Code No: R13211 **R13** **SET-1**

I B. Tech II Semester Supplementary Examinations, November - 2021
NETWORK ANALYSIS
(Com. to ECE, EIE, E Com E)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**

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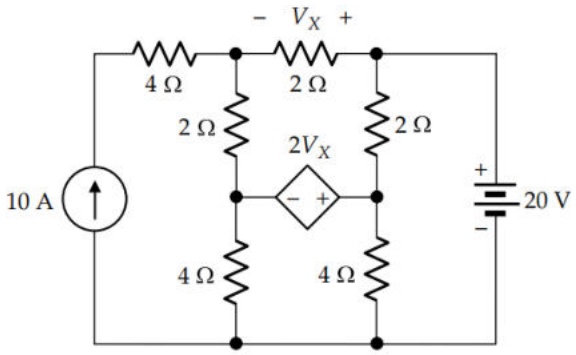
PART –A

1. a) What is the difference between active and passive element? (3M)
   b) Given $v(t) = 20\cos(\omega t - 45°)$ V and $i(t) = 10\sin(\omega t - 80°)$ A, determine which variable leads the other and by what angle. (3M)
   c) How do you use dot convention for ideal transformer circuit? (4M)
   d) Describe briefly Reciprocity theorem with an example? (4M)
   e) Define h-parameters? How do you obtain inverse h-parameters? (4M)
   f) Obtain the natural response of RC series circuit? (4M)

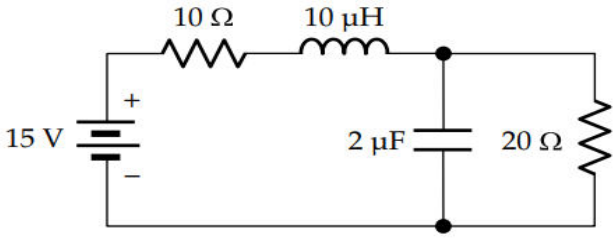
PART –B

2. a) By using the mesh analysis determine all branch currents and voltage, V_X of the circuit shown in figure. (8M)



Figure

   b) (i) Derive the dual of the circuit of figure, (ii) represent the two circuits in the dc steady state; (iii) compare voltage division in the given circuit with current division in the dual circuit; (iv) compare the power delivered or absorbed by each circuit element in the two circuits. (8M)



Figure
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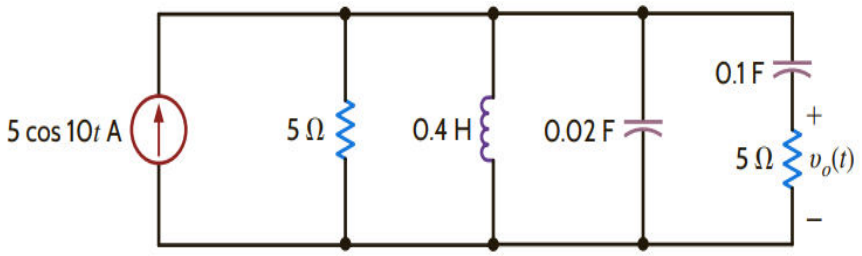
3. a) In the circuit shown in the figure, Find $\upsilon_o(t)$. (8M)



Figure

b) For each of the following cases, find the complex power, the average power, and the reactive power: (8M)

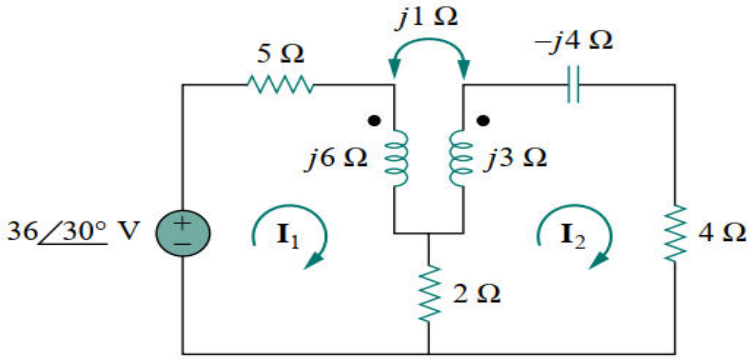
(i) $v(t) = 112\cos(\omega t + 10°)$ V, $i(t) = 4\cos(\omega t - 50°)$ A

(ii) $v(t) = 160\cos 377t$ V, $i(t) = 4\cos(377t + 45°)$ A

(iii) $\mathbf{V} = 80\angle 60°$ V rms, $\mathbf{Z} = 50\angle 30°$ Ω

(iv) $\mathbf{I} = 10\angle 60°$ V rms, $\mathbf{Z} = 100\angle 45°$ Ω

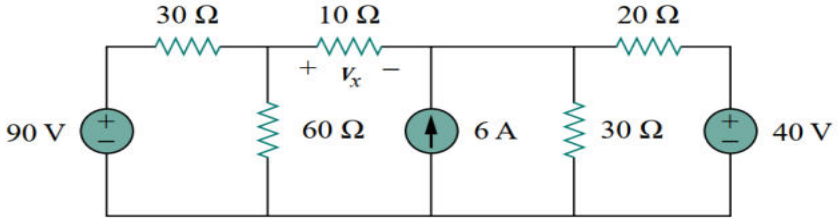
4. a) Find $\mathbf{I_1}$ and $\mathbf{I_2}$ in the circuit of below figure. Calculate the power absorbed by the 4 Ω resistor. (8M)



Figure

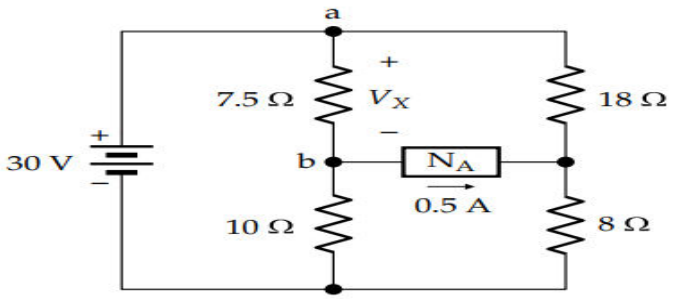
b) It is expected that a parallel *RLC* resonant circuithas a mid-band admittance of 25 × 10^3 S, qualityfactor of 80, and a resonant frequency of 200 krad/s. Calculate the values of *R*, *L*, and *C*. Find the bandwidth and the half-power frequencies. (8M)

5. a) Use superposition to obtain V_x in the circuit shown in figure. (8M)



Figure

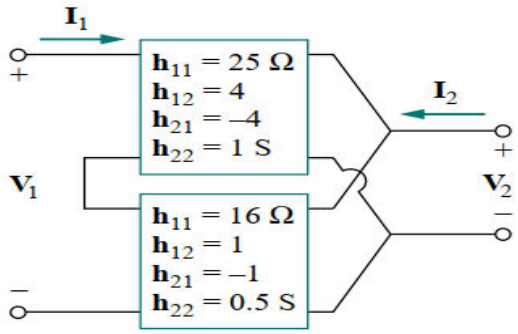
b) Determine V_X and maximum power transfer across the terminals 'ab',as shown in the figure, by deriving thevenin's equivalent circuit, where 'N_A' in the circuit that passes a current of 0.5 A. (8M)



Figure

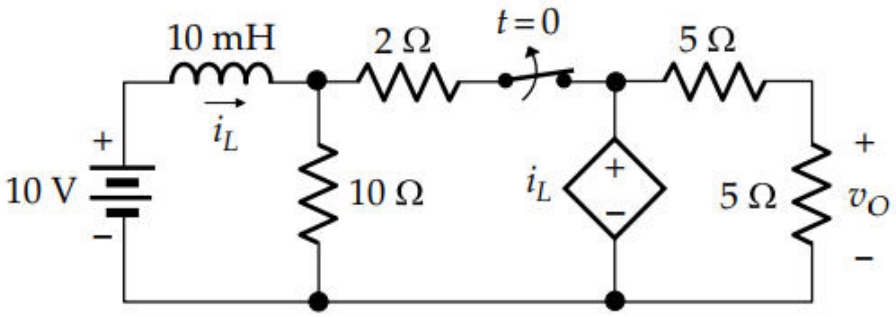
6. a) For a two-port, let A = 4, B = 30, C = 0.1 S,and D = 1.5. Calculate the input impedance $Z_{in}= V_1/I_1$, when, (i) the output terminals are short-circuited, (ii) the output port is open-circuited, (iii) the output port is terminated by a 10-Ω load. (8M)

b) A series-parallel connection of two two-ports is shown in figure. Determine the zparameterrepresentation of the network. (8M)



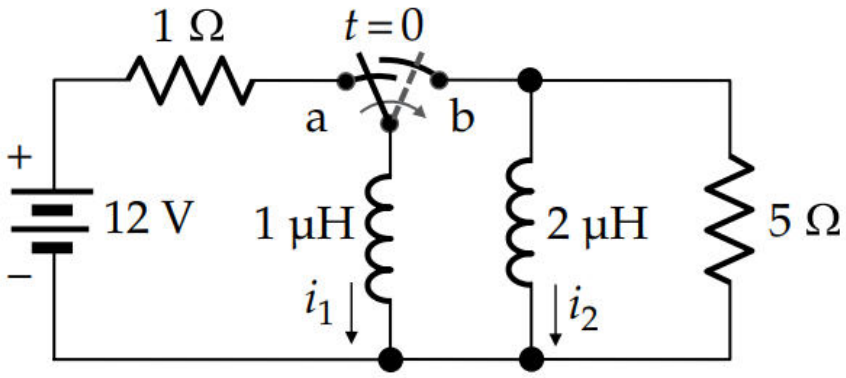
Figure

7. a) The switch in figure is opened at t = 0 after being closed for a long time. Determine $I_L(0+)$ and $v_o(t)$ (8M)



Figure

b) The switch in figure is moved to position 'b' at $t = 0$ after being in position 'a' for a long time.Determine the final values of i_1 and i_2 (8M)



Figure