Ref. No.: EE/5/T/121/2017(Old)

B. ELECTRICAL ENGG. (EVENING) 1ST YEAR 2ND SEMESTER EXAMINATION(OLD), 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 the dot convention regarding mutual inductance.
   (b) Find out the voltage across the capacitor in fig. 1.

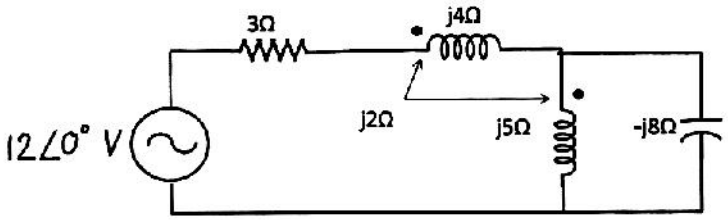

Figure 1

6 +10=16

2. (a) What are the conditions for a system to be linear? State the superposition theorem.
   (b) Find the current I_0 using superposition theorem for the network in fig. 2.

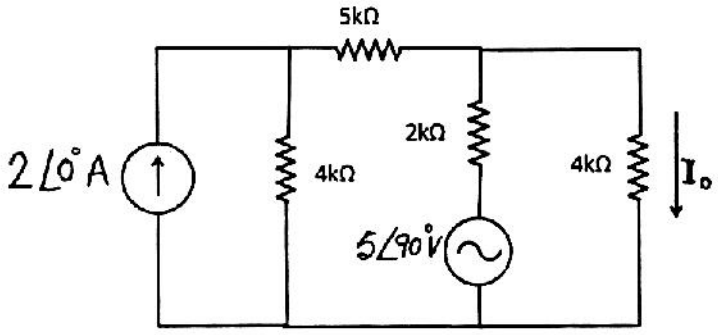

Figure 2

(2+2)+12=16

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

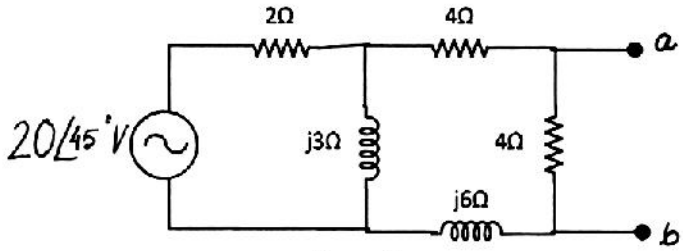

Figure 3 6+10=16

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.

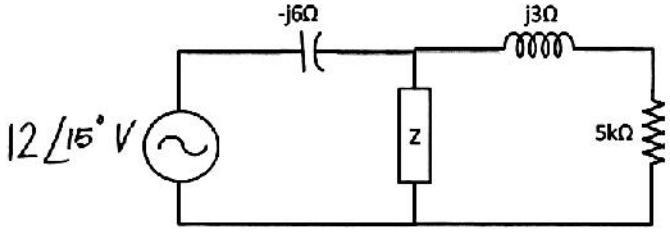

Figure 4 8+8=16

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.

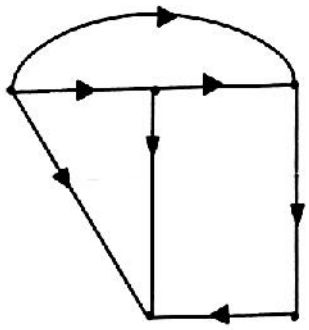

Figure 5 6+10=16

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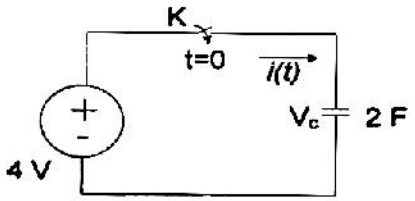
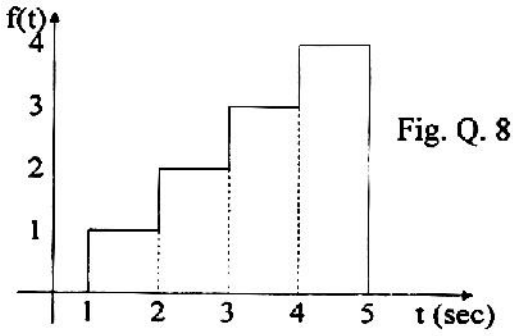
Ex/EE/5/T/121/2017 (Old)

B.E ELECTRICAL ENGINEERING (PART TIME) 1ST YEAR, 1ST SEMESTER EXAM, 2017(OLD)

SUBJECT: - CIRCUIT THEORY

Full Marks: 100

Time: Three hours (50 marks for this part)

No. of Question		PART -II Answer any Three (Two marks reserved for well organized answers)	Marks
6)	a)	With suitable examples state the differences between static and dynamic systems and continuous and discrete time systems.	(8)
	b)	With suitable example briefly discuss a passive network and a causal network.	(8)
7)	a)	Explain with suitable examples a unit ramp function and unit impulse function.	(8)
	b)	In the circuit given in Fig.Q.7(b), 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.7 (b)	(8)
8)	a)	Derive the transformed equivalent of capacitance and inductance with initial conditions and also draw the transformed equivalents in admittance and impedance form.	(8)
	b)	Express the following signal in terms of singularity functions and find its Laplace transform.  Fig. Q. 8 (b)	(8)

(please turn over)

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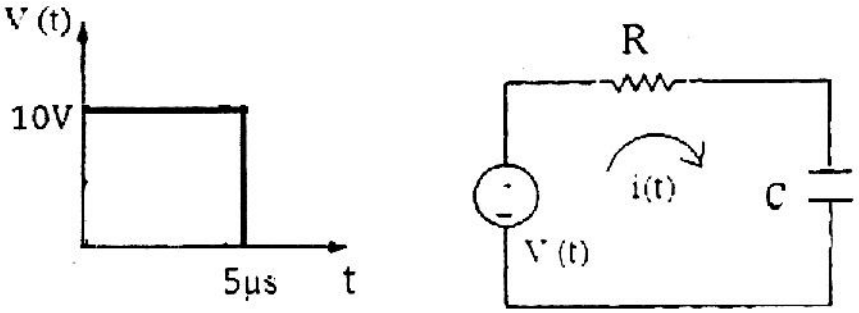
Ex/EE/5/T/121/2017 (Old)

B.E ELECTRICAL ENGINEERING (PART TIME) 1ST YEAR, 1STSEMESTER EXAM, 2017(OLD)

SUBJECT: - CIRCUIT THEORY

Full Marks: 100

Time: Three hours (**50** marks for this part)

9)	a)	Explain why the capacitor can be represented as a short circuit at $t = 0^+$.	(8)
	b)	A voltage pulse of 10V magnitude and 5 μsec duration is applied to the RC network as shown in the Fig. Q.9 (b) below. Find the current i(t) if R = 10 Ω and C = 0.05 μF.  Fig.Q.9(b)	(8)
10)	a)	Write a short note on complex frequency.	(8)
	b)	State and derive the initial value theorem and the final value theorem.	(8)