(45)

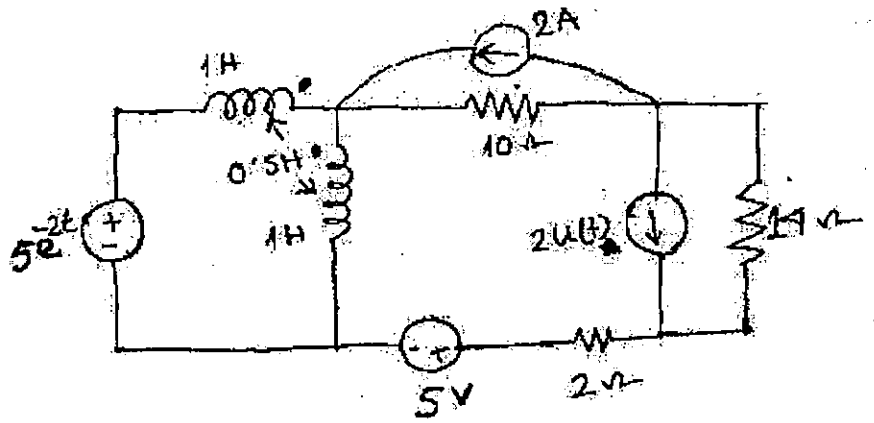
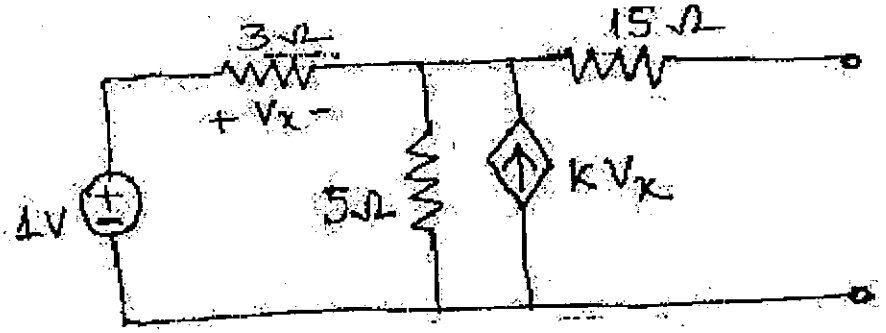
Ref No: EE/T/211/2017(S)

B.E.E 2ND YEAR 1ST SEM. SUPPLE EXAM.-2017

SUBJECT: - Circuit Theory

Time: Three hours | **Full Marks 100 (50 marks for each part)**

Use a separate Answer-Script for each part

No. of Questions	PART-I	Marks
	Answer any three, 2 marks for well organized answers	
1.	 Fig. 1(a)	
a)	Write loop equations in matrix form for the above circuit (Fig. 1(a)).	10
b)	For what value of k the open circuit voltage of the following circuit (Fig.1(b)) is zero ?  Fig. 1(b)	6
2. a)	Draw the graph of the network whose loop incidence matrix is shown as: $$B=\begin{bmatrix} 1 & 1 & -1 & 0 & 0 & 0 \\ -1 & 0 & -1 & 1 & -1 & 0 \\ 0 & 0 & 1 & 1 & 0 & -1 \end{bmatrix}$$ Choose a tree of the graph including branches 1, 2, and 4 and draw the corresponding cut-set matrix.	6

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b)	Find the short circuit current from terminal *A* to *B* for the Fig. 2. (b).	10

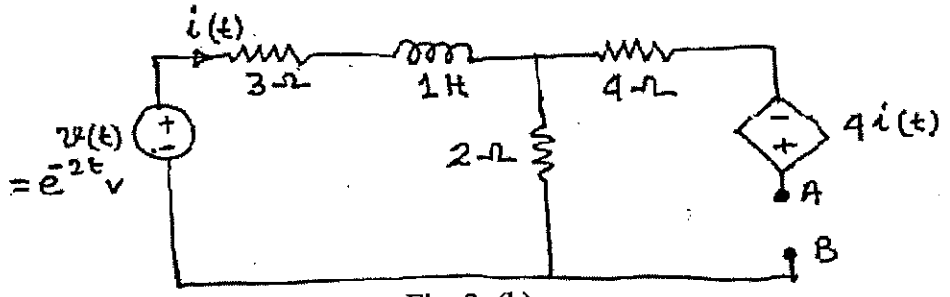

Fig. 2. (b)

3. a)	State and explain reciprocity theorem.	6
b)	Describe ***dot*** convention of coupled circuit with suitable example.	4
c)	Derive network equilibrium equations on node basis using node to element incidence matrix applying Graph Theory.	6
4. a)	State and explain ***Thevenin's theorem.***	4
b)	Apply nodal analysis to find current through 5 ohm resistor of the network given below.	12

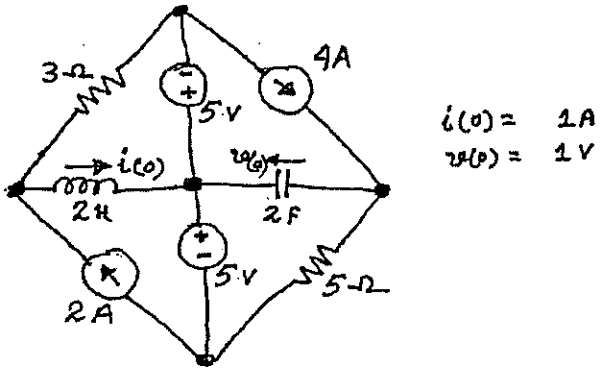

Fig. 4. (b)

5. a)	For the source of 25V, the current distribution in a source free resistive network (N) is shown in Fig. 5 a (i) given below. Find the value of current '*i*' for the conditions shown in Fig. 5 a (ii).	8

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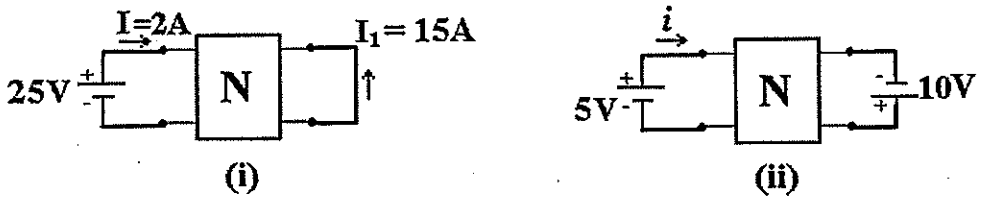

Fig. 5 (a)

b) Find the resistance seen by the independent voltage source in the circuit of Fig. 5 (b). 8

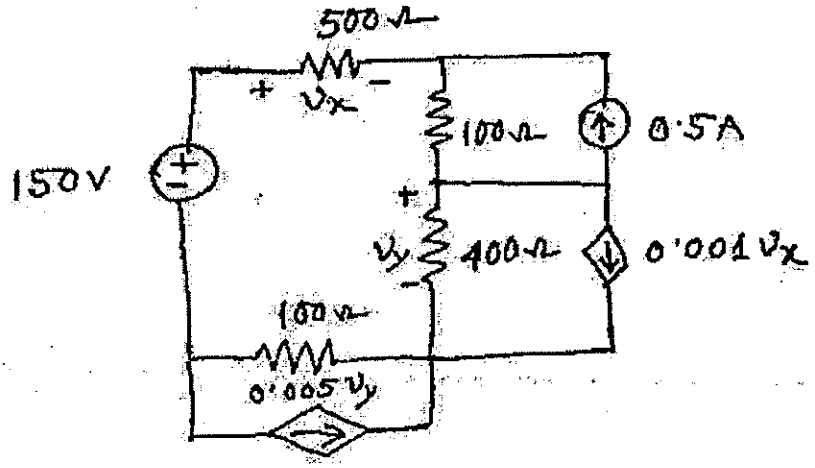

Fig. 5 (b)

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BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING EXAMINATION, 2017
(2nd Year 1st Semester, Supplementary)

SUBJECT: CIRCUIT THEORY

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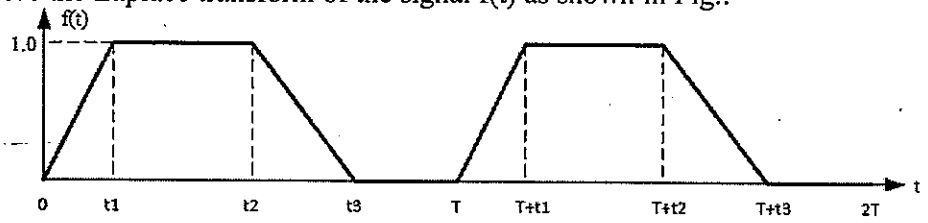
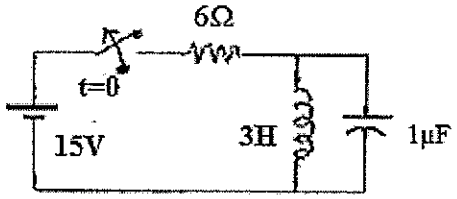
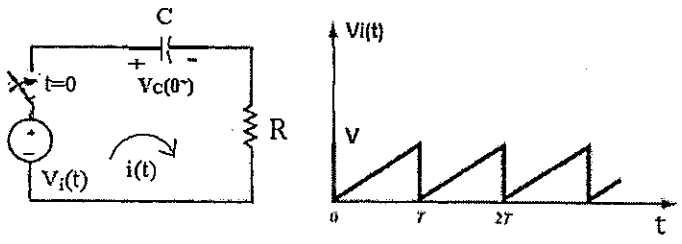
(50 marks for each part)

Use Separate Answer-Scripts for each part

No. of question	**Part II** **Answer any three questions.** **Two marks reserved for neatness and well organized answer.**	**Marks**
1.a)	Derive the Laplace transform of the signal f(t) as shown in Fig.:- 	8
b)	In the circuit shown in Fig, switch is closed and steady-state condition is reached. At time t = 0, the switch is opened. Obtain the expression of current through the inductor. 	8
2.a)	Determine the voltage drop across a resistance R for a periodic input waveform $V_i(t)$ as shown in Figure. The switch is closed at t=0. Assume $V_c(0+)=v/2$. 	10

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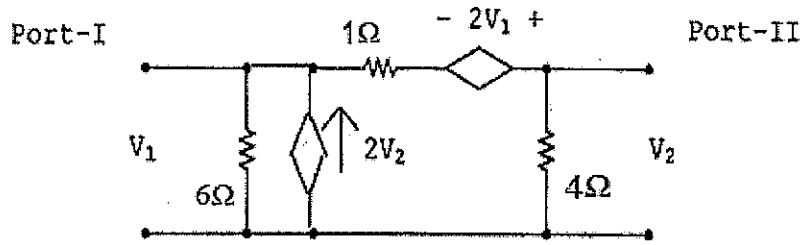
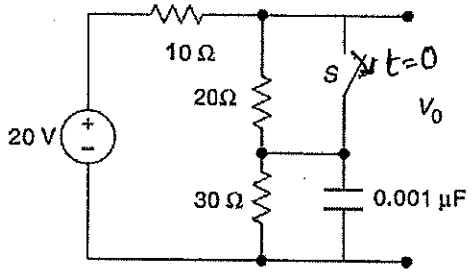
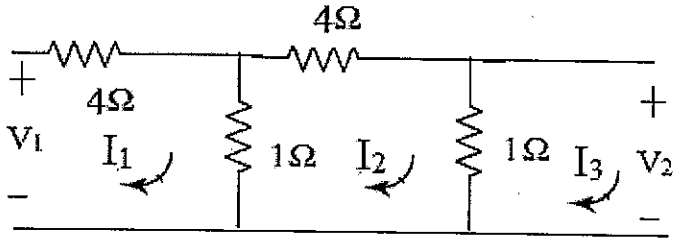
Use Separate Answer-Scripts for each part

b)	Find the Z parameters of the network shown below; 	6
3.a)	The switch S is closed for a long time in the given network. It is opened at t=0 and reclosed at t=10μs. Find the expression for voltage V_0 for t≤ 10μs and t>10μs. 	10
b)	Write a short note on the concept of "Complex frequency".	6
4.a)	Determine the transmission parameters of the network. Is it a reciprocal & symmetrical network? 	8

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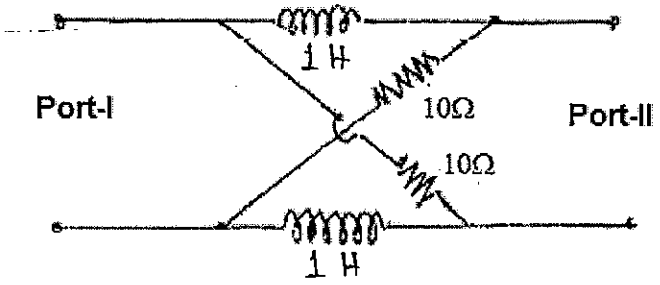
b)	Prove the condition for reciprocity and symmetry for a two-port network in terms of its short circuit admittance parameters.	8
5. a)	The open circuit impedance parameters of a certain two port network are z_{11} = 15 ohm, z_{12} = 5 ohm, z_{21} = 6 ohm, z_{22} = 10 ohm. Find the transmission parameters of the network. Derive necessary relations.	8
b)	Find the Y parameters of the network as shown in Figure: 	8