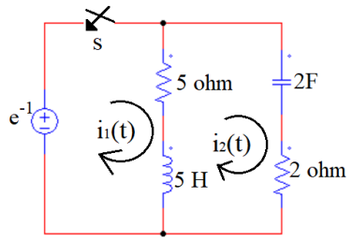
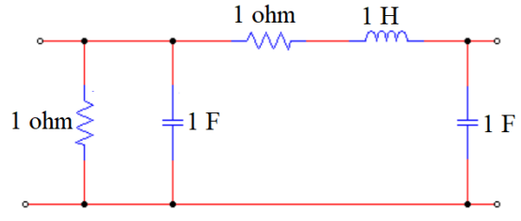


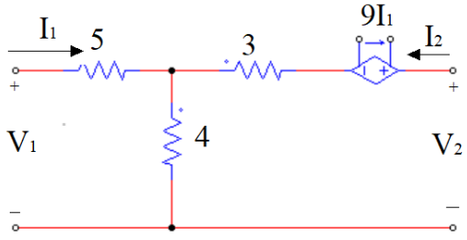
OR iii. Expand the full rectified sine wave into a Fourier series. **7**

Q.5 i. Derive the relationship between z-parameters and y-parameters **4**

ii. Obtain the z-parameters for the network shown in figure as function of s. **6**



OR iii. Find z-parameters for the circuit shown below **6**



Q.6 Attempt any two:

i. Find the first Foster form of the driving point function of **5**

$$Z(s) = \frac{s(s+2)(s+5)}{(s+4)(s+6)}$$

ii. Find the first cauer form of the function **5**

$$Z(s) = \frac{(s+3)(s+7)}{(s+2)(s+4)}$$

iii. Find the second Foster form of RL network for the function **5**

$$Y(s) = \frac{s^2+8s+15}{s^2+5s+4}$$

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2017

EE3CO07 / EX3CO07 Circuit Analysis and Synthesis

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated.Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. When the superposition theorem is applied to any circuit, the dependent voltage source in that circuit is always **1**

(a) Opened (b) Shorted (c) Active (d) None of these

ii. Indicate the dual of series network consists of voltage source, capacitance, inductance in **1**

(a) Parallel combination of resistance, capacitance & inductance

(b) Series combination of current source, capacitance & inductance

(c) Parallel combination of current source, inductance & capacitance

(d) None of these

iii. The time constant of a series RL circuit is **1**

(a) LR (b) $\frac{L}{R}$ (c) $\frac{R}{L}$ (d) $e^{-R/L}$

iv. The tie-set schedule gives the relation between **1**

(a) Branch currents and link currents

(b) Branch voltages and link currents

(c) Branch current and link voltages

(d) None of these

v. The laplace transform of the integral of function f(t) is **1**

(a) $\frac{F(s)}{s}$ (b) $sF(s) - f(0)$

(c) $F(s) - f(0)$ (d) $f'(0)$

vi. The final value theorem is used to find the **1**

(a) Steady state value of the system output

(b) Initial value of the system output

(c) Transient behaviour of the system output

(d) None of these

P.T.O.

vii. The number of possible combinations generated by four variables taken two at a time in a two-port network is **1**

(a) Four (b) Two (c) Six (d) Five

viii. For a two-port network to be reciprocal. **1**

(a) $Z_{11} = Z_{22}$ (b) $Y_{21} = Y_{22}$

(c) $h_{21} = -h_{12}$ (d) $AD - BC = 0$

ix. A polynomial must satisfy the condition that **1**

(a) Z(s) is a real function

(b) All the roots of P(s) have zero real parts, or negative real parts

(c) Both (a) and (b)

(d) None of these

x. In the first Foster form, the presence of first element capacitor C_0 indicates **1**

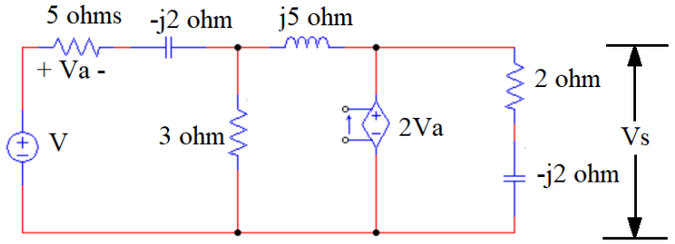
(a) Pole at ω=0 (b) Pole at ω=∞

(c) Zero at ω=0 (d) Zero at ω=∞

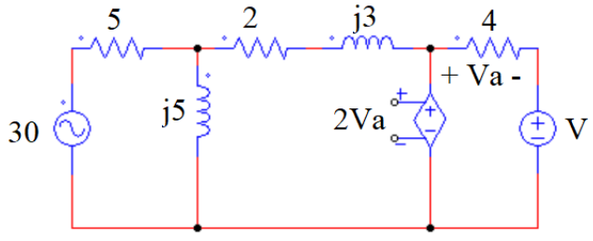
Q.2 i. State the limitations of superposition theorem. **2**

ii. State and explain reciprocity theorem. **3**

iii. Find the value of voltage V which results in $Vs = 5\angle 0^0$ in the circuit shown in fig below **5**



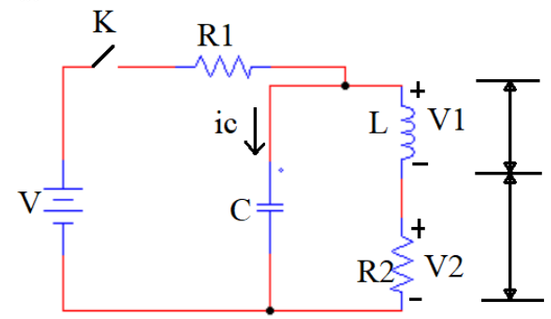
OR iv. Determine the voltage V which results in a zero current through the 2+j3 Ω impedence in the circuit shown in figure below **5**



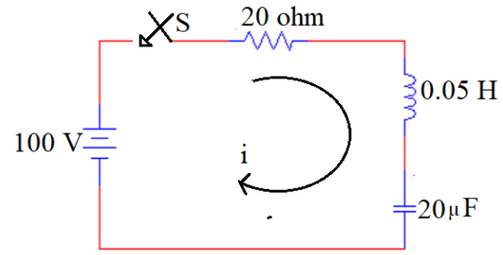
Q.3 i. Define the following: **2**

(a) Tree (b) Co-tree (c) Twig (d) Link

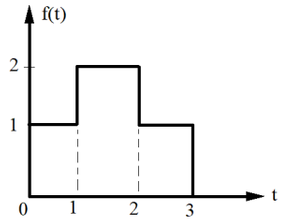
ii. In the network below switch K is closed at t=0. Determine $i_c, i_L, \frac{dv_1}{dt}, \frac{dv_2}{dt}$ at t=0^+. **8**



OR iii. The circuit shown in figure consists of resistance, inductance and capacitance in series with a 100V constant source when the switch is closed at t=0. Find the current transient using differential equation method. **8**



Q.4 i. Find F(s) **3**



ii. For the circuit shown in figure below determine the total current when the switch S is closed at t=0 using Laplace transform method. **7**

P.T.O.

EE3CO07 / EX3CO07 Circuit Analysis and Synthesis

Marking Scheme

Q.1	i.	(c) Active	**1**
	ii.	(c) Parallel combination of current source, inductance & capacitance	**1**
	iii.	(b) $\frac{L}{R}$	**1**
	iv.	(a) branch currents and link currents	**1**
	v.	(a) $\frac{F(s)}{s}$	**1**
	vi.	(a) steady state value of the system output	**1**
	vii.	(c) six	**1**
	viii.	(c) $h_{21} = -h_{12}$	**1**
	ix.	(c) both (a) and (b)	**1**
	x.	(a) pole at ω=0	**1**
Q.2	i.	Limitations minimum 4 points (0.5 mark * 4 = 2 marks)	**2**
	ii.	Statement – 1 mark Explanation – 2 marks	**3**
	iii.	For Equation (i) – 1 mark For Equation (ii) – 1 mark For Equation (iii) – 1 mark For Voltage Va – 1 mark For Voltage V – 1 mark	**5**
OR	iv.	For Equation (i) – 1 mark For Equation (ii) – 1 mark For Va – 1.5 marks For V1 – 1.5 marks	**5**
Q.3	i.	Definition each 0.5 mark (0.5 mark * 4 = 2 marks)	**2**
	ii.	(a) ic – 2 marks (b) i_L – 2 marks (c) dv_1/dt – 2 marks (d) dv_2/dt – 2 marks	**8**
OR	iii.	(a) C.F – 2 marks (b) P.I – 2 marks (c) Value of Constants – 2 marks (d) Expression – 2 marks	**8**
Q.4	i.	(a) Time domain expression f(t) – 1.5 marks (b) Laplace of f(t) - 1.5 marks	**3**
	ii.	(a) $i_1(t)$ & $I_1(s)$ – 2 marks (b) $i_2(t)$ & $I_2(s)$ – 2 marks (c) i(t) & I(s) – 3 marks	**7**
OR	iii.	Diagram – 1 mark Calculate a_0, a_n, b_n and expression of fourier series – 6 marks	**7**
Q.5	i.	(a) Z-parameters to Y-parameters – 2 marks (b) Y-parameters to Z-parameters – 2 marks	**4**
	ii.	For each z parameter 2 marks (2 marks * 3 = 6 marks)	**6**
OR	iii.	For each z parameter 2 marks (2 marks * 3 = 6 marks)	**6**
Q.6		Attempt any two:	
	i.	Calculations – 3 marks Diagram – 2 marks	**5**
	ii.	Calculations – 3 marks Diagram – 2 marks	**5**
	iii.	Calculations – 3 marks Diagram – 2 marks	**5**

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