Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

**Course Code: EC201**

**Course Name: NETWORK THEORY**

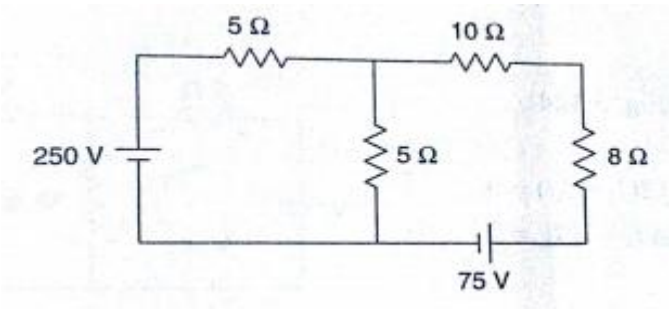
Max. Marks: 100 Duration: 3 Hours

**PART A**

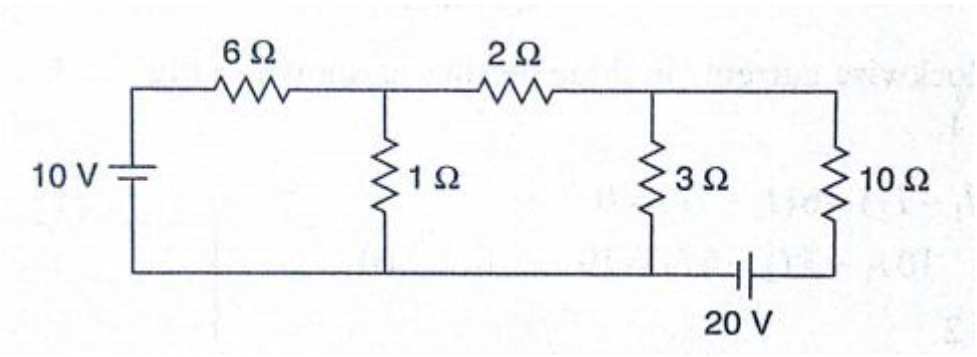
***Answer any two full questions, each carries 15 marks.*** Marks

1 a) State and prove initial value theorem and final value theorem (8 )

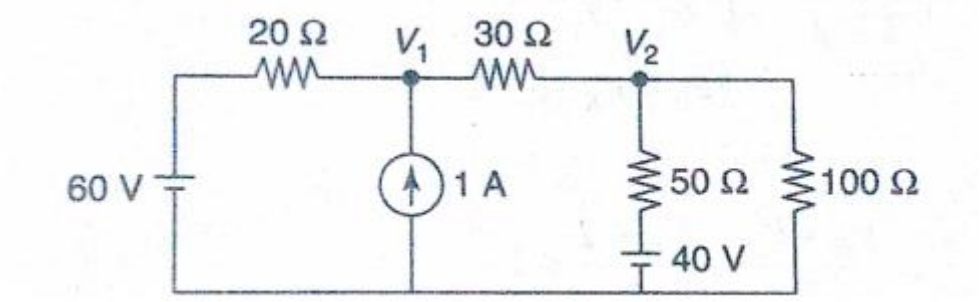
b) Find the current through 8 Ω resistor in the network using Thevenin's theorem (7 )




2 a) Find the current through 2 Ω resistor using Mesh analysis (8)



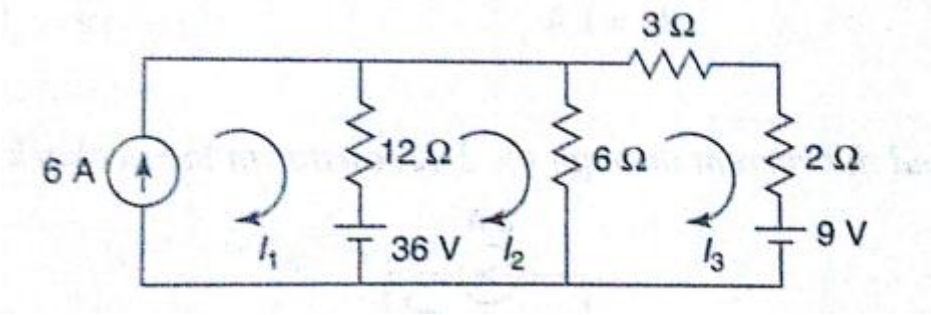

b) Find the current in the 100 Ω resistor using Nodal analysis (7)




3 a) State and prove maximum power transfer theorem when the load impedance is a (8)

complex impedance with variable resistance and variable reactance

b) Find the current through the 2 Ω resistor (7)



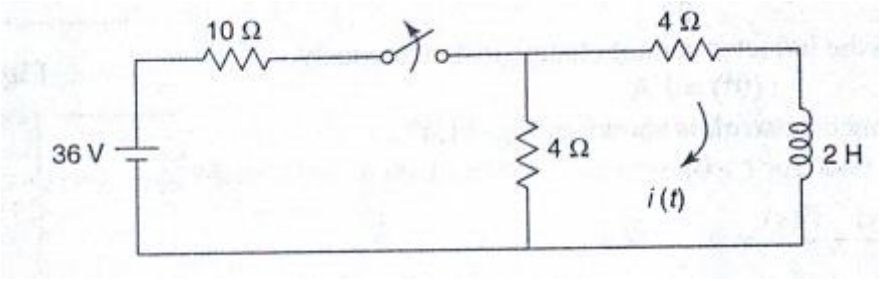

## PART B

***Answer any two full questions, each carries 15 marks.***

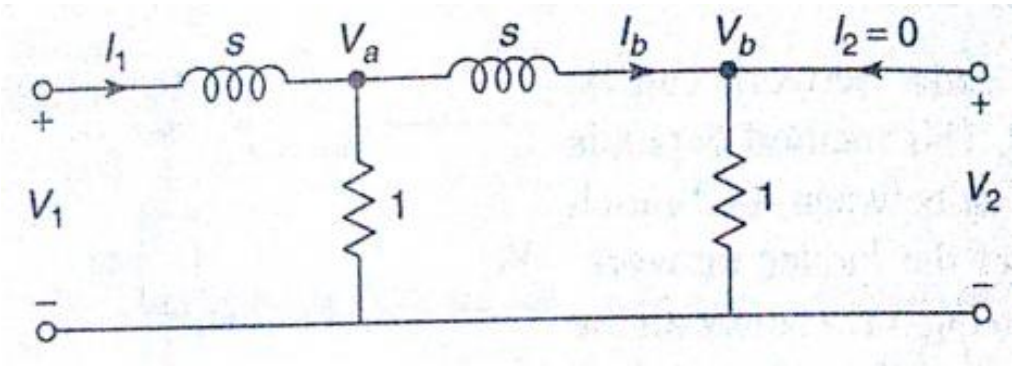
4 a) Solve $\frac{dy}{dt} + 2y = e^{-3t}$ , $y(0) = 1$ (8 )

b) The network shown has acquired steady state with the switch closed for t < 0. ( 7)

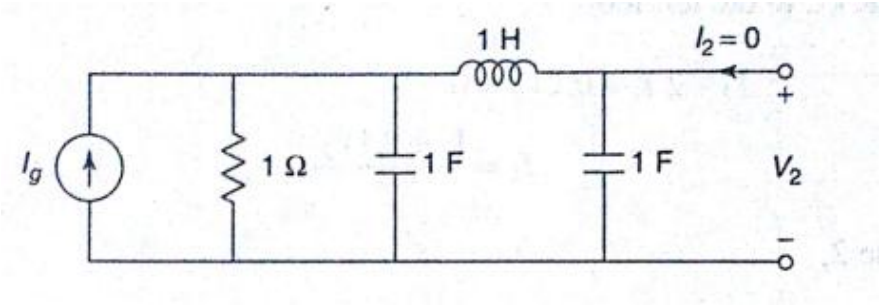
At t = 0, the switch is opened. Obtain i(t) for t >0.



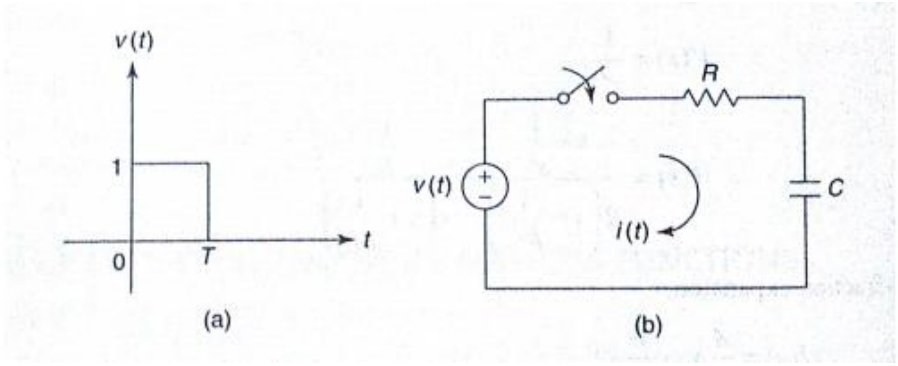

5 a) For the network determine the voltage transfer function $V_2/V_1$ (7)



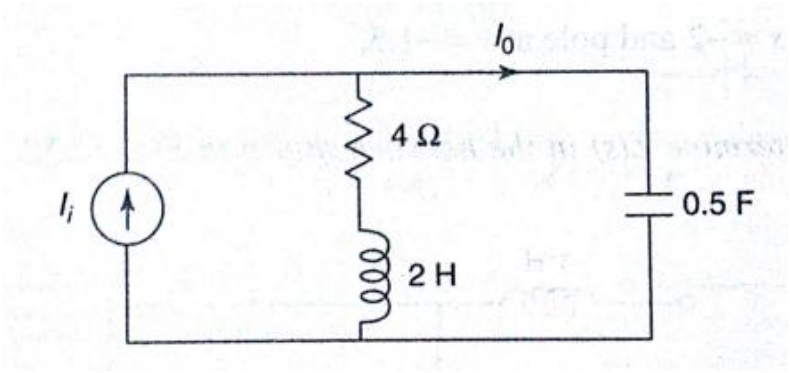
b) For the network shown determine $V_2/I_g$. Plot the pole zero diagram of $V_2/I_g$. (8)




6 a) A rectangular voltage pulse of unit height and T second duration is applied to a series RC network at t=0. Obtain the expression for curret i(t). Assume the capacitor to be initially uncharged. (7)



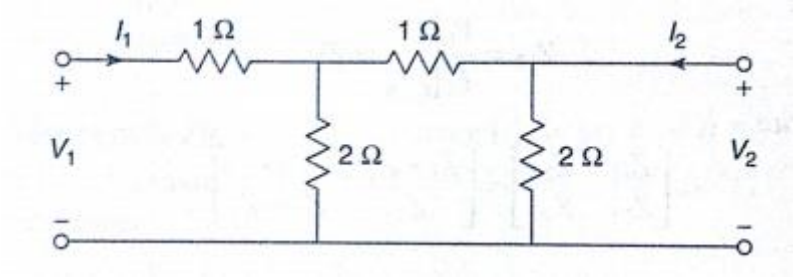

b) For the network shown plot poles and zeros of function $I_0/ I_i$ (8)



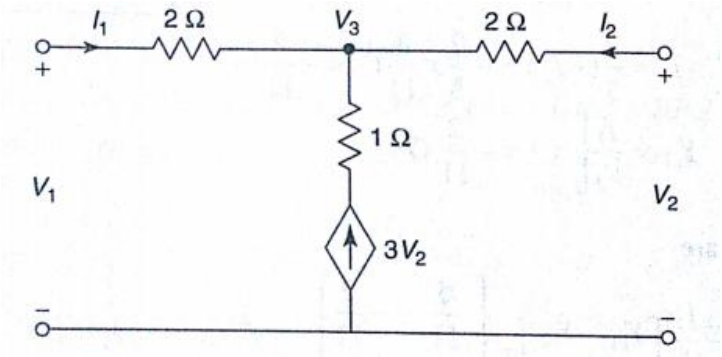
## PART C

***Answer any two full questions, each carries 20 marks.***

7 a) Find Z parameters for the network shown (10)




b) Find the Y parameters of the network shown (10)




8 a) Derive the resonance frequency for a series RLC circuit and give its power factor, current and voltage at resonance (10)

b) A series RLC circuit has a quality factor of 5 at 50 rad/s. The current flowing through the circuit at resonance is 10 A and the supply voltage is 100 V. Find the circuit constants R,L and C (10)

9 a) Compare series and parallel resonant circuits (current, impedance, power factor, resonant frequency and Q factor) (10)

b) A coil of 10 Ω resistance and 2 H inductance is connected in parallel with a variable capacitor across a 220 V, 50 Hz supply. Calculate (a) the capacitance of the capacitor for the resonance, (b)the dynamic impedance of the circuit and (c) supply current (10)

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Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

**Course Code: EC201**

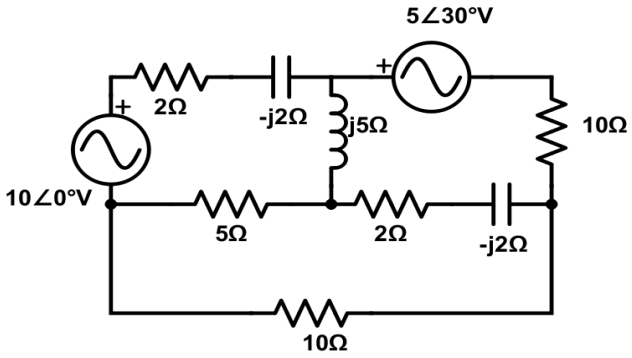
**Course Name: NETWORK THEORY**

Max. Marks: 100 Duration: 3 Hours

**PART A**

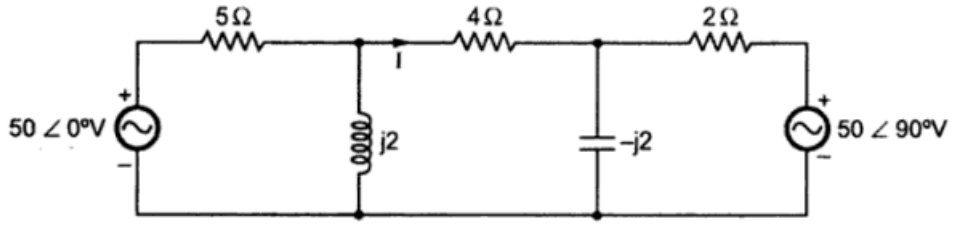
***Answer any two full questions, each carries 15 marks.*** Marks

1 a) Find the voltage across 10Ω resistor using mesh analysis. ( 8)

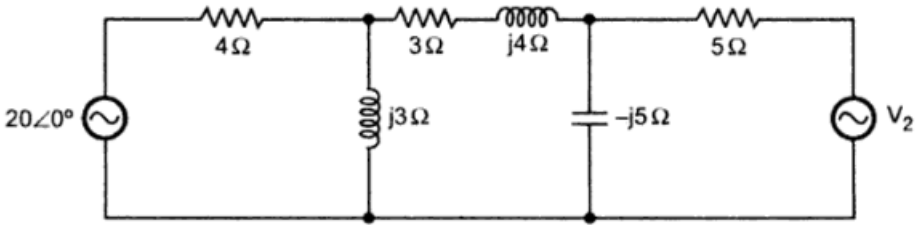



b) State and prove the following properties of Laplace transform i) Time Shifting ii) Frequency Shifting ( 7)

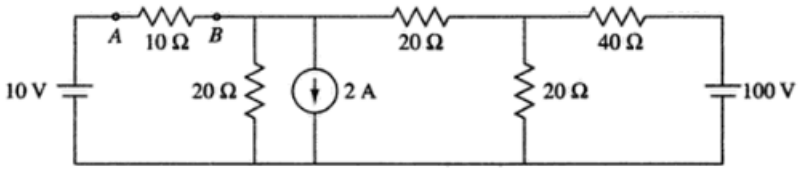
2 a) Find current I using node analysis. (8)



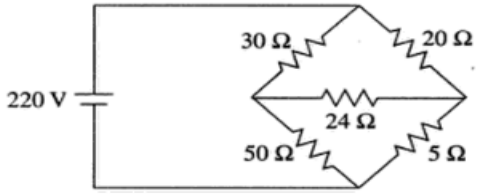

b) Determine the value of $V_2$ such that the current through the impedance (3+j4)Ω is zero. (7)



3 a) Determine the voltage across 10Ω, connected between the terminals A and B, using superposition theorem. (9)




b) Using Thevenin's theorem, find the power dissipated across 24Ω resistor. (6)




**PART B**

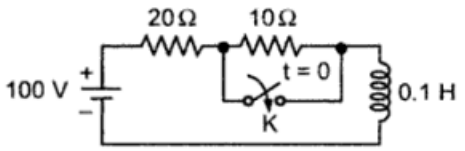
***Answer any two full questions, each carries 15 marks.***

4 a) Obtain the transient current and voltage responses of a RL circuit when subjected to a unit step input. ( 6)

b) Solve the differential equation $\frac{d^2v(t)}{dt^2} + 6\frac{dv(t)}{dt} + 8v(t) = 2u(t)$ subject to the initial conditions $v(0) = 1, v'(0) = -2$. (9 )

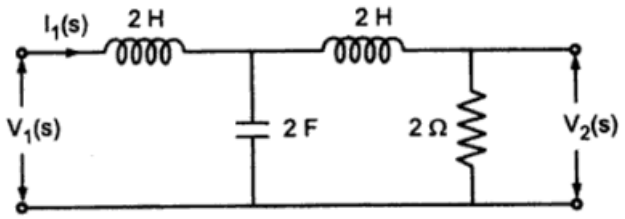
5 a) For the given network function, draw the pole-zero plot and hence, obtain its time domain response from the plot. $V(s) = \frac{5(s+5)}{(s+2)(s+7)}$ (8)

b) A dc voltage of 100V is applied in the circuit shown in the figure and the switch, K is kept open. The switch is closed at t=0. Find the resulting current. (7)




6 a) Write down the necessary conditions for driving point functions. (6)

b) For the network shown, find the following $\frac{I_2(s)}{I_1(s)}, \frac{V_2(s)}{V_1(s)}$ and $\frac{V_1(s)}{I_1(s)}$. (9)

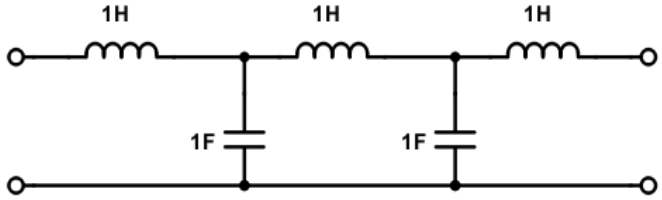


## PART C

***Answer any two full questions, each carries20 marks.***

7 a) Show that the overall Y parameter, of two 2-port networks when connected in parallel, is the sum of individual Y parameters of the two networks. ( 6)

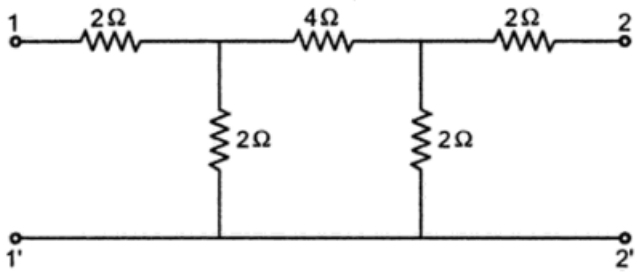
b) Determine the transmission parameters of the two port network given below. ( 9)




c) Define the terms (i) Characteristic impedance (ii) Propagation Constant (5)

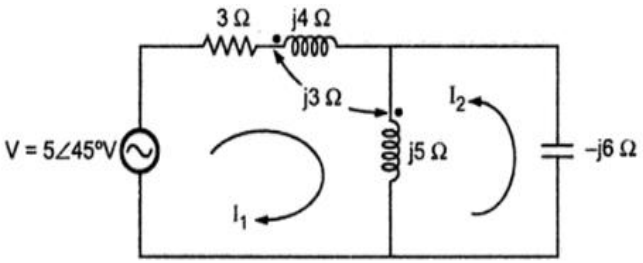
8 a) A series RLC circuit resonates at a frequency of 1500Hz and consumes 75W power for 50V ac source at resonant frequency. The bandwidth is 0.75kHz. Calculate R, L and C. Also calculate the maximum current and half power frequencies. (10)

b) Obtain the open circuit Z parameters of the network shown in figure. (10)




9 a) Derive the expressions for (i) maximum output voltage and (ii) maximum amplification factor for a single tuned circuit. (12)

b) Find the drop across the capacitor. (8)

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Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DEC 2019

**Course Code: EC201**

**Course Name: NETWORK THEORY**

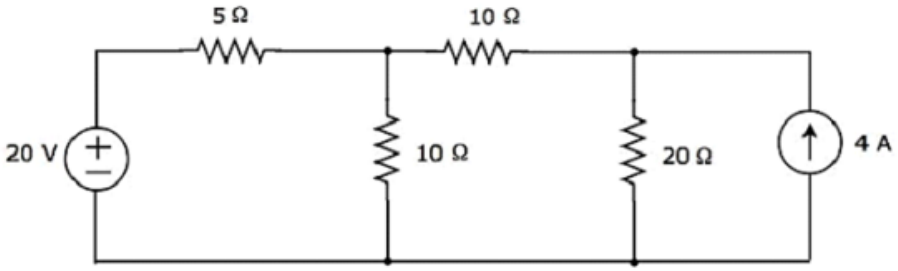
Max. Marks: 100 Duration: 3 Hours

**PART A**

***Answer any two full questions, each carries 15 marks.*** Marks

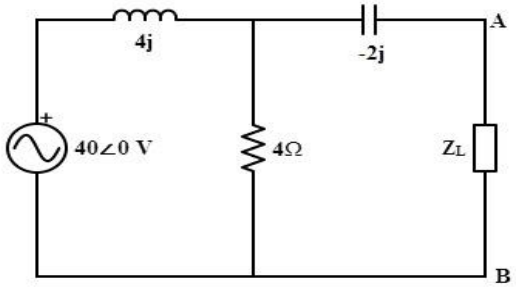
1 a) Classify independent and dependent sources. Also mention the types of dependent sources. (4 )

b) Calculate the current through 20Ω using node analysis (4)



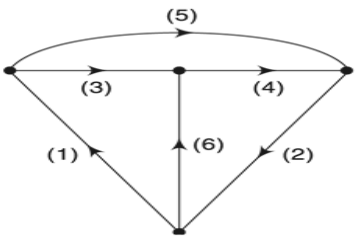

fig(1)

c) Find the value of load and maximum power delivered to load in fig(2) (7)




fig(2)

2 a) Find the tie set matrix for the graph shown in fig(3) (4)

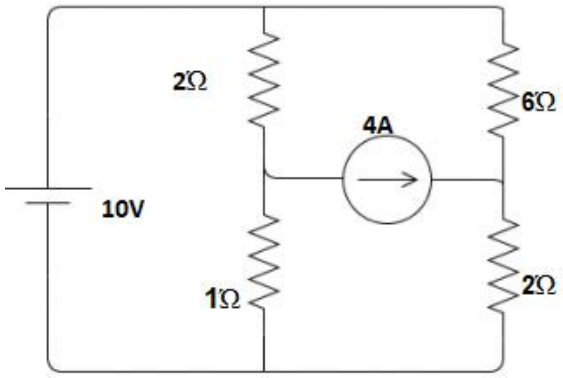



fig(3)

b) Define Node, Tree and Link (3)

c) State and prove initial value and final value theorem (8)

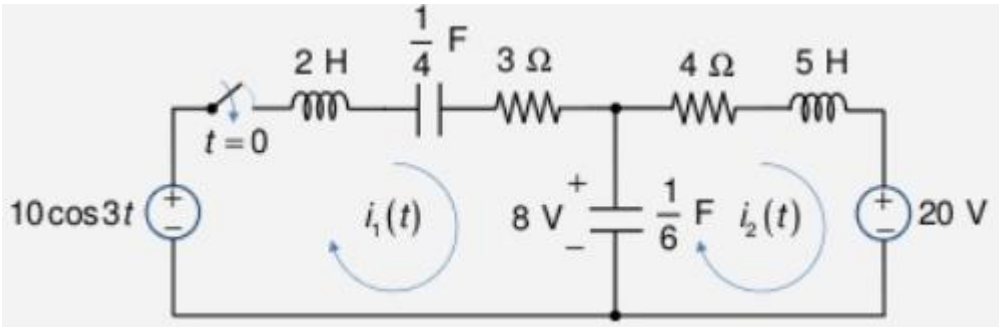
3 a) Solve the circuit and find the loop currents in fig(4) (6)




fig(4)

b) State reciprocity theorem (3)

c) Draw the laplace transformed circuit and write the mesh equations for the circuit shown in fig(5) (6)




fig(5)

## PART B

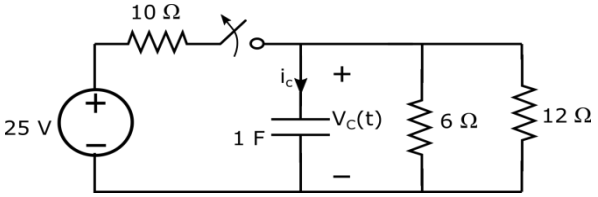
***Answer any two full questions, each carries 15 marks.***

4 a) Find the inverse laplace transform of ( 8)

$$F(S) = \frac{21S - 33}{(S+1)(S-2)^3}$$

b) Write any six properties of driving point and transfer functions. ( 7)

5 a) The switch is opened at t = 0. Find the capacitor voltage for t > 0 (8)




fig(6)

b) Draw the pole zero diagram of system function $\frac{S^3-7S^2+10S}{S^2+S-6}$. Also mention the nature of the system. (7)

6 a) Solve the differential equation using laplace transform (7)

$$2y'' + 3y' - 2y = te^{-2t}, \quad y(0) = 0 \quad y'(0) = -2$$

b) Draw Pole Zero Plot & using pole zero plot, Find the time domain response i(t). (8)

$$I(S) = \frac{2S}{(S+2)(S^2+2S+2)}$$

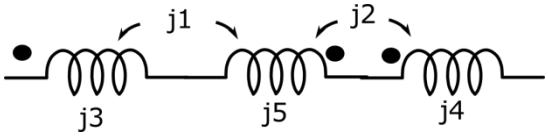
## PART C

***Answer any two full questions, each carries20 marks.***

7 a) The Z parameters of a two port network areZ11=20Ω, Z12=Z21=10Ω, Z22=30Ω. Find Y and ABCD parameters. (9 )

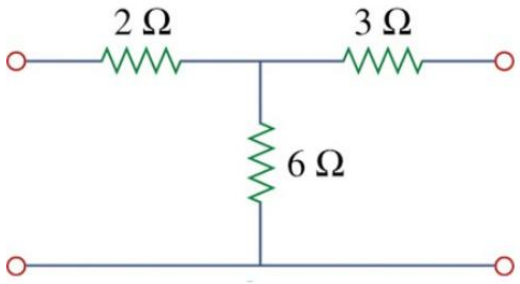
b) Derive the expression for voltage amplification of single tuned circuits. ( 7)

c) Find the equivalent inductance (4)




fig(7)

8 a) Find the hybrid parameters for the network in fig(8). Also represent its hybrid model. (6)

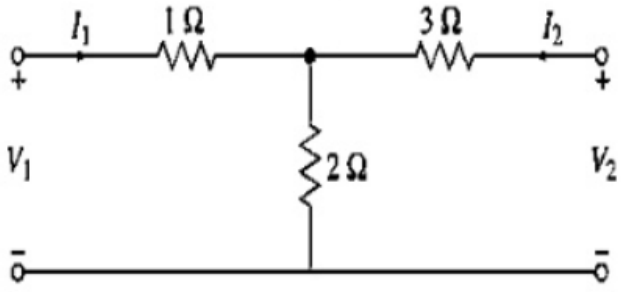



fig(8)

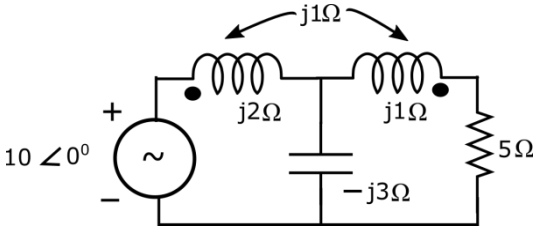
b) Explain characteristics impedance and image impedances (6)

c) Find the expressions for resonant frequency, Q factor and bandwidth of parallel RLC network (8)

9 a) Find the Y parameters of the circuit shown and comment on the symmetry and reciprocity of the circuit. (7)




b) For the circuit shown, find the drop across 5 Ohms (7)




c) Compare and classify parallel resonance network and series resonance network (6)

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Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Third semester B.Tech examinations (S) September 2020

**Course Code: EC201**

**Course Name: NETWORK THEORY**

Max. Marks: 100 Duration: 3 Hours

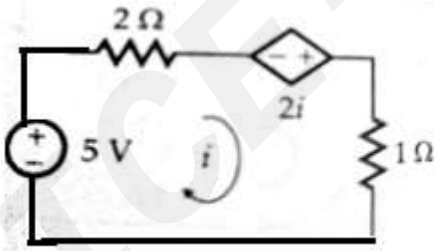
**PART A**

***Answer any two full questions, each carries 15 marks.*** Marks

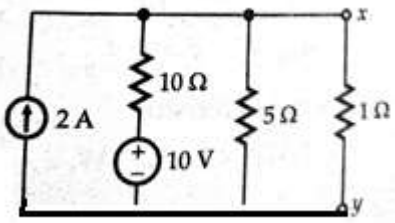
1 a) Explain Kirchoff's law with example (2)

b) Explain final value theorem. Find final value of $F(s) = \frac{2}{s} - \frac{1}{s+3}$ (8)

c) Find the value of dependent voltage source (5)




2 a) Find the power loss in 1 Ω resistor by Thevinin's theorem (8)




b) Explain maximum power transfer theorem applied to dc circuits (7)

3 a) Find the Laplace transform of (i) f(t) = $\cos^3 3t$ and (ii) $f(t) = \frac{(1-e^{-t})}{t}$ (8)

b) Explain tie set matrix, cut set matrix and fundamental cut set matrix with an example (7)

**PART B**

***Answer any two full questions, each carries 15 marks.***

4 a) A continuous LTI system is initially relaxed and represented by the equation y"(t) + 3 y'(t) + 2 y(t) = 2 x(t) . Using Laplace transform Find (a) transfer (8)

function and (b) Find response of a system for input $x(t) = 4\ e^{-3t}$

b) A series RLC circuit with R= 100Ω, L= 0.1 H and C= 40 μF has a dc voltage of 200 V applied at t= 0. Find the transient current. (7)

5 a) Derive the response of a series RC circuit for a step input (5)

b) What are the restrictions on poles and zeros for the transfer function and driving point functions (10)

6 a) A 100μF capacitor has an initial charge Qo = 0.002 C is connected in series with 200Ω across 50V supply at time t=0. Find the transient current. (8)

b) Define poles and zeros of a transfer function. For the given transfer function find the poles and zeros and also draw the pole zero plot (7)

$I(s) = 20\ (s+5) / (s^2 + 5s + 6)$

## PART C

***Answer any two full questions, each carries 20 mark.***

7 a) Two inductively coupled coils have self-inductance $L_1$ = 50mH, $L_2$ = 200mH. Given k = 0.5. Find the mutual inductance between the coil (3)

b) Two coupled coils have a coefficient of coupling k= 0.83. With coil1 open, a current of 5A flows in coil 2. Given flux in coil2 is 0.35 milli weber. Find $L_1$, $L_2$ and M. (6)

c) A coil having an inductance and resistance of 50 mH and 100Ω is connected in series with a capacitor and a 100V, 1 kHz source. Find the value of capacitance that will cause resonance in the circuit. Find the resulting current at resonance (6)

d) Define characteristic impedance and image impedance (5)

8 a) Explain Y parameters. (6)

b) Derive the inter relation between open circuit impedance parameters and transmission parameters (6)

c) In a RLC series circuit, the resistance, inductance and capacitance are 10Ω, 100 mH and 10 μF. Find $\omega_o$, ω1 and $\omega_2$. Also find band width and selectivity (8)

9 a) Explain parallel inter connection of two port networks (6)

b) The h parameters of a two port network are $h_{11}$ = 1.5 kΩ, $h_{12} = 2 \times 10^{-3}$ , $h_{21}$ = 250 and $h_{22} = 150 \times 10^{-6}$ . Find Z parameters and draw its equivalent (7)

c) Explain Double tuned coupled coils (7)

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