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Ref. No. : EE/5/T/112/2017(S)

B. ELECTRICAL ENGG. (EVENING) 1ST YEAR 1ST SEMESTER SUPPLE EXAMINATION, 2017

CIRCUIT THEORY

Time: Three hours | Full Marks: 100

(50 marks for each part)

Use a separate answer script for each part

PART-I

Answer *any* ***three*** questions.

Two marks reserved for neatness.

1. (a) Explain self inductance and mutual inductance.
   (b) Find out the voltage across the capacitor in fig. 1.

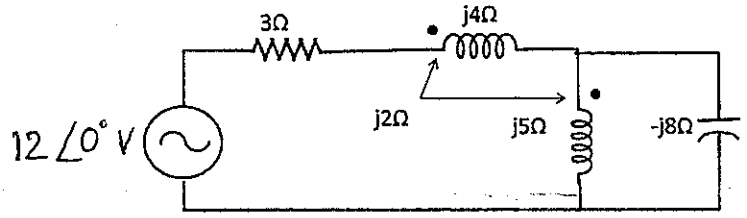

Figure 1

6 +10=16

2. (a) State and explain the superposition theorem.
   (b) Find the current through the capacitor using superposition theorem for the network in fig. 2.

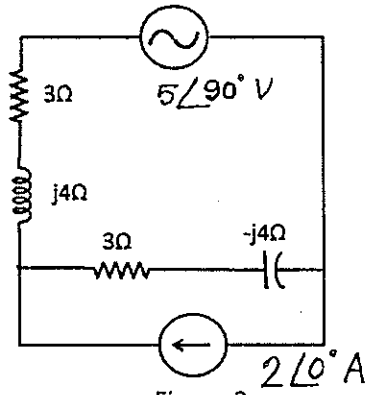

Figure 2

4+12=16

3. (a) State Thevenin's and Norton's theorem for a linear network.
(b) From the circuit in fig. 3, draw the Thevenin's equivalent circuit (looking through the terminal 'ab'). derive and

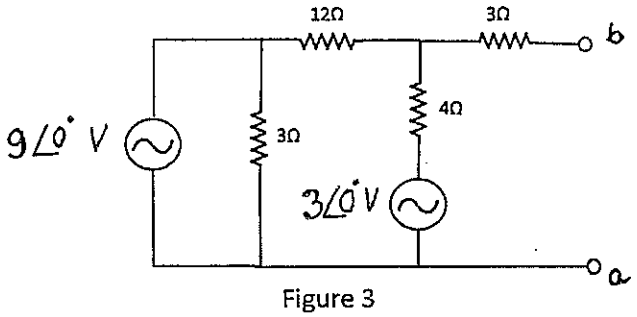

Figure 3 6+10=16

4. (a) Prove maximum power transfer theorem.
(b)In the given network shown in fig. 4, find out the the value of load Z so that it receives maximum power from the network. Also find the amount of maximum power delivered.

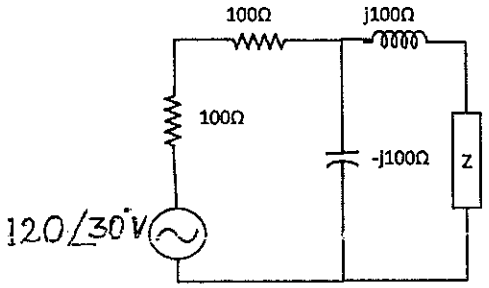

Figure 4 8+8=16

5. (a) Define tree, cotree, link and twig with suitable examples for the graph of a network.
(b) Find out the tie-set matrix of the graph in fig. 5 and express branch currents in terms of loop currents.

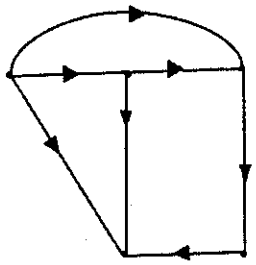

Figure 5 6+10=16

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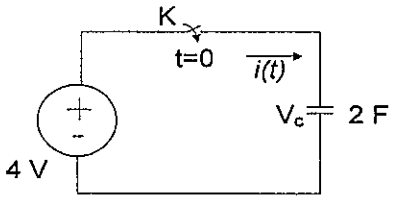
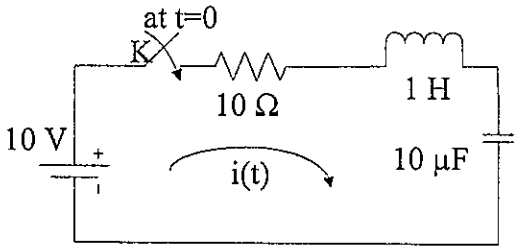
B. ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2017
(1st year, 1st Semester, Supplementary)

SUBJECT: - CIRCUIT THEORY

Time: Three hours

Full Marks: 100
(50 marks for this part)

Use a separate Answer-Script for each part

No. of Questions		PART -II Answer any Three (Two marks reserved for well organized answers)	Mark
6)	a)	In the circuit given in Fig.Q.6(a), find the current *i(t)* through the capacitor when the switch K is closed at t = 0. Explain the result so obtained. Given: $V_C(0^-) = 0$.  Fig. Q.6(a)	(8)
	b)	With suitable examples define a unit ramp function and a unit impulse function.	(8)
7)	a)	Initially the circuit shown in Fig Q.7(a) was relaxed. If the switch is closed at t = 0 , find the values of $i(0^+), \frac{di}{dt}(0^+)$ *and* $\frac{d^2i}{dt^2}(0^+)$.  Fig.Q.7(a)	(8)
	b)	Derive the transformed equivalent of capacitance and inductance with initial conditions and also draw the transformed equivalents in admittance and impedance form.	(8)
8)	a)	Find the Laplace transform of the following signal: (please turn over)	(8)

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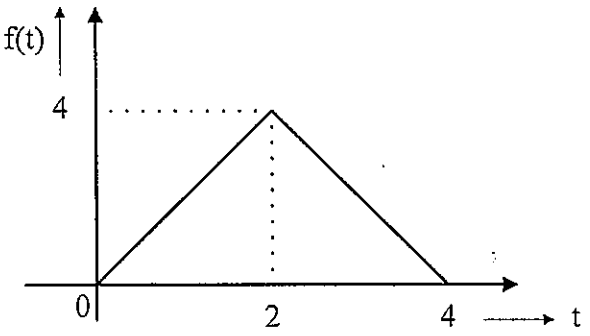

Fig. Q.8 (a)

	b)	Explain why the capacitor can be represented as a short circuit at $t = 0^+$.	(8)
9)	a)	In the circuit shown in Fig Q.9(a) determine the initial and final values of the current through the 1F capacitor.	(8)

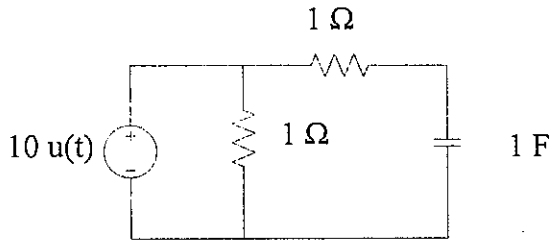

Fig.Q.9 (a)

	b)	Write a short note on complex frequency.	(8)
10)	a)	Briefly discuss a passive network and a causal network.	(8)
	b)	State the Initial Value Theorem and the Final Value Theorem. Use these theorems to find $i(0)$ and $i(\infty)$ of the following current signal: $$I(s) = \frac{5+s}{s(s+0.5)}$$	(8)