Roll No.

B.E / B.Tech (FT) END SEMESTER EXAMINATIONS – APRIL / MAY 2019

ELECTRONICS AND COMMUNICATION ENGINEERING

II Semester

EC 7251 Circuit Theory

(Regulation 2015)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Determine the current flowing through an element if the charge flow is given by $q(t)= 20\ e^{-4t} \cos 50t\ \ \mu C$.
2. Name and draw the symbols of the 4 types of dependent sources.
3. For a Thevenin equivalent circuit with V_{th} =12V and R_{th}=4 Ω, what is the maximum power transferred to the load.
4. Mention any six Dual pairs.
5. Indicate the following sinusoids in the phasor diagram:
   $i_1(t) = -6\cos(\omega t - 30^o)$ A; $i_2(t) = 6\sin(\omega t - 30^o)$ A; $i_3(t) = -6\sin(\omega t + 30^o)$ A .
6. The voltage across a 5μF capacitor is v(t)=10cos6000t V. Calculate the current through it.
7. Determine the type of natural response (damping condition) for the series RLC circuit with R= 10 Ω, L= 5 H and and C= 2mF.
8. For a RC circuit with 4 Ω and 0.1F, if the initial voltage across the capacitor $v_C(0)$=15V, find v_C for t>0.
9. Two identical coupled coils(L_1=L_2) have an equivalent inductance of 80mH when connected in series aiding and 35mH in series opposing. Find L_1, L_2, M and the coupling coefficient k.
10. The primary current to an ideal transformer rated at 2200/110 V is 2A. Calculate the turns ratio, the KVA rating and the secondary current.

PART-B (5 x 13 = 65 Marks)

11. a) Use Mesh analysis to find the current I_0 in the circuit of Fig.11(a). (13)

(OR)

b) Using Nodal analysis, determine the current (i_1) through 2 Ω resistor in Fig.11(b). (13)

12. a) For the circuit in Fig.12(a), use Superposition theorem to find v_0. (13)

(OR)

b) Find the Thevenin equivalent circuit at terminals a-b in the circuit of Fig.12(b). Hence draw the Nortons equivalent circuit. (13)

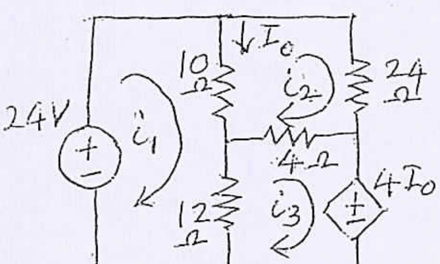

Fig.11(a)

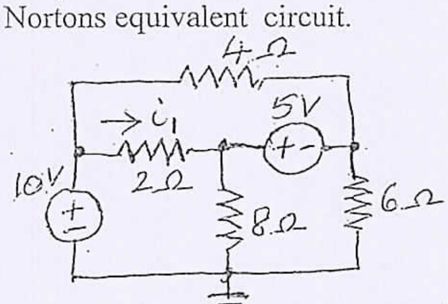

Fig.11(b)

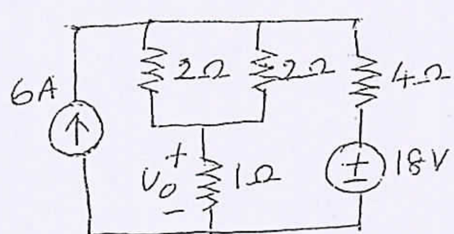

Fig.12(a)

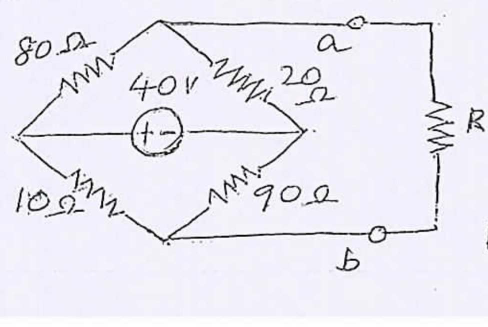

Fig.12(b)

13.	a)	Using Mesh analysis, find I_1 and I_2 in the circuit of Fig.13(a).	(13)
		(OR)	
	b)	i. A series connected load draws a current $i(t) = 4\cos(100\pi t + 10^0)$ A, when the applied voltage is $v(t) = 120\cos(100\pi t - 20^0)$V. Find the apparent power and the power factor of the load. Determine the element values that form the series connected load.	(7)
		ii. Calculate the average power supplied by the source in the circuit of Fig.13(b).	(6)
14.	a)	In the circuit of Fig.14(a), the switch has been closed for a long time and is opened at t=0. Find i(t) for t>0.	(13)
		(OR)	
	b)	i. A series resonant circuit has R=2 Ω, L= 1mH, C=0.4 μF and v_S= 20 sin ωt. Find the resonant frequency ω_0, half-power frequencies ω_1 and ω_2, the quality factor, bandwidth and the amplitude of the current at ω_0, ω_1 and ω_2.	(7)
		ii. For the circuit given in Fig.14(b), find the resonant frequency.	(6)
15.	a)	If M=0.2H and v_s=12cos 10t V in the coupled circuit of Fig.15(a), find i_1 and i_2.	(13)
		(OR)	
	b)	Obtain the branch currents for the circuit of Fig.15(b) using Tie-set approach.	(13)

PART-C (1 x15 = 15 Marks)

16	i.	Using star to delta transformation, obtain the equivalent resistance at the terminals a-b of the circuit given in Fig.16(i).	(4)
	ii.	Find the admittance Y_{eq} of the circuit in Fig.16(ii).	(5)
	iii	Determine the input impedance of the air-core transformer circuit of Fig.16(iii).	(6)

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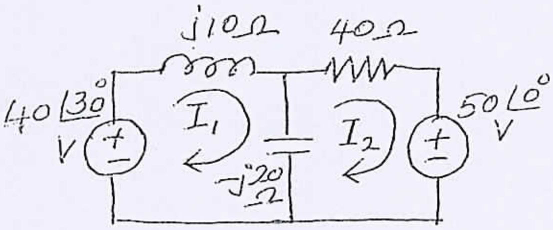

Fig. 13 (a)

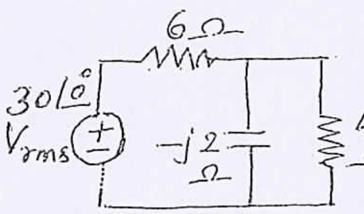

Fig. 13 (b)

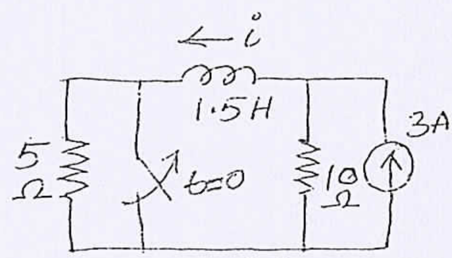

Fig. 14(a)

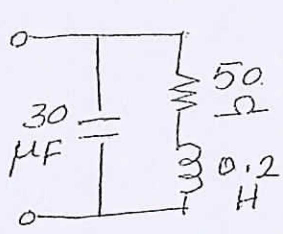

Fig. 14 (b)

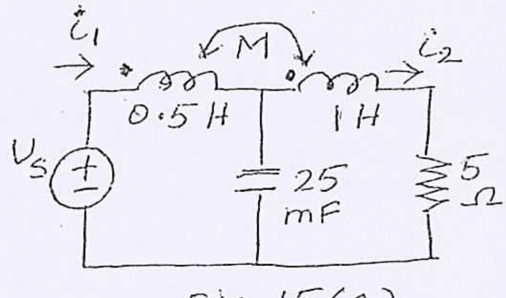

Fig. 15 (a)

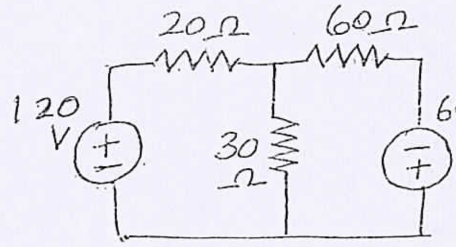

Fig. 15 (b)

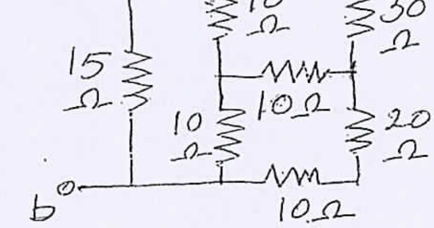

Fig. 16 (i)

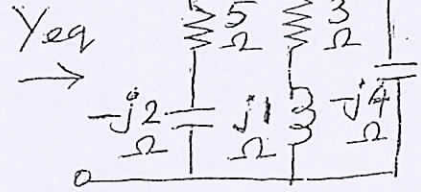

Fig. 16 (ii)

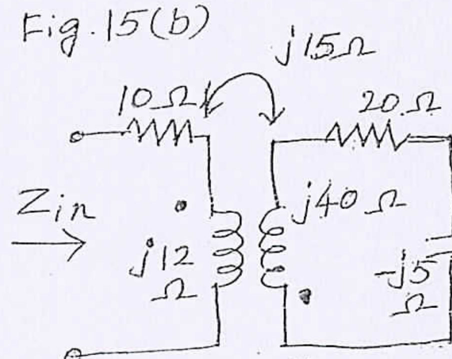

Fig. 16 (iii)