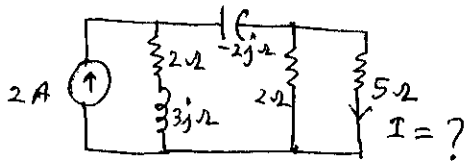
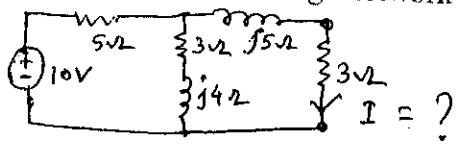
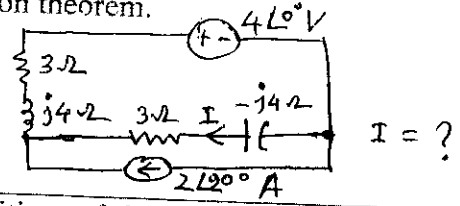
Ref. No. : EX/IT/PE/T/116/2018

B.E INFORMATION TECHNOLOGY 1ST YR, 1ST SEM. EXAMINATION- 2018
Subject: ELECTRICAL CIRCUITS Time: Three Hours Full Marks: 100

Answer any FIVE questions

No. of Questions		Marks
1.a)	Classify overhead transmission network. Derive any one type transmission network parameters from transmission line equations.	2+8
b)	Classify underground cable. Drawing a neat figure of cable cross section show different components & briefly explain their significance.	2+2+6
2.a)	State the difference between node & mesh. Solve the following network using nodal analysis method. 	2+8
b)	Define: Thevenin's theorem. Solve following network using Thenenin's theorem. 	2+8
3.a)	State Superposition theorem in any network. Solve the following network using superposition theorem. 	2+8
b)	Derive the condition of Maximum power transfer theorem in any A.C network.	5
c)	How can you convert any delta network into an equivalent star network?	5
4.a)	State the conditions of any function f(t) must be satisfied for expanding the function into Fourier series.	2
b)	In a two element series network voltage v(t) is applied which is given as– v(t)= 100+150 sine(4000t)+120 sine(8000t); The resulting current is given as– 20 sine(4000t+70^0)+25 sine(8000t+50^0); Determine the network elements & power dissipated & power factor of the circuit.	8
c)	State the conditions for which any exponential Fourier series will tend to	2

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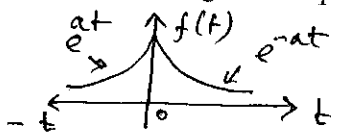
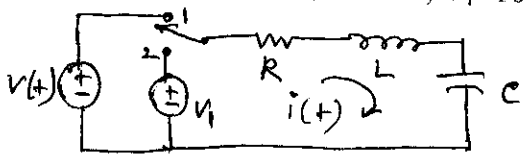
	Fourier transform.	
d)	Determine the Fourier transform of the following exponential function & then after transformation show the magnitude spectrum of the function. 	**8**
5.a)	State Convolution theorem.	**4**
b)	Consider the circuit shown in following figure. The switch is thrown from position 1 to 2 at time t=0. Just before the switch is thrown, the initial conditions are $i_L(0+)=4$Amps, $v_c(0+)=4$ volts. Find the current i(t) after switch is thrown. Assume L= 2H, R=5Ω, C=0.7F, V_1=10 volts. 	**8**
c)	Determine the Laplace transform of any impulse function.	**8**
6.a)	Derive the condition of resonance in parallel R-L-C circuit & define significance of dynamic impedance in resonance condition. Show the frequency response of susceptance in that circuit & mention power factor.	**8+2+2**
b)	A coil of resistance 15Ω & inductance 150μH is in parallel with a variable capacitor C. This combination is in series with a resistor of 6000Ω. The voltage of supply is 250Volt at a frequency 10^6Hz. Calculate value of C to give resonance, Q-factor of the coil, the current in each branch of the circuit at resonance.	**8**
7.a)	Derive the 3 phase power & power factor in terms of wattmeter reading in 3 phase power measurement using two wattmeter method.	**8**
b)	Determine the line current & phase current relation of 3 phase delta connected load.	**4**
c)	Three 150Ω non-inductive resistances are connected in (a) star, (b) delta across a 415Volt, 50Hz, 3 phase mains. Calculate the power taken from the supply system in each case. In the event of one of the resistances getting open circuited, what would be the value of total power taken from the mains in each of the two cases.	**8**