Exam Date & Time: 19-Apr-2022 (02:00 PM - 05:00 PM)

# MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH END SEMESTER MAKE - UP EXAMINATIONS, APRIL 2022

**NETWORK ANALYSIS AND SIGNALS [ICE 2154]**

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

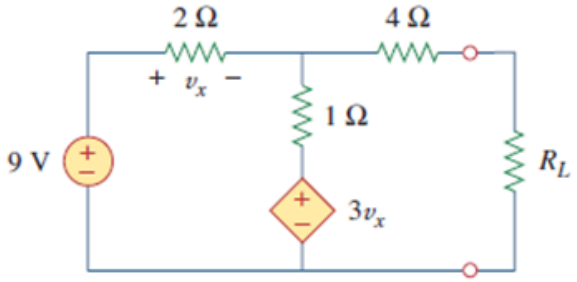
**A**

**Answer all the questions.**

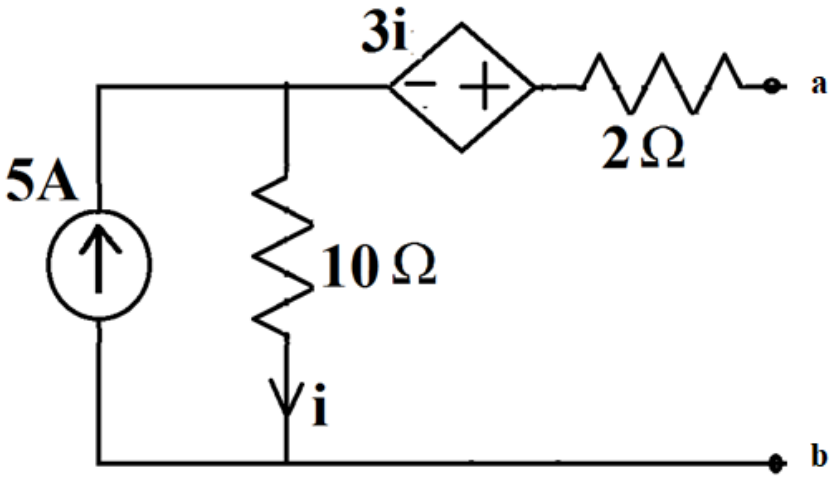
Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) For the circuit shown in figure, find the value of load resistance RL for maximum power transfer. Also calculate the power delivered to the load. (5)

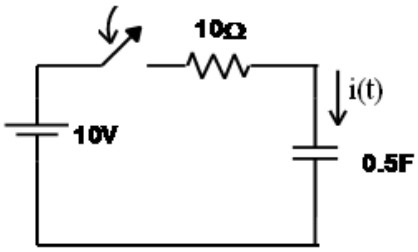
A)




B) Find the Norton's equivalent for the circuit shown in figure. (3)

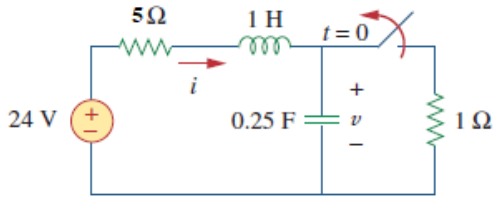



C) In the circuit shown in figure below switch is closed at t = 0, with no initial charge on capacitor. Find current i (t) at time t = 5mSec. (2)

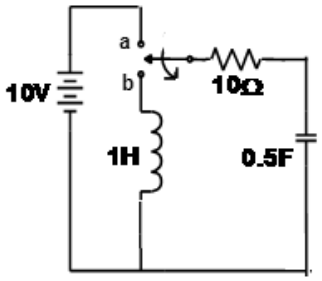



2) (5)

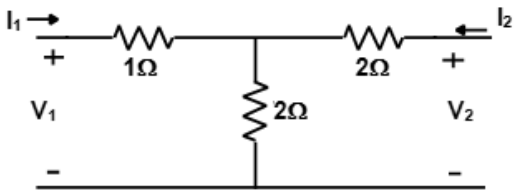
A) In the network shown in figure, the switch is opened at t=0, after the network has attained steady state with the switch closed. Obtain expression for current i(t) in complementary and particular solution form. Also obtain total solution for i(t).




B) In the circuit shown in figure below switch is moved from a to b at t = 0, before which steady state has been reached. Obtain the expression for the circuit current for t ≥ 0 using Laplace transform. (3)

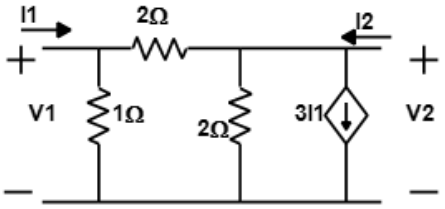



C) For the network shown in figure below, find h parameters. (2)




3) For the network shown in figure determine Z and Y parameters.

A) (5)




B) State with justification whether the system ***y(t)= tx(t)*** is memory less, causal, linear, time invariant, stable and invertible. (3)

C) Evaluate the energy and power of the signal $x(t)=e^{2t}u(-t)$. (2)

4) Input *x(t)* and impulse response *h(t)* of a LTI system is given by $x(t) = 3e^{-0.5t}\,u(t)$ and $h(t) = u(t) - u(t-2)$. Use convolution integral to evaluate the output y(t) of the system and sketch *y(t)*. (5)

A)

B) Find Fourier representation of $x(t) = u(t+2) - u(t-2)$ . Plot the magnitude spectrum. (3)

C) Obtain Fourier representation of $x(t) = 1+Cos(\pi t) + Sin(2\pi t)$ . Plot the spectrum. (2)

5) A LTI system is described by

A) $$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$ (5)

. Determine (i) Frequency response of the system (ii) impulse response of the system (iii) Output of the system for an input $x(t)= e^{-2t}\,u(t)$.

B) Find $x(t)$ if

$$X(j\omega) = \frac{2\sin(\omega)}{\omega(j\omega+1)}$$ (3)

C) Evaluate the following

$$\int_{-\infty}^{\infty} \left(\frac{\sin(\pi t)}{\pi t}\right)^2 dt$$ (2)

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