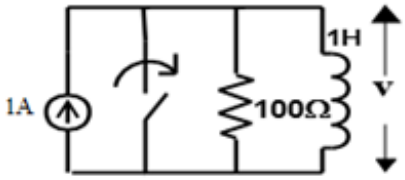
A)



B) The switch shown in figure below was at position a for a long time and is moved to position b at t = 0. Obtain expression for current i(t) for t ≥ 0 using Laplace transform method. (3)



C) In the circuit shown in figure below, switch is opened at t=0 before which a steady state has been reached. Using Laplace transform, find the expression for v(t) for t ≥ 0. (2)



4) Evaluate and plot *y(t)/y(n)*. (5)

A) *(i)* ***y(t) = x(t)*h(t),*** where ***x(t) = δ(t+1)-δ(t-1)*** *and* ***h(t) = r(t+1)-r(t)-2u(t)+u(t)***

ii. ***y(n) = x(n)*h(n),*** where ***x(n) = u(n)- u(n-4)*** *and h(n) =* ***u(n)- u(n-5)***

B) Evaluate the energy and power of the signal (i) ***x(t)= tu(t) (ii) x(n)= u(n)-2u(n-4) +un-8).*** (3)

C) Determine whether the LTI systems given below are causal and stable. (2)

i. ***h(n) = (-0.5)$^{-n}$ u(n-1)***

ii. ***h(t) = e^{2t} u(-t)***

5) An LTI system is described by the differential equation (5)

A) $$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = x(t)$$

Determine (i) Frequency response of the system (ii) Impulse response of the system (iii) Output of the system for an input $x(t) = e^{-t}\,u(t)$.

B) Find x(t) if (3)

$$X(j\omega) = \frac{2\sin(\omega)}{\omega(j\omega+1)}$$

C) Obtain Fourier representation of $x(t) = Sin(\pi t) + Cos(2\pi t) + Sin(5\pi t)$. Plot the spectrum. (2)

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