B.E. ELECTRICAL ENGINEERING (PART TIME) FIRST YEAR SECOND SEMESTER EXAMINATION(OLD), 2018

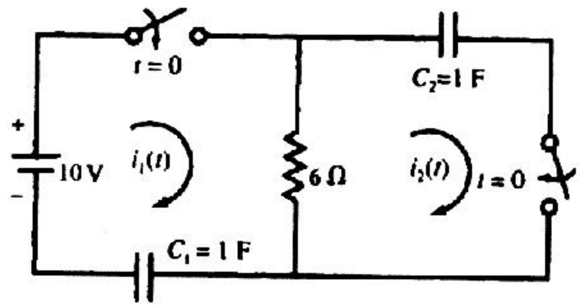
SUBJECT : CIRCUIT THEORY

Full Marks -100

Time : Three hours

Use Single Answer-Script

Answer any five questions

No. of question		Marks
1.a)	Write down Initial value and Final value theorem of Laplace Transform.	6
b)	Verify Initial and Final value theorem for (i) $t + \text{Sin } 3t$ and (ii) $1 + e^{-t}(\sin t + \cos t)$.	8
c)	Derive the Laplace transform of a repetitive half-wave rectified sinusoidal voltage waveform. Consider the amplitude and the time period of the rectified voltage as V_m and T respectively.	6
2. a)	A series circuit, composed of a 15 ohm resistor and a 100 mH inductor, is connected across a 100 V, 50 Hz sinusoidal supply. Assuming, the initial current to be zero, find expression for the instantaneous current in the circuit for $t \geq 0$. Sketch the waveforms of the transient, steady-state and the total current in the circuit.	10
b)	In the following circuit, two switches are closed simultaneously at $t = 0$. The voltages across capacitors C_1 and C_2 before the switches are closed are 2V and 5 V respectively. Find the currents $i_1(t)$ and $i_2(t)$. Also determine the voltages across the capacitors at $t = 0^+$. 	10
3.a)	State when a two-port network is stated as reciprocal and symmetric.	4
b)	Prove the condition for Reciprocity and Symmetry for a two-port network in terms of ABCD parameters.	8
c)	The open circuit impedance parameters of a certain two port network are $z_{11} = 15$ ohm, $z_{12} = 5$ ohm, $z_{21} = 5$ ohm, $z_{22} = 10$ ohm. Find the transmission parameters of the network.	8

[Turn over

Ref. No. Ex/EE/5/T/121/2018(Old)

B.E. ELECTRICAL ENGINEERING (PART TIME) FIRST YEAR SECOND SEMESTER EXAMINATION(OLD), 2018

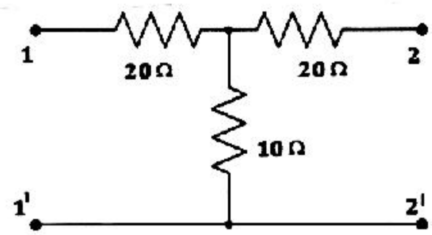
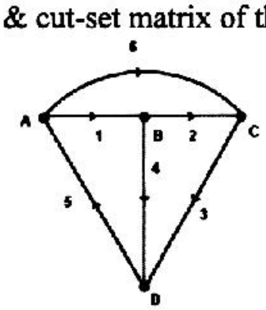
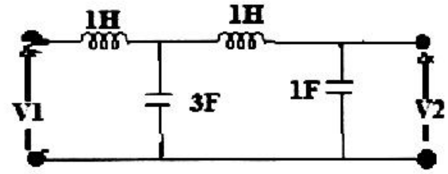
SUBJECT : CIRCUIT THEORY

Full Marks -100

Time : Three hours

Use Single Answer-Script

<u>Answer any five questions</u>

4.a)	Draw a two port network whose y parameters are $y_{11} = -y_{12} = -y_{21} = y_{22} = 5$ mho. If two such networks are cascaded then determine the y parameter of the overall network.	6
b)	Obtain the Z-parameters of any two port network in terms of its hybrid parameters.	8
c)	Find the short circuit admittance parameters of the T network shown in fig below:	6
		
5.a)	Define tree, twig, link and co-tree of a graph of any electrical network with suitable example.	8
b)	Find the no. of possible trees of the given graph. Also write down the reduced incidence matrix, tie-set matrix & cut-set matrix of this graph.	8
		
c)	Determine the driving point impedance and transfer admittance of the given network.	4
		

Ref. No. Ex/EE/5/T/121/2018(Old)

B.E. ELECTRICAL ENGINEERING (PART TIME) FIRST YEAR SECOND SEMESTER EXAMINATION(OLD), 2018

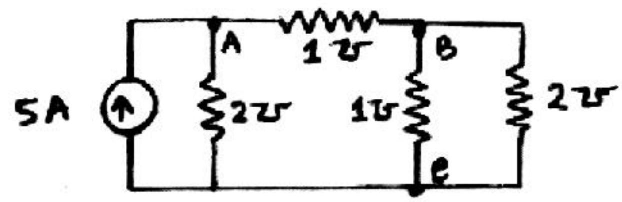
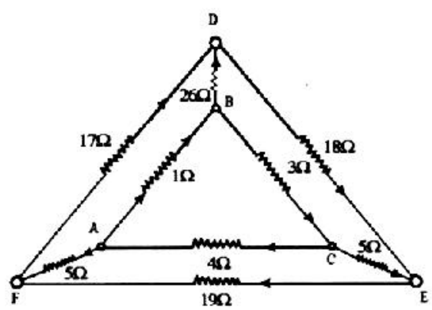
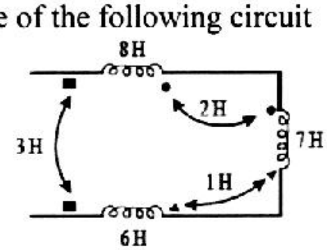
SUBJECT : CIRCUIT THEORY

Full Marks -100

Time : Three hours

Use Single Answer-Script

<u>Answer any five questions</u>

<table>
<tr><td>6.a)</td><td>Write down the equilibrium equation on node basis for the given network:

</td><td>12</td></tr>
<tr><td>b)</td><td>Find out the TIE Set Matrix of the following circuit after drawing the directed graph.

</td><td>8</td></tr>
<tr><td>7.a)</td><td>Show that in a series R-C circuit, initially relaxed and excited at t = 0 with a step voltage source v.u(t), the voltage across the capacitor rises to 0.632v at the end of an interval of one time constant.</td><td>8</td></tr>
<tr><td>b)</td><td>State and Prove Thevenin's Theorem.</td><td>4</td></tr>
<tr><td>c)</td><td>Two coils with self inductance of 2 H and 5 H are mutually coupled, the coefficient of coupling being 0.5. The coils are connected in series and produce flux in the opposite directions in the common magnetic circuit. Find equivalent inductance of the combination.</td><td>8</td></tr>
<tr><td>8.a)</td><td>Find out equivalent inductance of the following circuit

</td><td>4</td></tr>
</table>

[Turn over

Ref. No. Ex/EE/5/T/121/2018(Old)

B.E. ELECTRICAL ENGINEERING (PART TIME) FIRST YEAR SECOND SEMESTER EXAMINATION(OLD), 2018

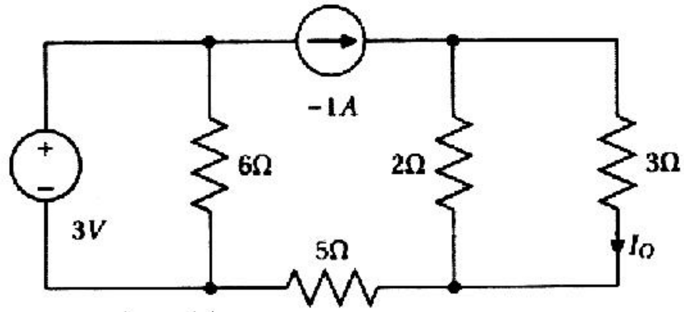
SUBJECT : CIRCUIT THEORY

Full Marks -100

Time : Three hours

Use Single Answer-Script

Answer any five questions

b)	Use Thevenin's theorem to determine I_O in the circuit shown below:. 	8
c)	Write a short note on the concept of "Complex frequency".	8