B.Tech. / B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-III

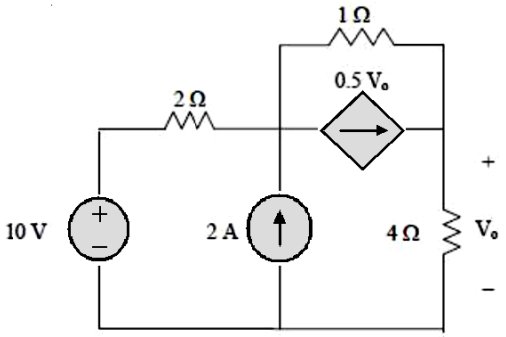
102 / 002 - Electrical Circuit Analysis

P. Pages : 4 **GUG/W/23/13853**

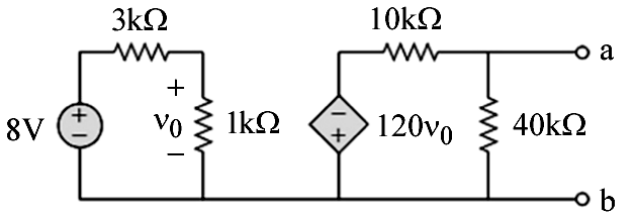
Time : Three Hours * 7 4 4 0 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
6. Use of non programmable calculator is permitted.

1. a) Use superposition to find V_0 in the circuit of fig. **8**

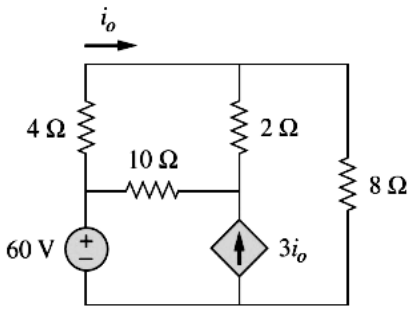


b) What resistor connected across terminals a-b will absorb maximum power from the circuit? What is that power? **8**

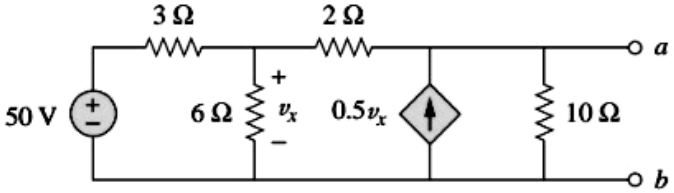


OR

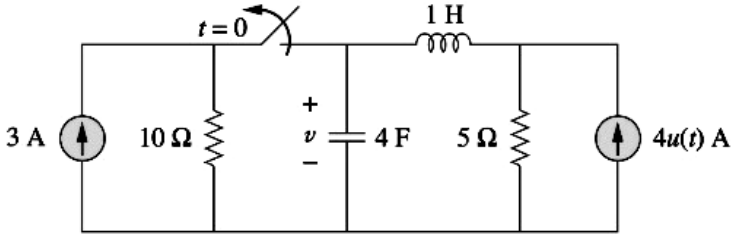
2. a) Using nodal analysis, find current i_0 in the circuit shown in fig. **8**



b) Obtain the Thevenin's equivalent circuits at terminals a-b for the circuit in fig. **8**

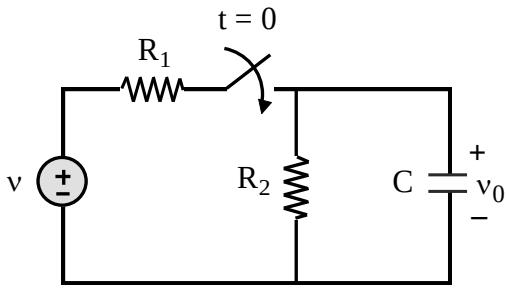


3. a) Find $v(t)$ for $t > 0$ in the circuit of fig. **8**



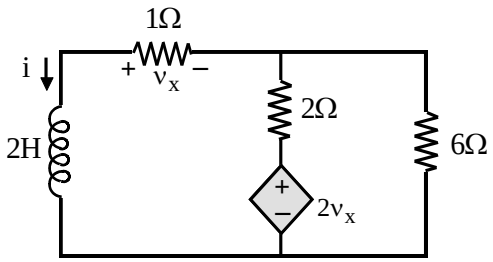
b) (a) If the switch in fig. has been open for a long time and is closed at t = 0 find $V_0(t)$ **8**

(b) Suppose that the switch has been closed for a long time and is opened at t = 0. Find $V_0(t)$ Consider, v = 12V, R_1 = 2 ohm, R_2 = 4 ohm and C = 3F.

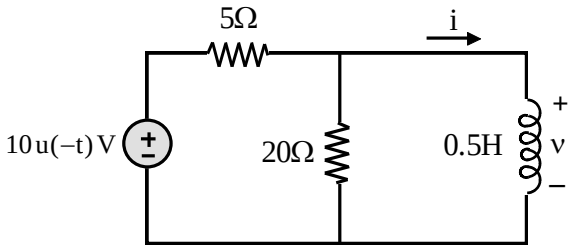


OR

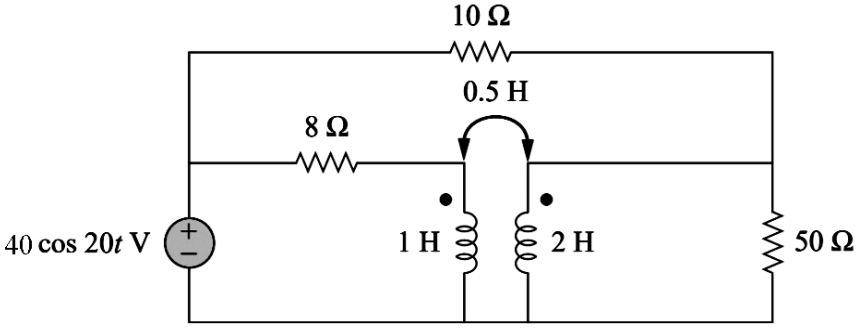
4. a) Find i and v_x in the circuit of fig. Let i(0) = 12A. **8**



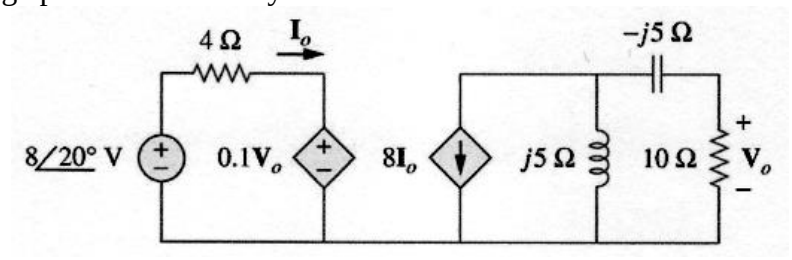
b) Obtain $v(t)$ and $i(t)$ in the circuit of fig. **8**



5. a) Find the average power delivered to the 50 ohm resistor in the circuit of fig. **8**

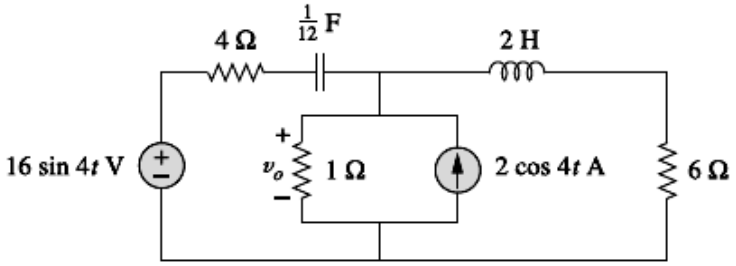


b) Find the average power absorbed by the 10 ohm resistor. **8**

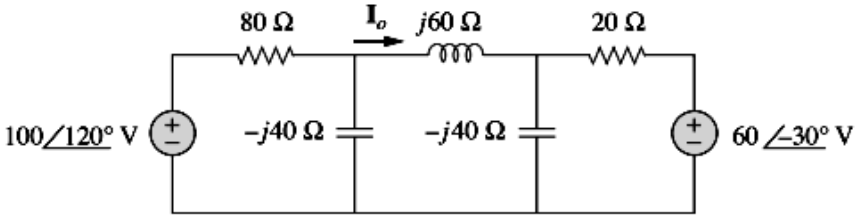


OR

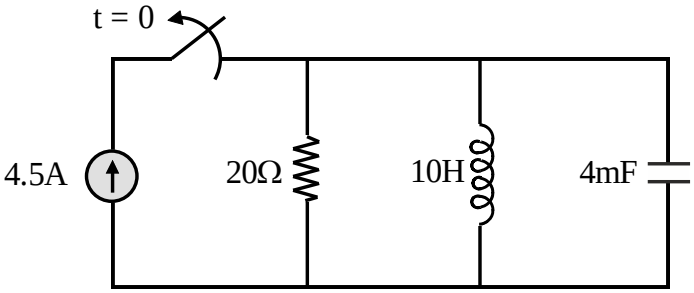
6. a) Determine V_0 in the circuit of fig. **8**



b) Determine current I_0 in the circuit. **8**

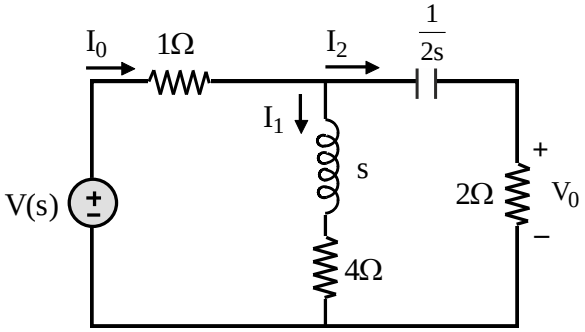


7. a) In the circuit of fig. find $v(t)$ for $t > 0$. **8**



b) For the circuit shown in fig. Determine the transfer Function. **8**

$$H(s) = \frac{V_0(s)}{I_0(s)} \text{ and } G(s) = \frac{I_1(s)}{I_0(s)}$$



OR

8. a) Solve the following differential equations subject to **8**

(a) $d^2v/dt^2 + 4v = 12,\ v(0) = 0,\ dv(0)/dt = 2$

(b) $d^2i/dt^2 + 5di/dt + 4i = 8,\ i(0) = -1,\ di(0)/dt = 0$

The specified initial conditions.

b) Find the inverse Laplace transform of **8**

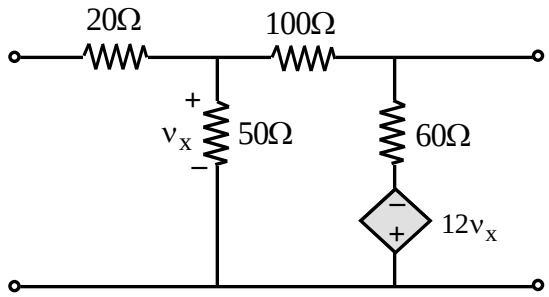
(a) $F_1(s) = \dfrac{6s^2 + 8s + 3}{s(s^2 + 2s + 5)}$ (b) $F_2(s) = \dfrac{s^2 + 5s + 6}{(s+1)^2(s+4)}$

9. a) Express **8**

a) Y-Parameters in terms of Z-Parameters

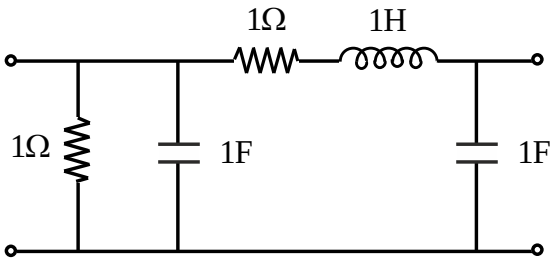
b) H-Parameters in terms of Z-Parameters

b) Calculate the impedance-parameter equivalent of the circuit in fig. **8**

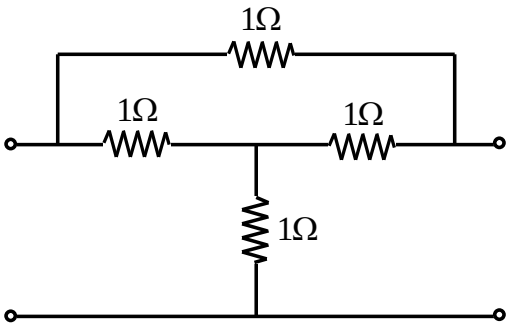


OR

10. a) Obtain the z parameters for the network in fig. as functions of s. **8**



b) For the bridge circuit in fig. obtain h-parameters. **8**



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