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

Answer	1	2	3	4	5	6	7	8	Total
Maximum Marks	10	10	10	10	15	15	10	20	100
Marks Obtained									

Questions

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

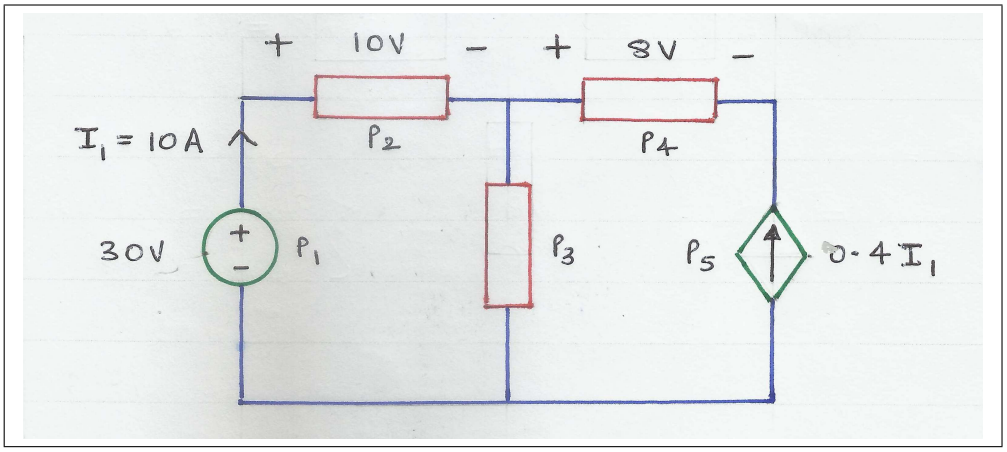


Figure 1:

2. A simple model of a photovoltaic solar cell is a current source, with the current proprtional 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)

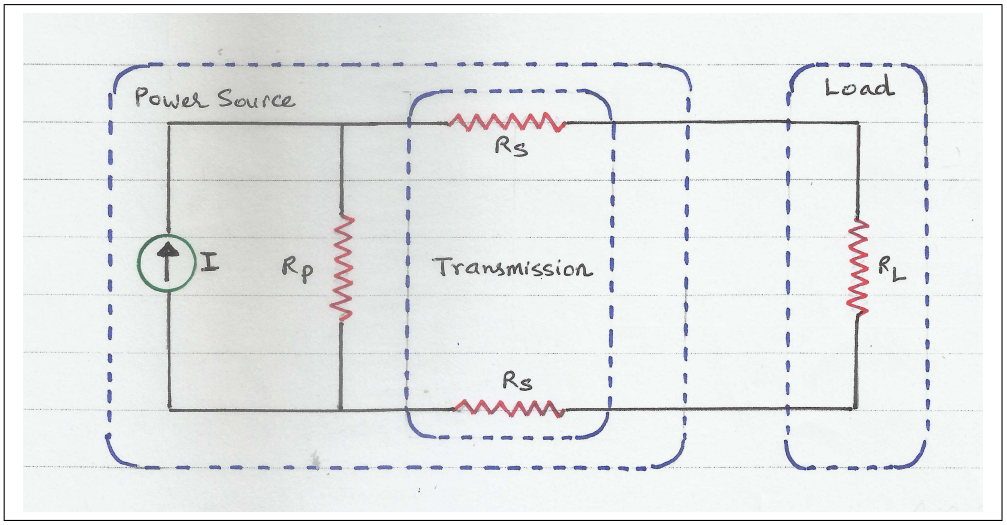


Figure 2:

If I = 0.2 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)

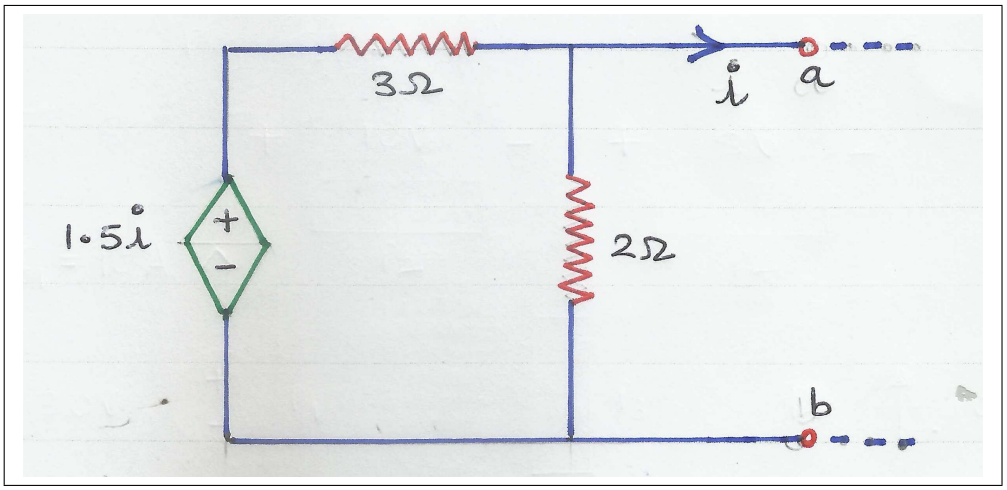


Figure 3:

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)

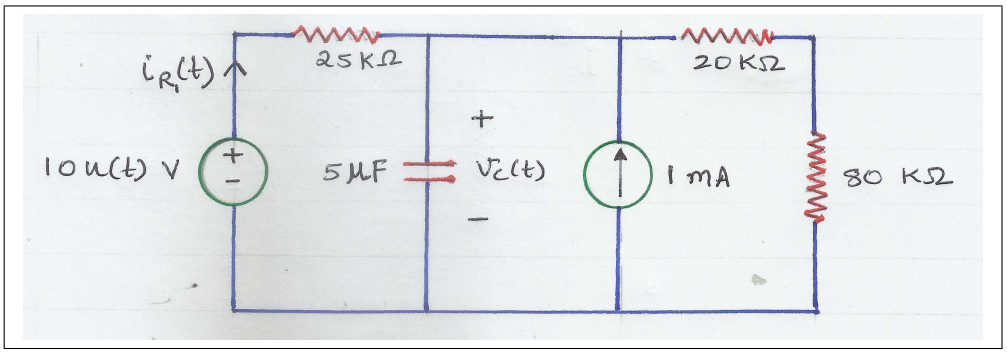


Figure 4:

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)

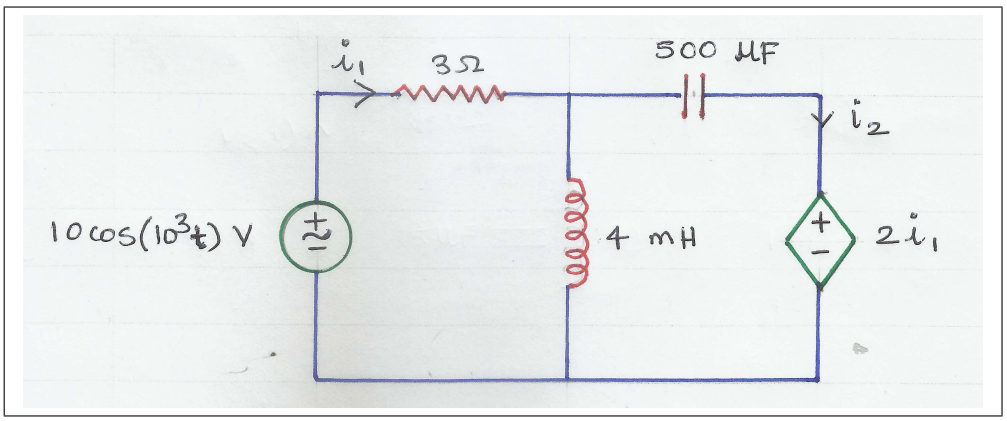


Figure 5:

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

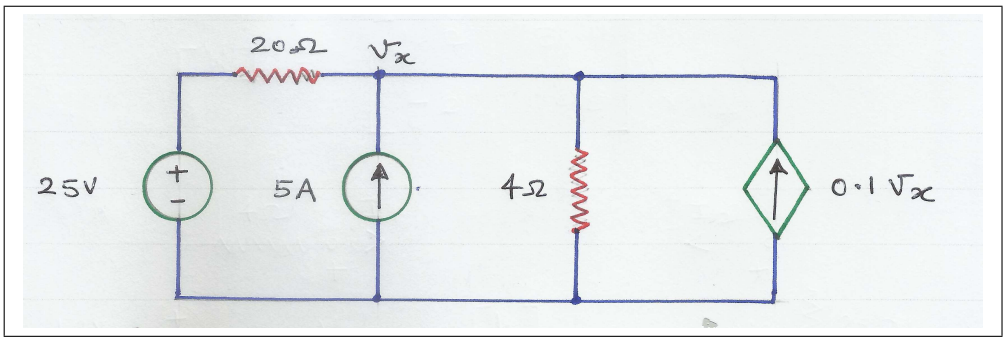


Figure 6:

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

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

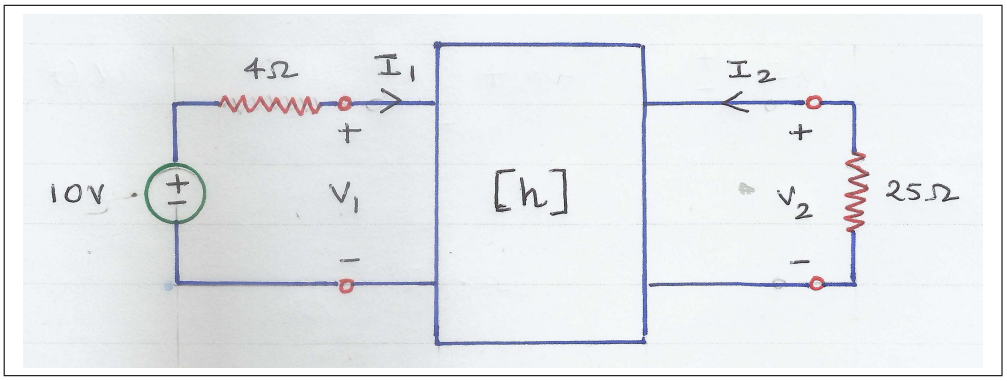
then find (20 Marks)

(a) $\mathrm{V_2/V_1}$

(b) $\mathrm{I_2/I_1}$

(c) I_1/V_1

(d) V_2/I_1



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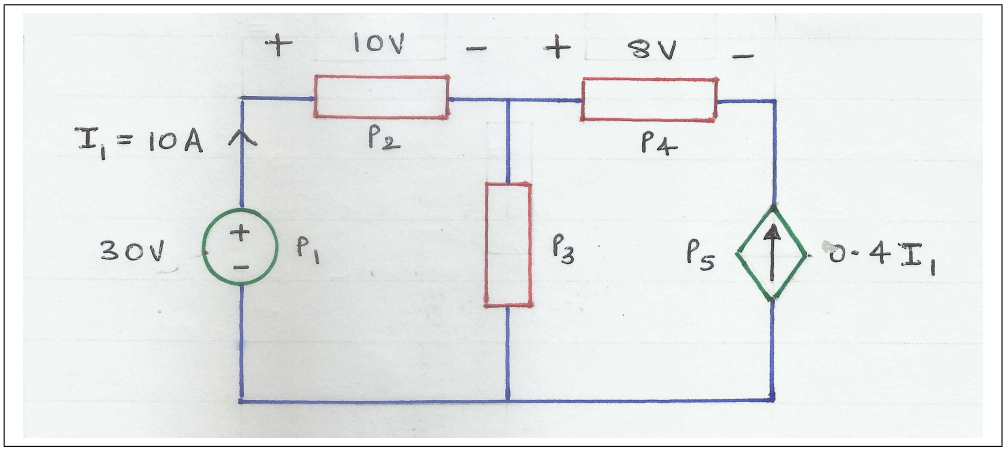

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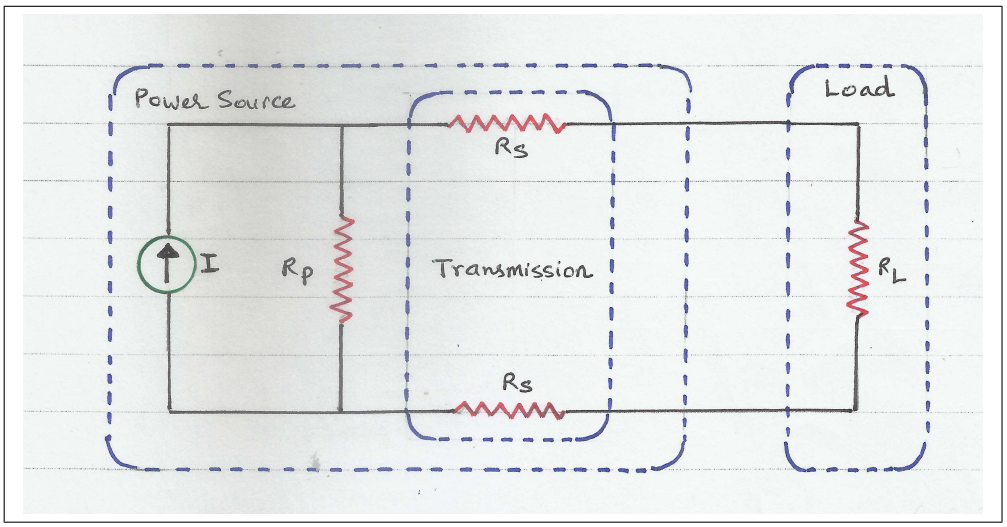

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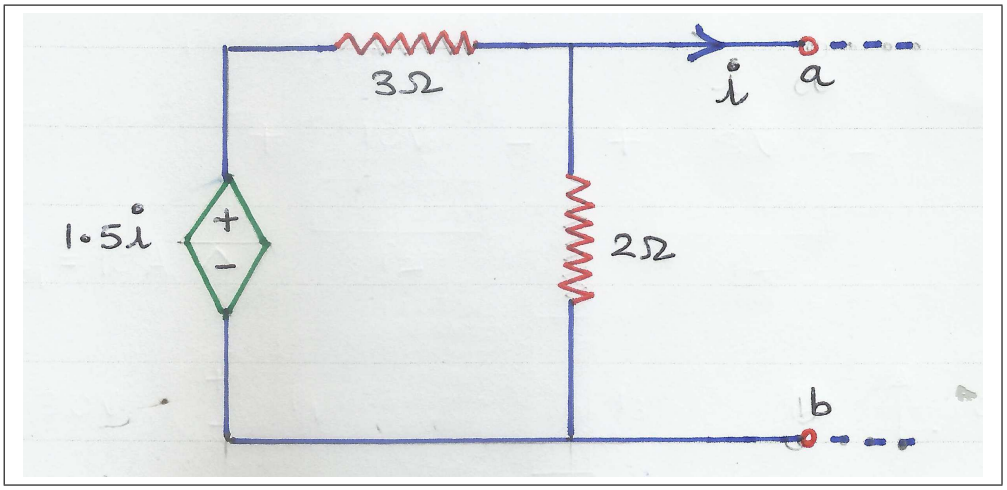

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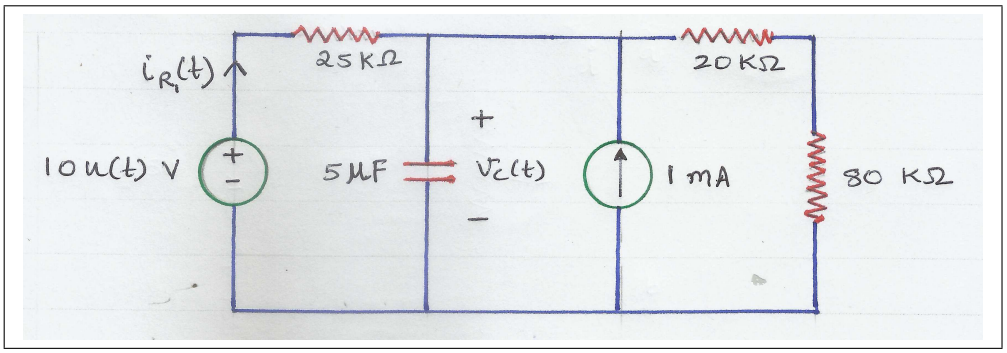

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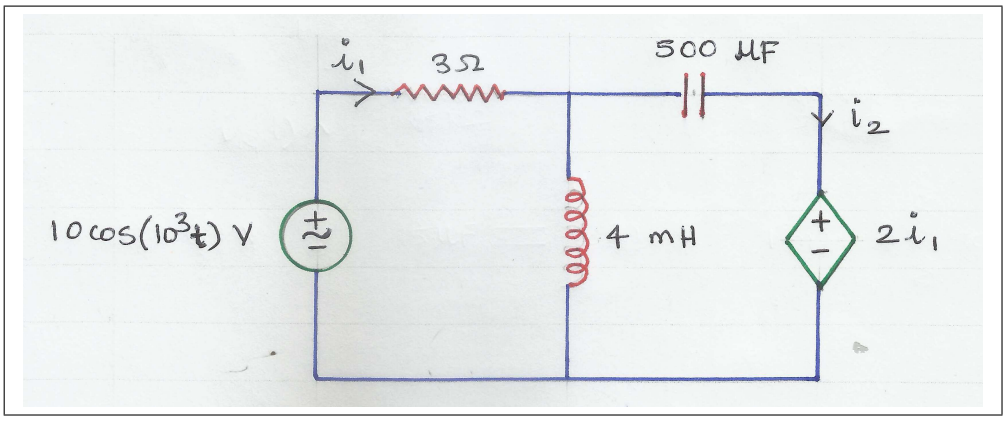

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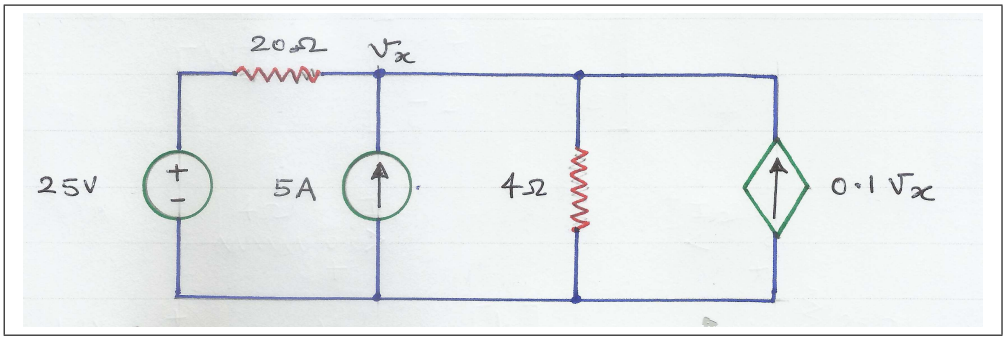

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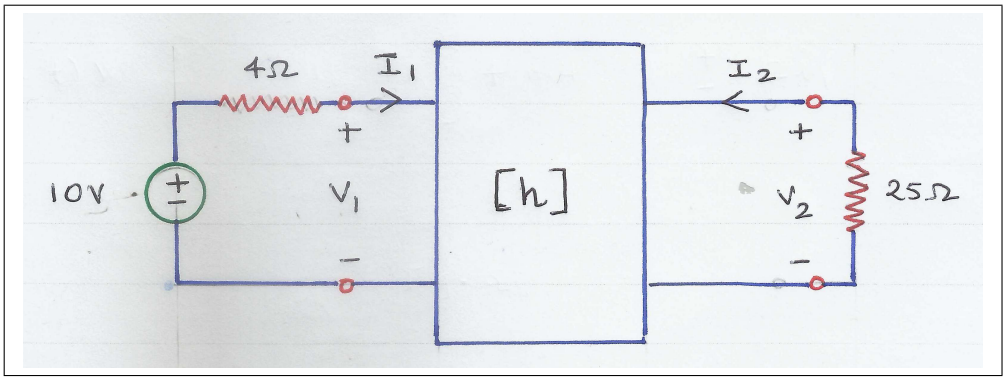

Figure 7:

Rough Work