

International Institute of Information Technology Hyderabad
Electrical Science-I (IEC102)
End Semester Examination

Date: 19-11-2016

Time: 9:00 AM - 12:00 PM

Roll No:.....

Programme:.....

Seat No.

Invigilator's Signature

Instructions

- This is a question cum answer booklet.
- Answer all the questions.
- Answer to each question has to be written only in the space provided for that question.
- Last two sheets can be used for rough work.
- Scientific calculator can be used for computing.

For Examiner

[illegible]

Questions

1. Calculate the power absorbed by each element of the circuit shown in Fig.1. (10 Marks)

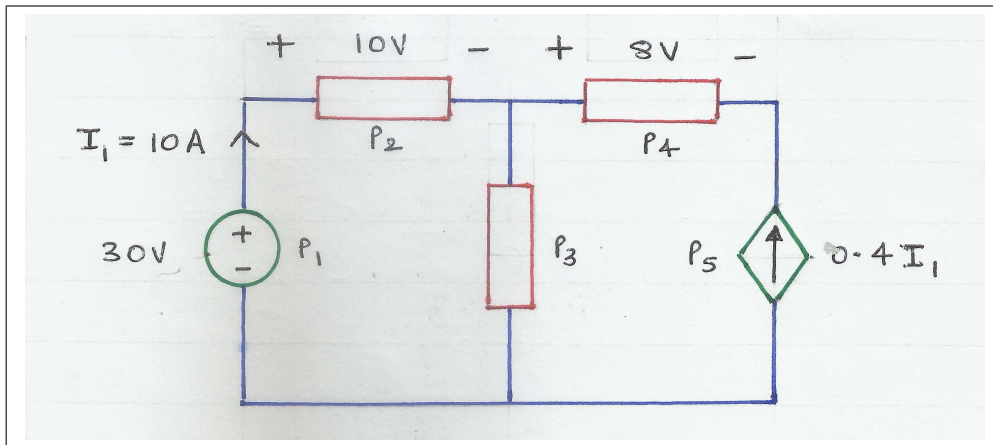


Figure 1:

2. A simple model of a photovoltaic solar cell is a current source, with the current proportional to the amount of sunlight falling on it. There is some leakage current that can be modeled with a parallel resistor, and there is voltage drop in the interconnect that we can model with series resistances connecting to the load resistor. So a crude model of the complete system can be represented as a circuit shown in Fig. 2. (10 Marks)

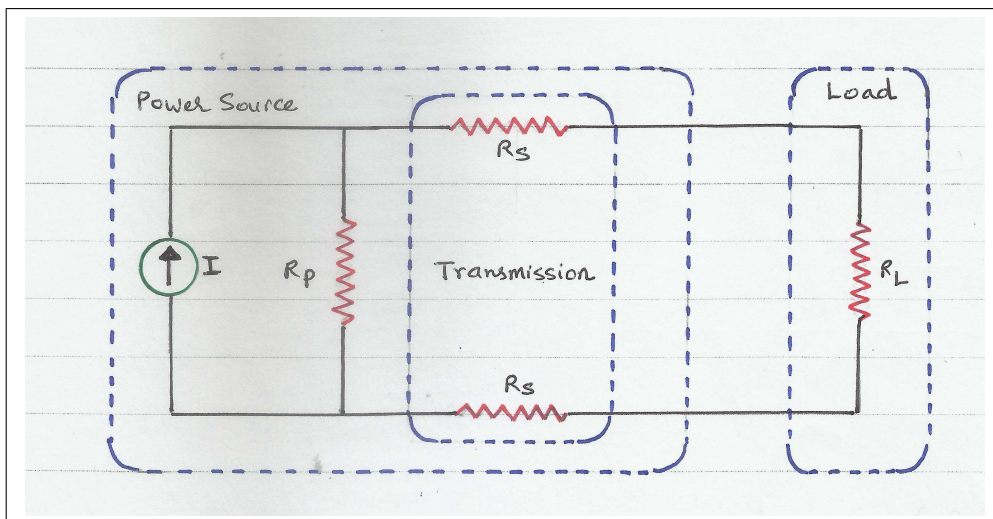


Figure 2:

If $I = 0.2 \text{ A}$, $R_p = 3 \Omega$, and $R_s = 1.8 \Omega$, determine

- (a) the load the load resistance R_L for which maximum power is transferred to the load?
- (b) the power (in watts) that is delivered to this best load resistance.
- (c) thevenin equivalent of the circuit.
3. Determine the Thevenin equivalent of the circuit shown in Fig. 3. (10 Marks)

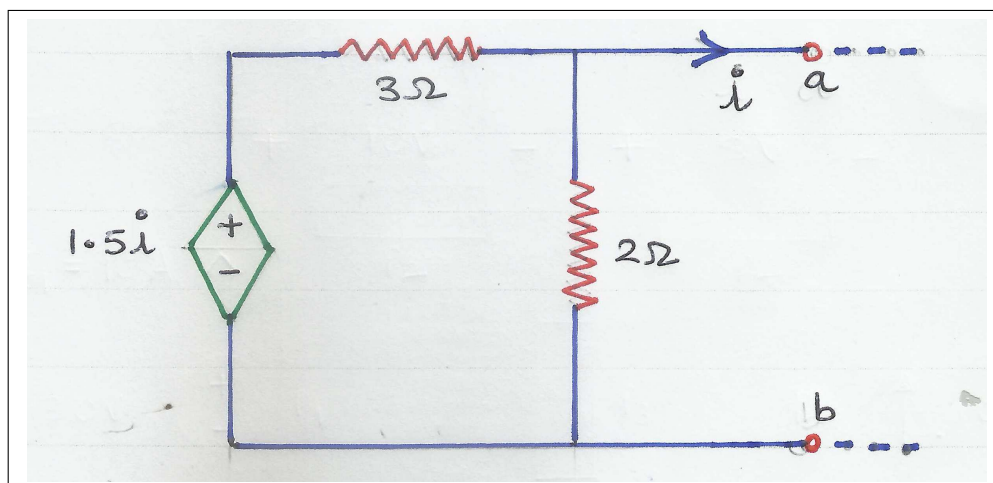


Figure 3:

4. Determine $v_C(t)$ and i_{R1} for $t \geq 0$ in the circuit shown in Fig. 4.
Given that the circuit is in steady state at $t = 0^-$. (10 Marks)

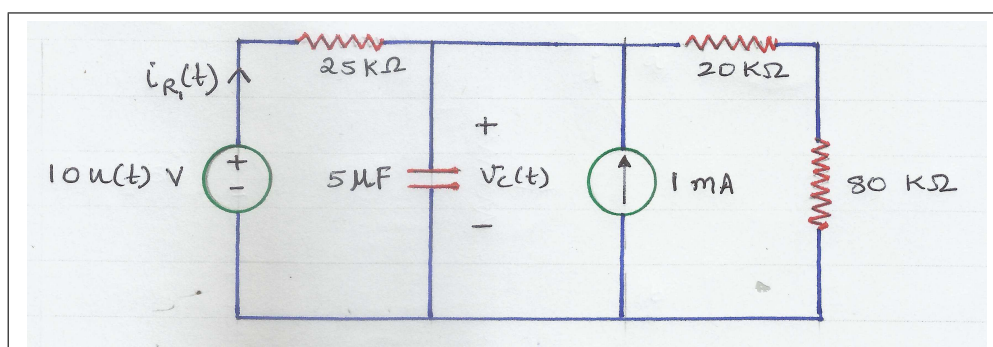


Figure 4:

5. The response of a series RLC circuit is

$$v_C(t) = 50 - 56.25e^{-t} + 6.25e^{-9t}$$

and

$$i_L(t) = 506.25e^{-t} - 506.25e^{-9t}$$

where $v_C(t)$ and $i_L(t)$ are the capacitor voltage and inductor current respectively. Determine the values of R, L, and C. (15 Marks)

6. Determine $i_1(t)$ and $i_2(t)$ in steady state for the circuit shown in shown in Fig. 5. (15 Marks)

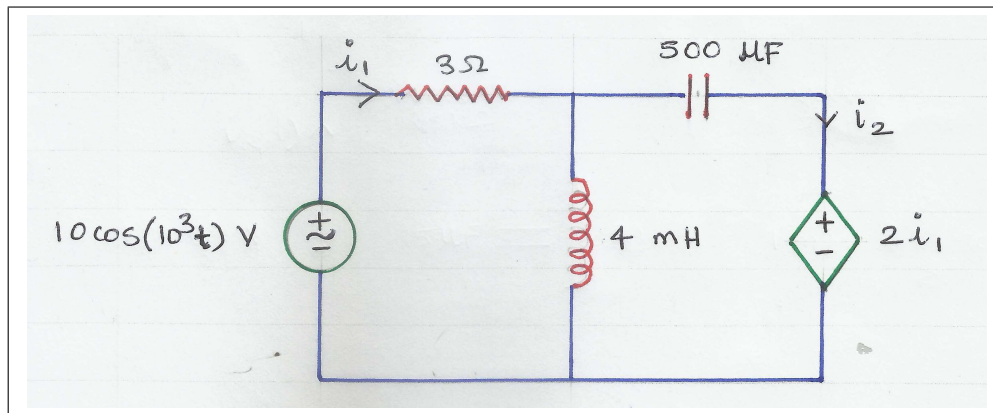


Figure 5:

7. Use superposition to find v_x in the circuit shown in shown in Fig. 6. (10 Marks)

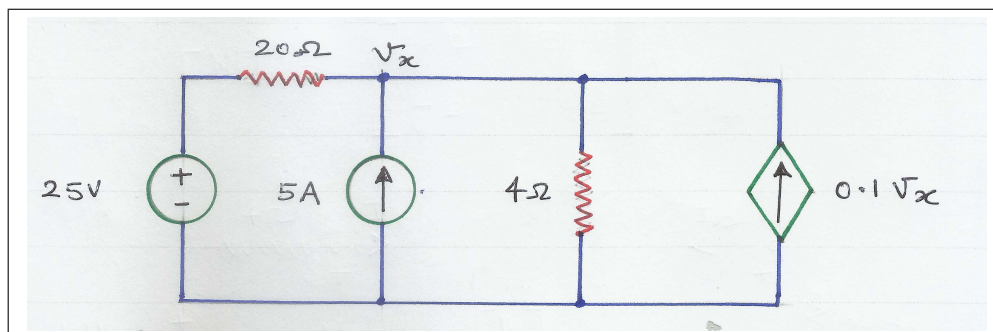


Figure 6:

8. The hybrid parameters of a 2-port network shown in Fig. 7 are

$$[\mathbf{h}] = \begin{bmatrix} 16\Omega & 3 \\ -2 & 0.01S \end{bmatrix},$$

then find

(20 Marks)

(a) V_2/V_1

(b) I_2/I_1

(c) I_1/V_1

(d) V_2/I_1

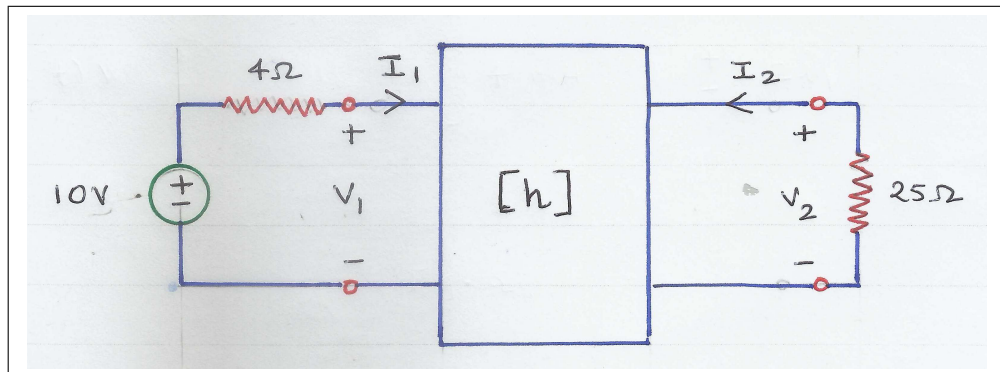


Figure 7:

1. Calculate the power absorbed by each element of the circuit shown in Fig.1. (10 Marks)

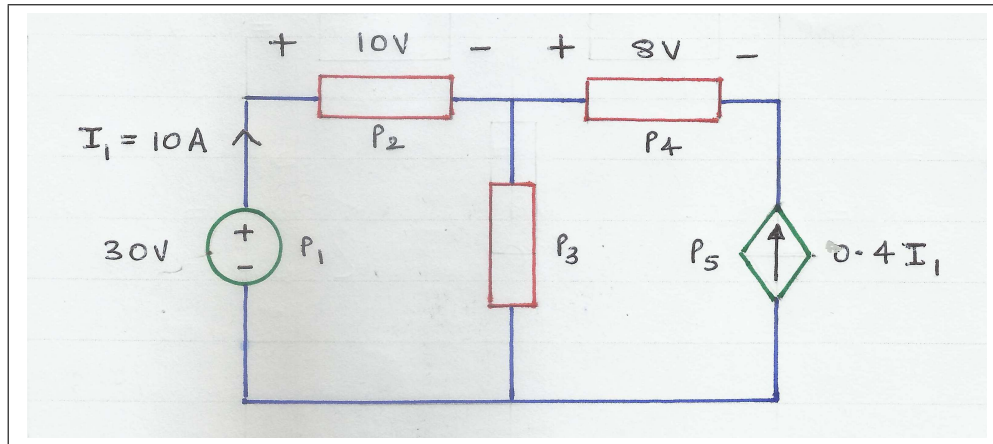


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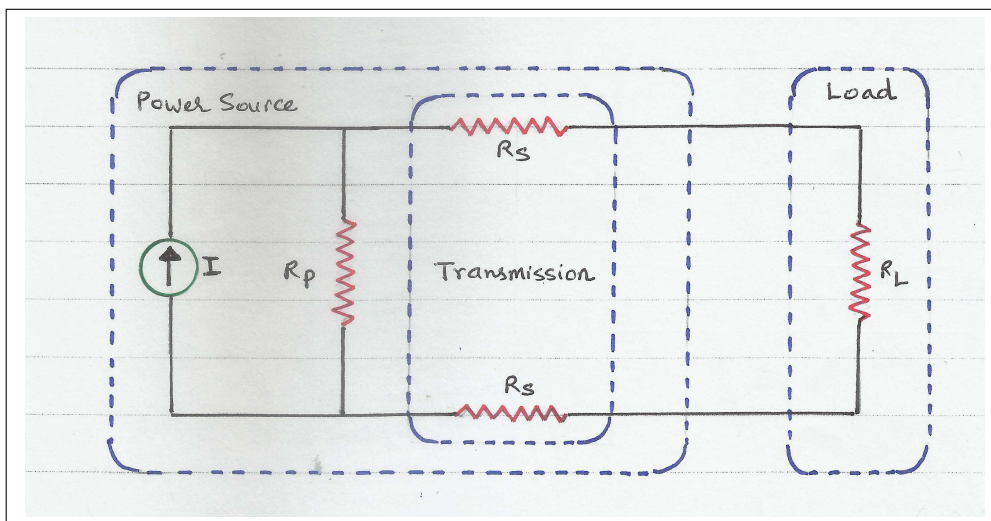


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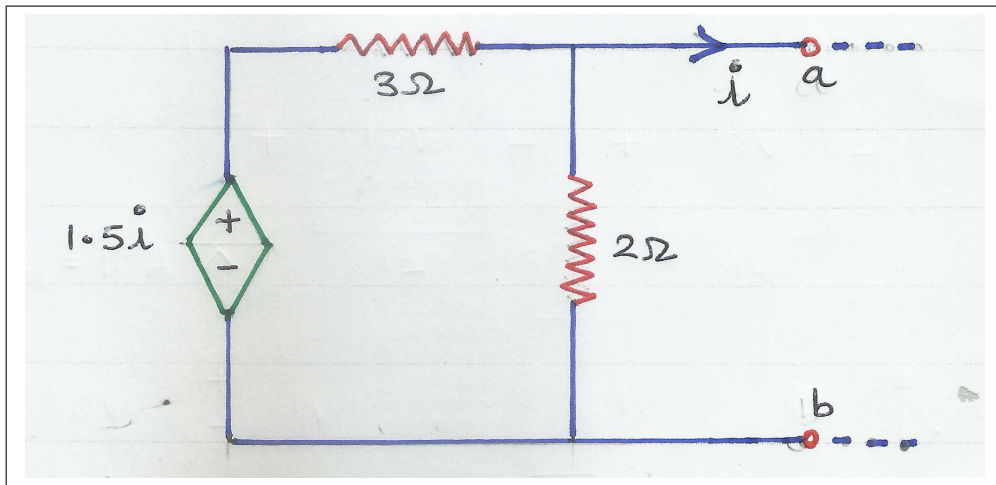


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4. Determine $v_C(t)$ and i_{R1} for $t \geq 0$ in the circuit shown in Fig. 4.

The circuit is in steady state at $t = 0^-$. (10 Marks)

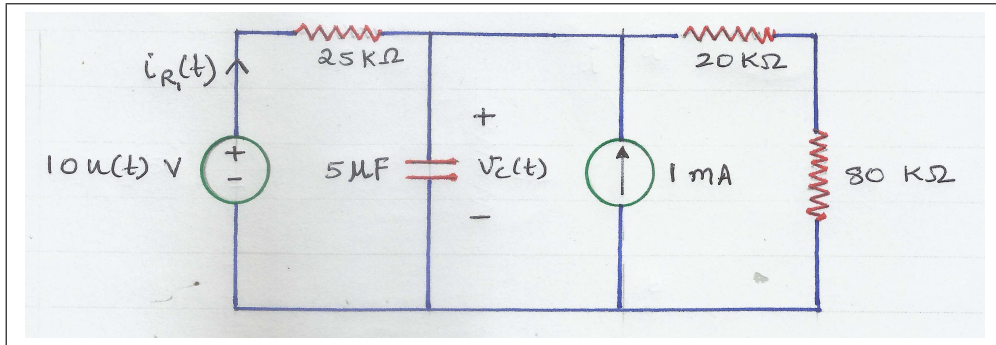


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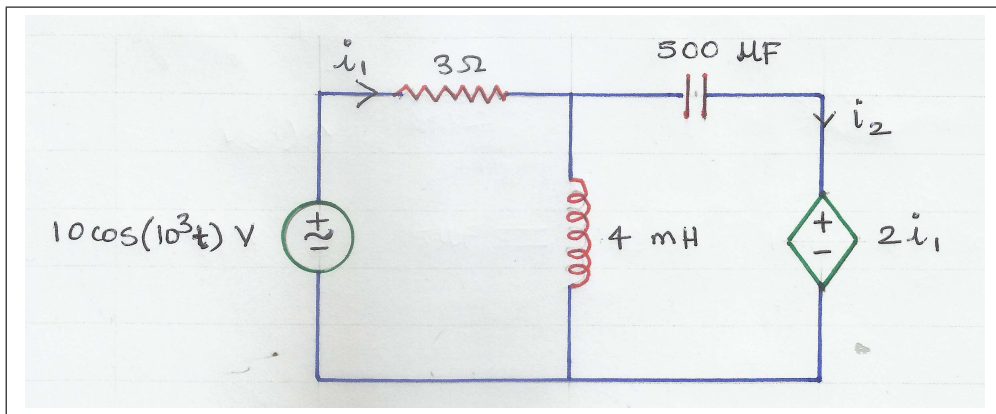


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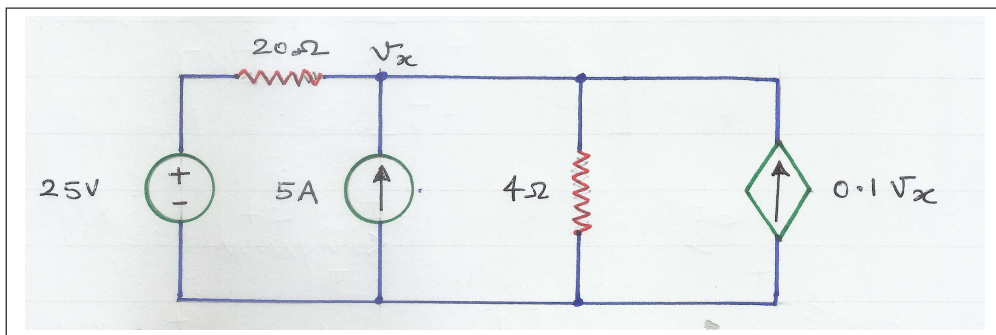


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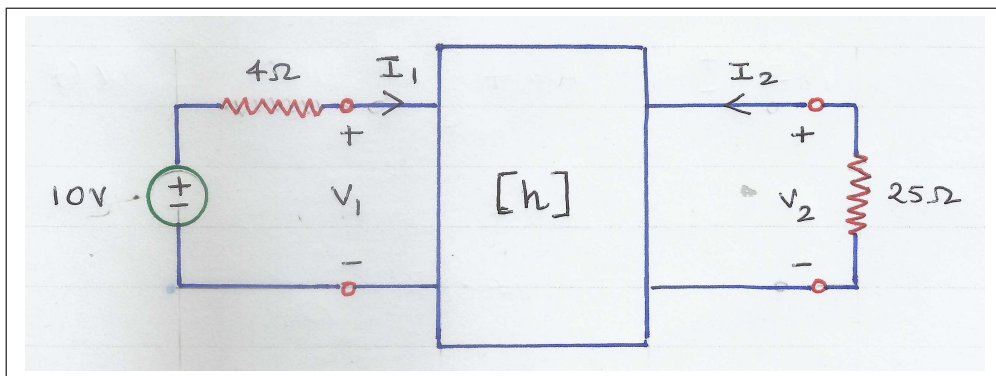


Figure 7:

Rough Work

