Question Paper

Exam Date & Time: 16-Nov-2018 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
THIRD SEMESTER B.Sc. Applied Sciences in Engg.
END-SEMESTER THEORY EXAMINATIONS NOVEMBER - 2018
NETWORK ANALYSIS [IEE 231]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

Missing data, if any, may be suitably assumed

1) A) Find the laplace transformation of the periodic rectified sine wave with period T and peak value of A (5)

B) Find the initial and final values of the function whose laplace transform is (6)

$$F(s)=\frac{(2S+1)}{(6S^2+11S+6)} \quad \text{and} \quad F(s)=\frac{10}{S(S^2+2S+4)}$$

C) Currents I_1 & I_2 entering port1 & port 2 respectively are given by (9)

$I_1=0.5\ V_1 - 0.2\ V_2$

$I_2= - 0.2\ V_1 + V_2$

Find Y, Z and ABCD parameters.

2) A) A step voltage of E volts is applied to a series RLC circuit with L=1H, C=$\frac{1}{4}F$. Find the voltage across the capacitor for the following values of resistance. (12)

R=2 Ω, R=4 Ω and R=5 Ω. Comment on the results.

B) Find the Thevenin equivalent for the network shown in Fig 2B (8)

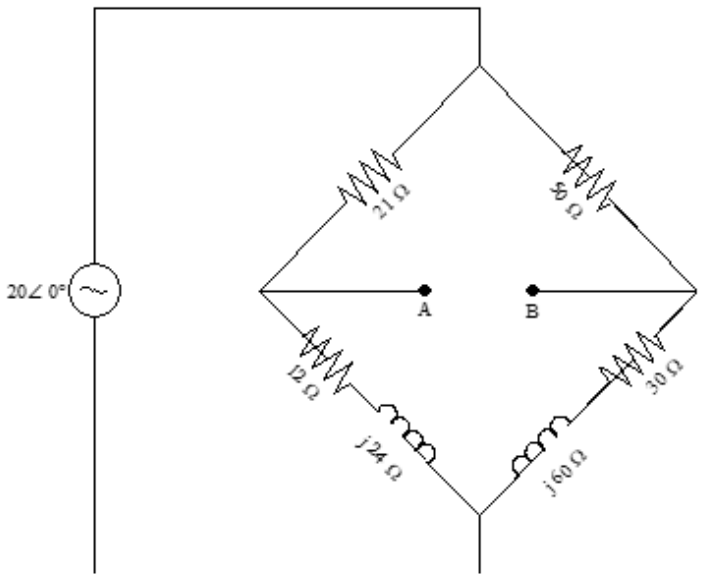

Fig 2B

3) A) Two coils with L_1=6.8 mH and L_2=4.5 mH are connected in series cumulative mode and differential mode. The equivalent inductance in cumulative mode is 19.6 mH and in differential mode is 3 mH. Find the value of mutual inductance and coefficient of coupling. (8)

B) Using convolution theorem evaluate the inverse laplace transform of the following. (12)

i) $\frac{1}{(s+a)^2}$ ii) $\frac{1}{s(s+a)}$ iii) $\frac{1}{(s^2+1)^2}$

4) Find the laplace transform of the following functions. (12)

A) i) $f(t)=\cos^2 t$ ii) $f(t)=t\sin\omega t$ iii) $f(t)=\frac{(1-e^{-t})}{t}$ iv) $(t+1)^2 e^t$

B) Find the Y parameters of the network shown in Fig 4B. (8)

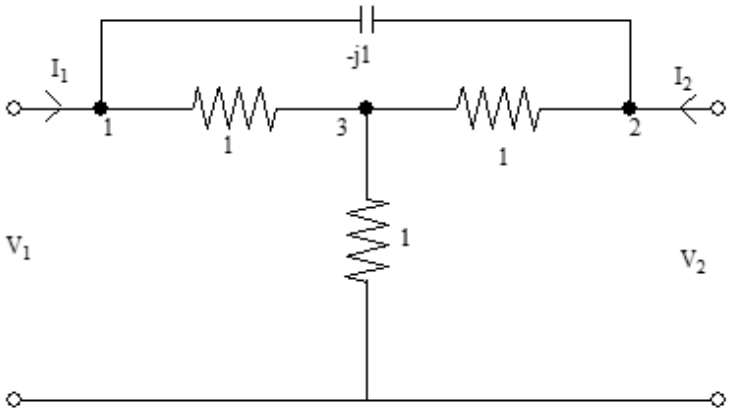

Fig 4B

5) (10)

A) Find the network functions $\frac{V_1}{I_1}$, $\frac{V_2}{V_1}$ for the network in Fig 5A.

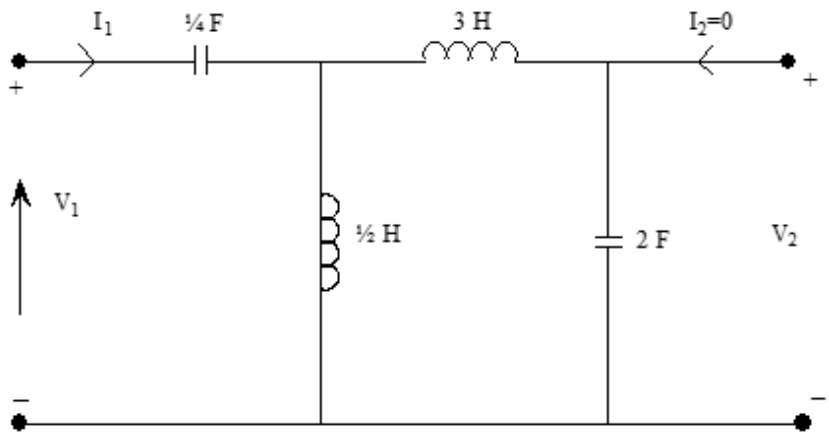

Fig 5A

B) For the given electrical circuit shown in Fig 5B find $\frac{V_o(s)}{V_i(s)}$. (10)

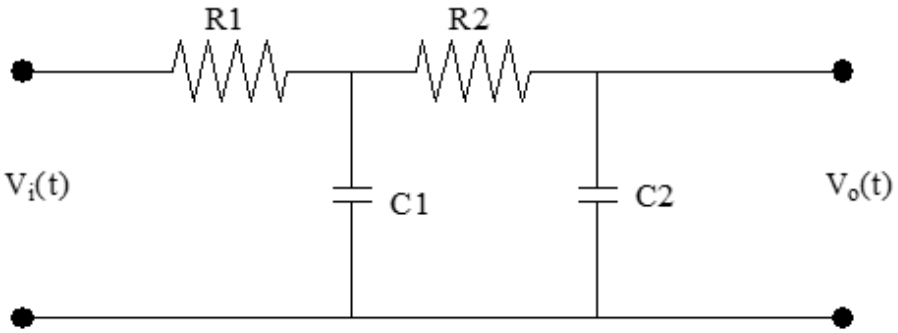

Fig 5B

6) (10)

A) A rectangular pulse of height 1 and width T is applied to a series RC circuit. Find the expression for voltage across the capacitor and plot the waveform.

B) Find the value of Z_L so that maximum power can be transferred to it (Fig 6B). Find the maximum power. (10)

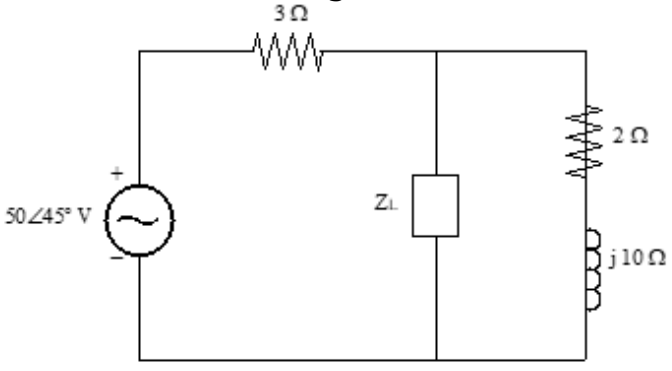

Fig 6B

7) A) For the network shown in Fig.7A find K and place the dots so that the power output of source is 168 W. (10)

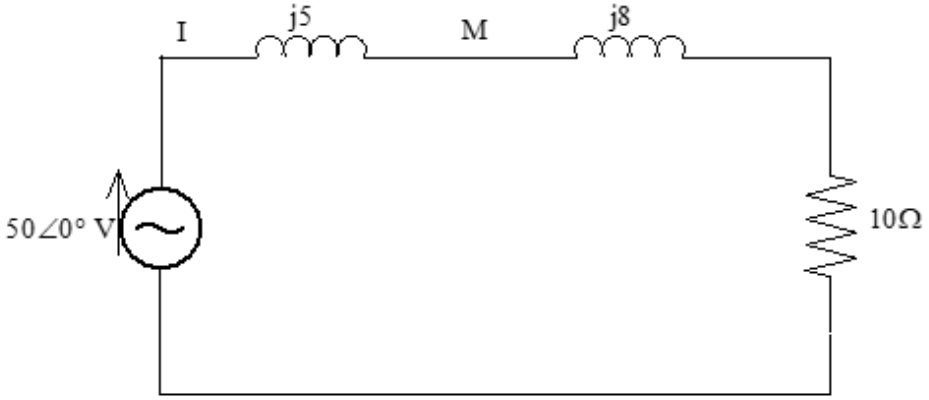

Fig.7A

B) In the network shown in Fig 7B, the switch is moved from a to b, at t=0, find V(t) (10)

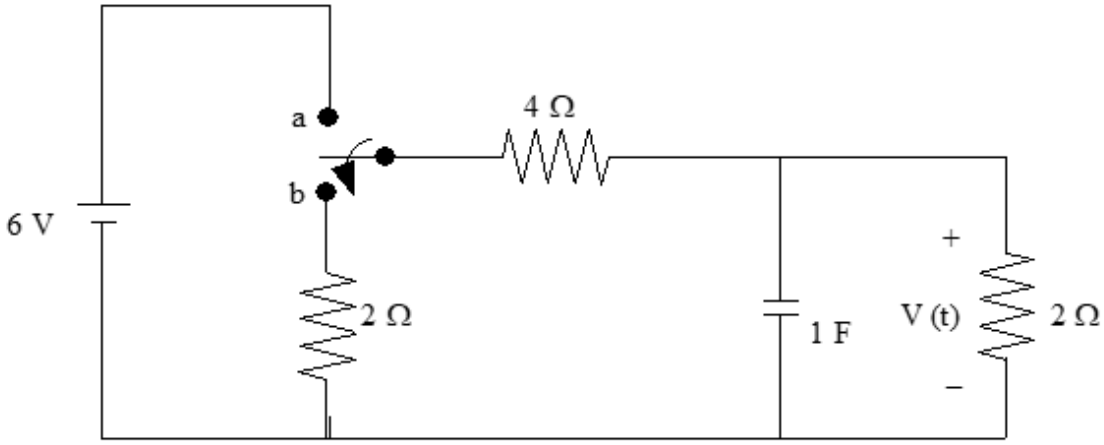

Fig 7B

8) A) Find the current through the 6 Ω resistor on Fig 8A using mesh analysis. (10)

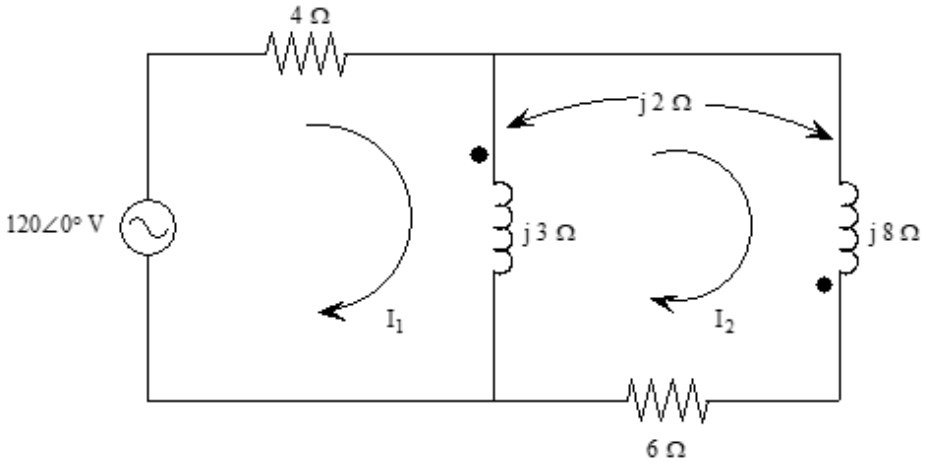

Fig 8A

B) In the network shown in Fig 8B, the switch is moved from a to b at t=0, determine $V_c(t)$. (10)

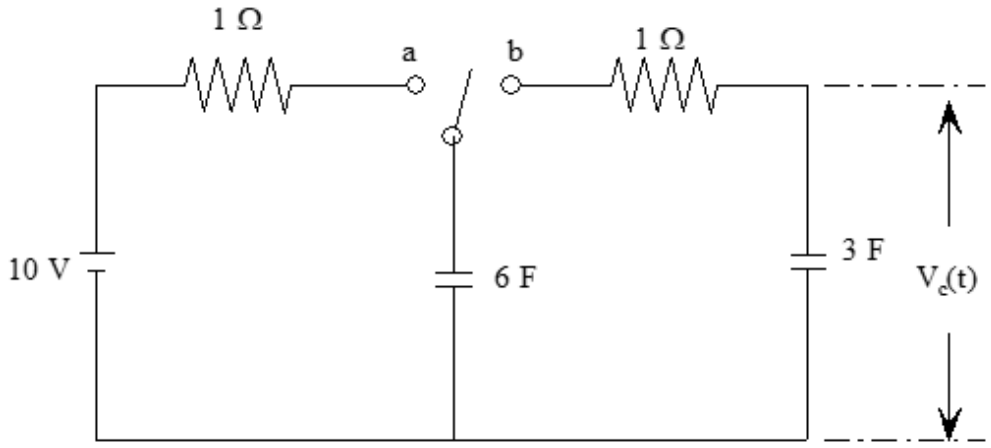

Fig 8B

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