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ELL100: Fundamentals of Electrical Engineering

Minor Exam I (Semester II 2014-15)

Duration: 1 hour

Total Marks: 20

1. For a linear resistive network as shown in Fig. 1, when the resistance across the terminals *ab* i.e., $R_{ab}=10\Omega$, the voltage $V_{ab}=2V$. For the same network, when $R_{ab}=20\Omega$, $V_{ab}=3V$. Find V_{ab} for $R_{ab}=5\ \Omega$. (3 Marks)

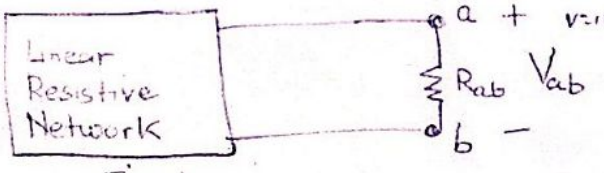

Fig. 1

2. Consider the circuit shown in Fig. 2, where V_0 is unknown. When the switch S is open (as shown in the figure), the voltage 'V_R' across the 30 Ω resistor is measured to be $V_R=22.5$ V. Determine V_R after the switch S is closed. (5 Marks)

Use Superposition principle only.

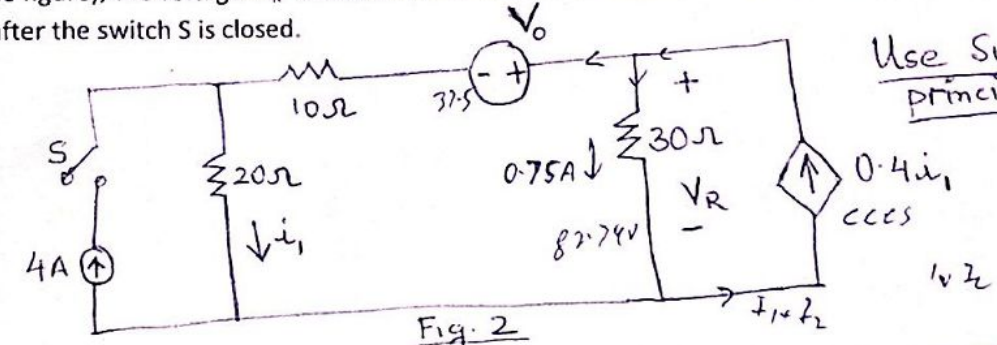

Fig. 2

3. Consider the circuit shown in Fig. 3. The switch S is closed for a long time. At time t = 0, S is thrown open. Find the voltage $v_L(t)$ and the current $i_L(t)$ for $t \geq 0$. (5 Marks)

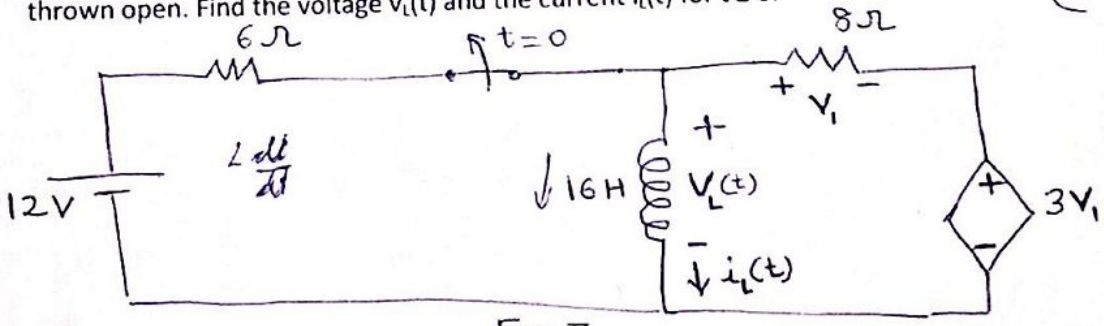

Fig. 3

4. For the circuit shown in Fig. 4, (2 + 5 Marks)
   a. Calculate $Y_{ab} = Y_{ab} \angle \phi_{ab}$
   b. Calculate the current i(t) for $t \geq 0$. (*Note the switch is closed at t = 0*).

Y_{ab} = Admittance

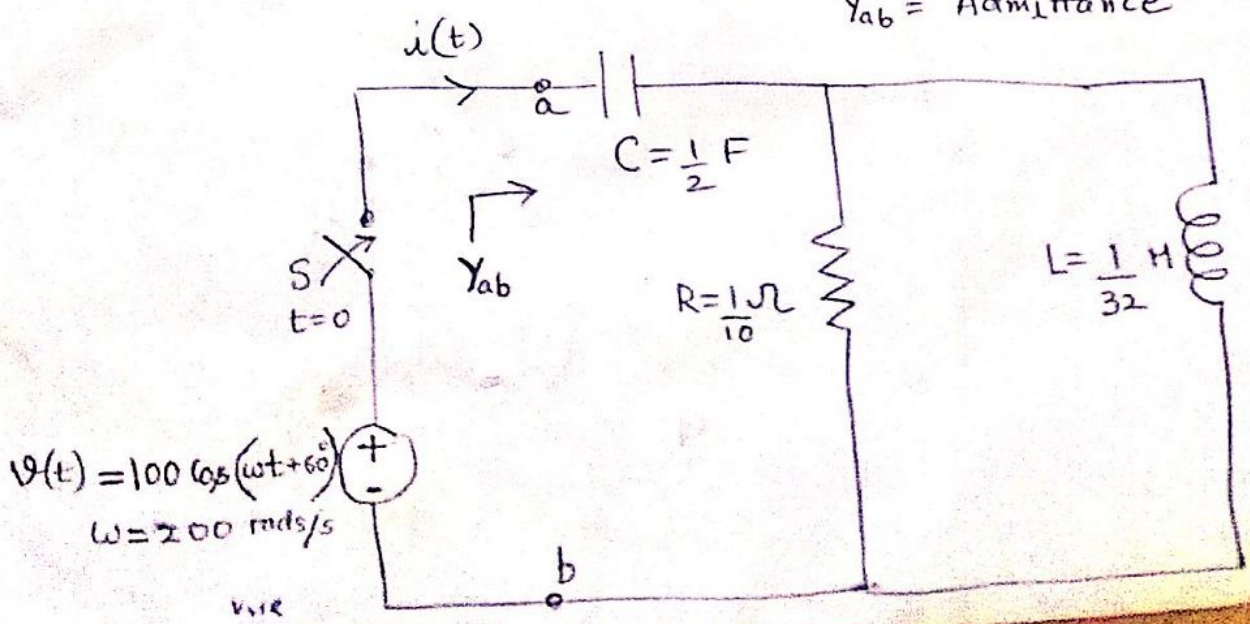

Fig. 4