NOV 2018 EXAMINATION
B.E. II Year EXAM
EI 2701/27001: CIRCUIT ANALYSIS AND SYNTHESIS

[Time: 3 Hrs.]

[Max. Marks : 70]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Attempt all the questions carrying equal marks. Solve any two part from A.B.C. From each question. Make suitable assumption if required.

Q.1   (a)   Explain in brief **ideal and non ideal** voltage and current sources, It's terminal voltage and current behavior w.r.t. Current and voltage respectively also draw equivalent ckt. For **VCVS**.

(b)   Write down various network theorems with required circuitry in detail.

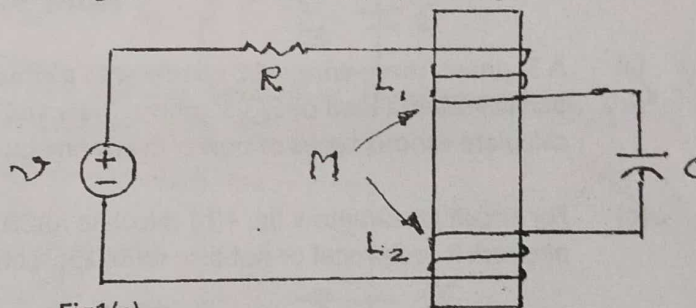(c)   Write down **KVL** equation for circuit given below i.e. fig 1(c) by making its dotted equivalent circuit.

Fig1(c)

Q.2   (a)   Explain in brief what **series and parallel resonance**. What is term **Minimum** impedance and **Maximum** impedance, **BW, Selectively, Quality Factor** etc. Relevant characteristics required for each term.

(b)   Write the test c conditions for PR (positive real) functions also show restriction on poles and zeroes for Z_{RC} impedance function. What is **Foster** and **Cauer form** of synthesis.

(c)   What is importance of **poles** and **zeroes**? Also explain in brief frequency response of **Integrator** circuit as a **LPF** operation.

OR

(c)   Short notes on : Passive filters

Q.3   (a)   A series RLC circuit with capacitor initially charges to voltage ' V_0 ' for circuit shown below fig3(a) . Find solution for i(t) for all (t) using Laplace transform.

Fig3(a)
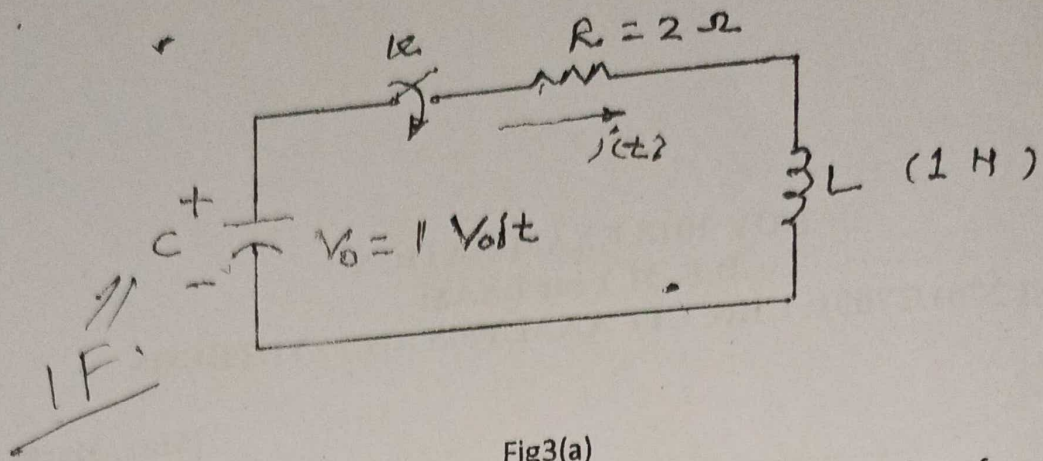
(b) What are singularity functions? Enumerate them. Write function of each w.r.t. time. Find **Transform** of each. Also represent their **graphical** behavior.

(c) Apply **Tellegen's** theorem in circuit shown in fig. 3 (C)

Fig3(c) b
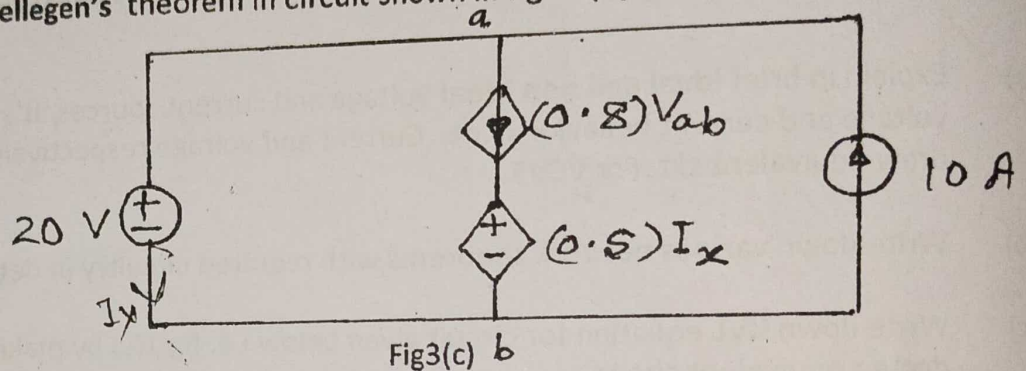
Q.4 (a) A 3- phase, three wire, ABC system with a **effective** line voltage of **120** V has balanced **Delta** load of $5\underline{/45^0}$ ohms. Draw and calculate V-I phasor. also calculate various types of power in any one load.

(b) For circuit given below fig. 4(b) calculate ABCD parameter. Show whether this network is reciprocal or not also write application of various parameter set.

Fig4(b)
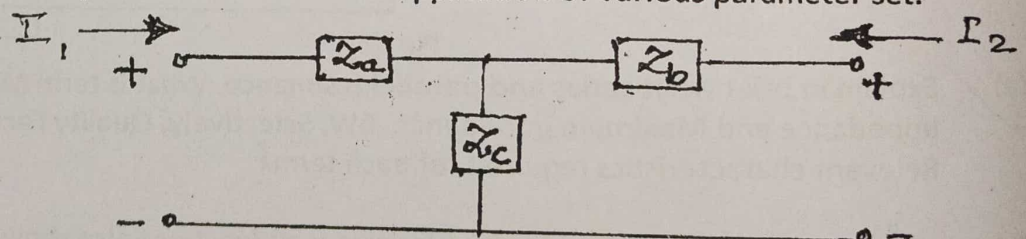
(c) Give a brief **interpretation** of parameter L and C according to their physical phenomenon, Field and circuit interpretation. Also write **power** and **energy** relations.

Q.5 (a) Write short note on graph theory explaining definitions of each term associated with it.

(b) Explain in brief voltage and current **Impulse.**

(c) Explain **Initial** conditions in circuit elements in detail.

SUMMER SEMESTER
MAY-JUNE 2017 EXAMINATION
B.E. II Year EXAM
EI27001: Circuit Analysis & Synthesis

8072

Time: 3 Hrs.

Max. Marks : 70
Min. Marks : 22

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Attempt all the questions carrying equal marks.
Brief & to the point answers should be appreciated.
Each Question has three parts a, b & c, solve any two of them.

Q.1 (a) Explain in brief, Ideal and Non-ideal voltage source giving terminal behavior by relevant characteristics.   7

(b) Explain, What is source transformation? Giving various examples.   7

(c) Explain what is the 'DOT' rule for coupled coils. For circuit given below, write KVL equation for loop (i3).   7
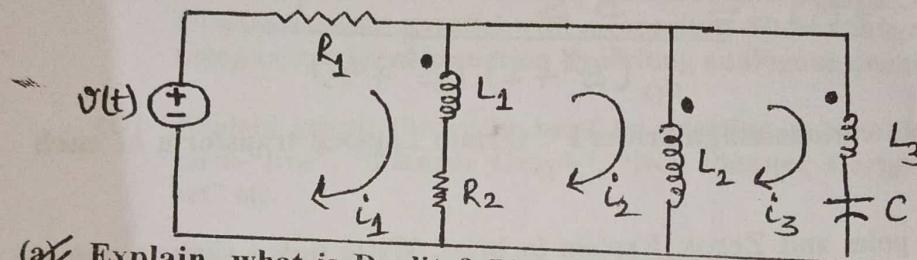
Q.2 (a) Explain, what is Duality? List various analogous Dual quantities. For circuit given below, draw its dual network.   7
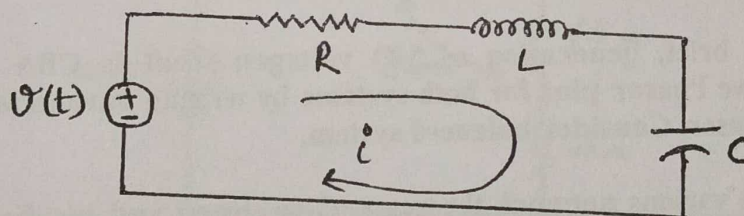
(b) Write expression for current, for circuit given below; when switch is moved from position 1 to position 2.   7
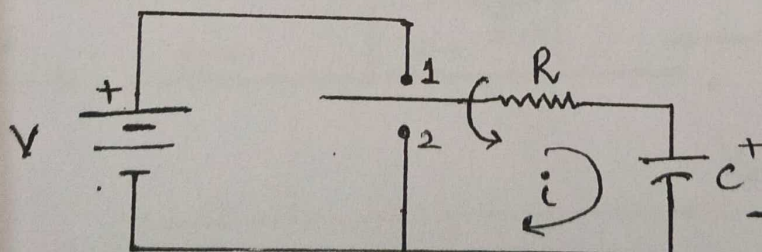
(c) Draw down various circuit elements with 'initial condition' & 'Steady state' maintaining on it. If series RLC circuit excited by V. u(t). Calculate $\frac{d^2i}{dt^2}$; If R = 10Ω; L=1H; C = μF; V= 10v.   7

C = 10 μf.

Q.3 (a) Explain in brief, phenomenon of generating current impulse by drawing suitable circuit. How it can be avoided.   7

(b) If a series are RLC Circuit excited by step input, show graph of response indicating all parameter of damping cases with circuit behavior.   7

(c) Write down basic theorem for Laplace Transformation i.e. Transform of Linear combinations; Transform of Derivatives; Transform of Integral; give proof of any one of them.   7

Q.4 (a) For the circuit given below; if switch is closed at t=0, write down expression for current i(t) for all 't' using Laplace transformation method.   7
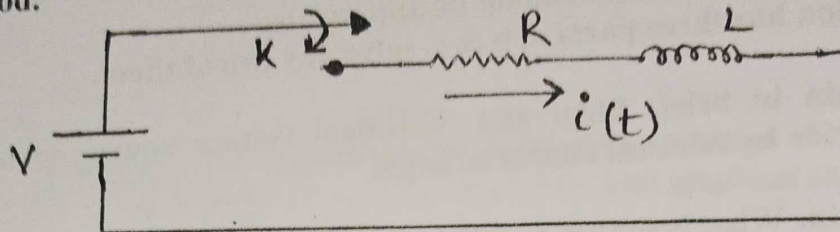
(b) Obtain Inverse Laplace transform for equation given below.   7

$$\mathcal{L}^{-1} f(s) = \frac{3 \cdot 5}{(s^2 + 1)(s^2 + 4)}$$

(c) Write down various singularities F^n. Obtain Laplace transform of each shifted by 'a'   7

Q.5 (a) What are poles and Zeros, Explain in brief. Write down various poles-Zero location for Z_{RC}; Z_{LC} function. Also show S-Plane indicating various restrictions given to Poles-Zeros for same.   7

(b) Explain in brief, generation of 3-Ø voltages; what is CBA & ABC system? Give Phasor plot for both systems by writing various voltage & Current Phasor. Consider balanced system.   7

(c) Write down various network theorems. Give circuit and justification for each. Select suitable choice of figure and parameters.   7

NOV-DEC 2016 EXAMINATION
B.E. IInd Year EXAM
EI 27001: CIRCUIT ANALYSIS & SYNTHESIS

Time: 3 Hrs.

Max. Marks : 70
Min. Pass Marks : 22

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Note: Solve all five questions carrying equal marks. Each question has four parts. Solve any one from (A) OR (B) & (C) OR (D). Make suitable assumptions if necessary.

Q.1 (A) A 12 volt car battery in connected to a 1µf capacitor. Compute the energy stored in the capacitor.   7

OR

(B) Draw equivalent circuit for voltage controlled voltage source. Mention **dependent** and **independent** electrical quantities on it. Explain VCVS by plotting a graph between output voltage & current.   7

(C) Explain in brief. What is <u>source transformation</u>? Justify your answer by drawing a circuit containing a voltage source in <u>series with inductor</u> and a current source <u>parallel with a capacitor</u>. Show changes made on circuit using source transformation by writing analogous quantities on it.   7
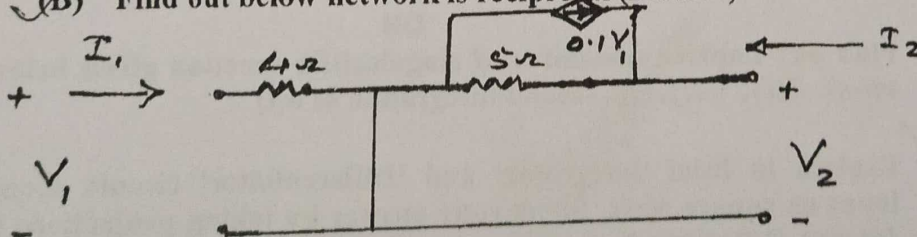
OR

(D) Explain graph theory in brief by selecting a suitable example stating term-"tree", "Planner Graph". "Non Planner Graph", "Tie set", "cut set" etc.   7

Q.2 (A) Obtain Thevenin equivalent circuit for network given below.   7

OR
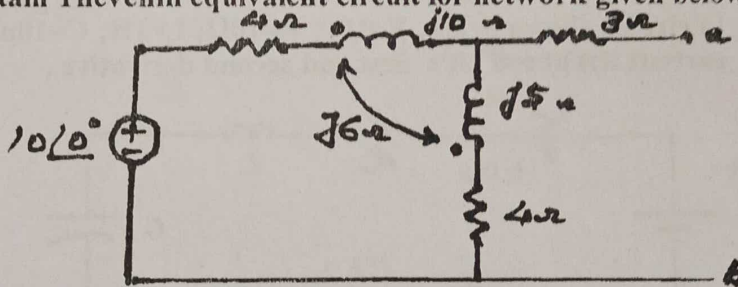
(B) Find out below network is reciprocal (Passive) or not.   7


Justify your answer by calculating 'h' parameters only.

(C) Explain what are 'poles' and 'zero'? Draw <u>single pole integrator</u> circuit. Calculate its <u>pole & zeros</u> by obtaining its transfer function. Also show frequency response of circuit given by you.   7

(D) Write down restrictions given to poles-zeros on complex plane for Z_{RC} and Z_{LC} also draw pole-zero plots for it.

Q.3 (A) In circuit given below switch is moved from position (1) to position (2) at t=0; Write down expression for current for all 't'. Also show variation of current w.r.t. the graph.
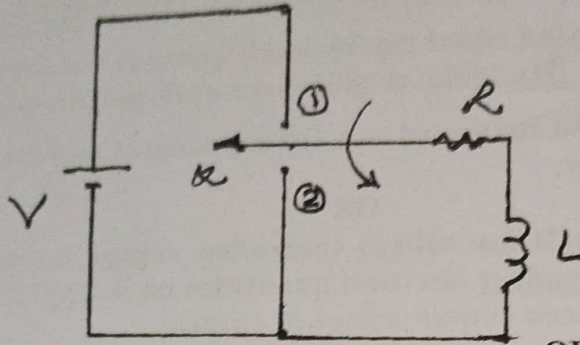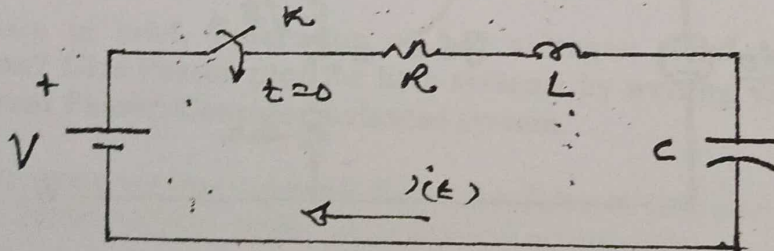

OR

(B) For circuit shown below switch 'k' is closed at t=0; Write down expression for current i(t) for all 't'; Use **Laplace Transform** method.
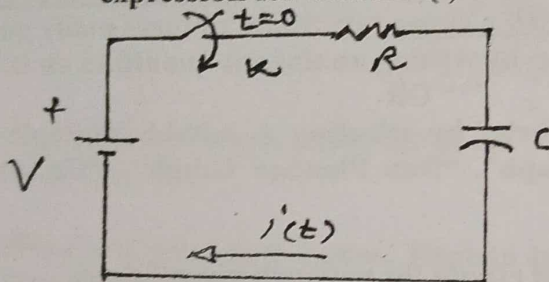
(C) In circuit shown below. V=10v; R=10Ω; L=1H; C=10µf; $V_c(0)$= 0V; Find current i(t) at t=0^+; it's first and second derivative .

OR

(D) Find out Laplace transform of singularities function given below. u(t) , u(t-a), $\partial(t)$, $\partial'(t)$, r(t), second integration of u(t).

Q.4 (A) Explain in brief 'Integrator' and 'Differentiator' circuit. Considering input as square-wave. Show your answer by taking projections between I/P and O/P at turning points. Also give mathematical expression for each output.

OR

(B) What is Cauer I & II form; Foster I & II form of synthesis. Also give partial fraction expansion for <u>both</u> form of network synthesis.

(C) Give solution for step *I/P* given to series *RLC* circuit. What is damping, damping ratio, critical resistance; undamped natural frequency; Different cases of damping; circuit '*Q*'.   7

OR

(D) Explain in brief current impulse and voltage impulse. Is it advantageous or not? Justify your answer.   7

Q.5 (A) Find the Fourier transform of $x(t)=e^{at} u(-t)$ for (a>0); Also write properties of Fourier transform.   7

OR

(B) A *3*-phase; 3-wire; 150v; CBA system; *Y* connected load. $Z_A = 6\angle 0^0$, $Z_B = 6\angle 30^0$, $Z_C = 5 \angle 45^0$. Calculate displacement neutral voltage V_{ON}? Also calculate different types of powers in load 'Z_A'.   7

(C) Explain in brief series and parallel resonance; Draw different characteristics for magnitude w.r.t. frequency; plot for normalized impedance w.r.t. freq; plot for phase w.r.t. frequency for series & parallel *RLC* circuit.   7

OR

(D) Draw and write expression for following function; Giving suitable examples :   7
  1. Periodic Function
  2. Non periodic function
  3. Random function

Also show amplitude; angular velocity; phase angle; frequency in your example.

Time: 3 Hrs.]

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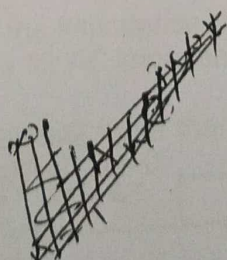
TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Attempt all the questions. Answer (a) OR (b) & (c) OR (d) parts in each question. All questions carry equal marks.make necessary asymptions if required. Brief and to the point answers will be appreciated.

Q.1 (a) Draw and explain ideal and non ideal voltage and current sources. Also   7
draw the equivalent circuit of voltage controlled voltage source by writing two port parameters.
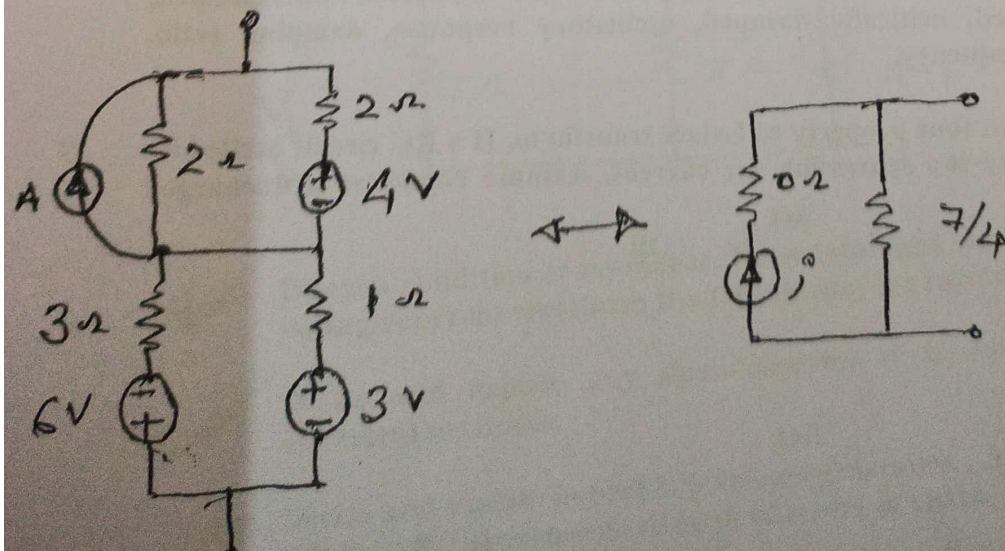
OR

(b) Write the value of unknown variables shown in circuit below.   7
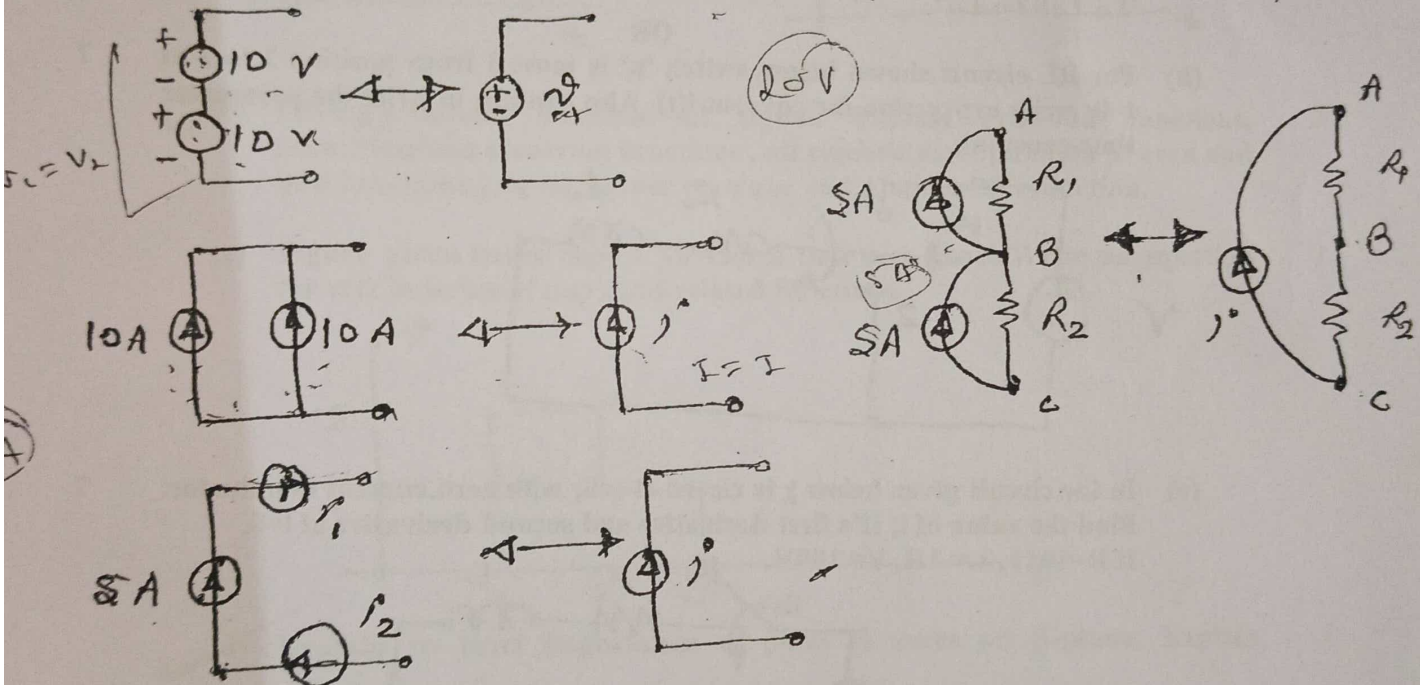
(c) Write condition of duality by writing each element variables and it's   7
possible dual quantities. Tabulate the result in your answer.

OR

(d) In circuit shown below what will be the value of i?   7

Q.2 (a) For circuit given below obtain dotted equivalent circuit and write KVL equation for loop containing capacitor.
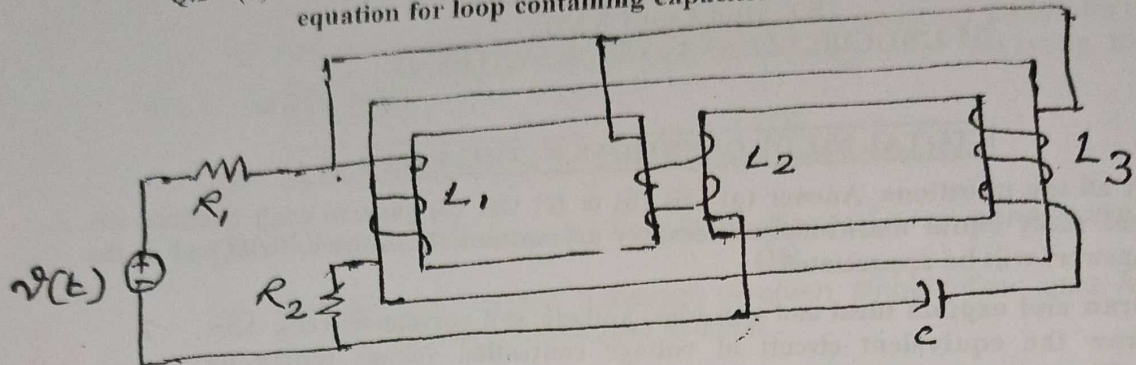
Mutual Inductances are M_{12} , M_{23} , M_{13} : respectively $L_1 L_2$, $L_2 L_3$, $L_1 L_3$.

OR

(b) For RL circuit shown below switch 'K' is moved from position 1 to 2 at t=0; write expression for current i(t). Also explain in brief the parameter time-constant.
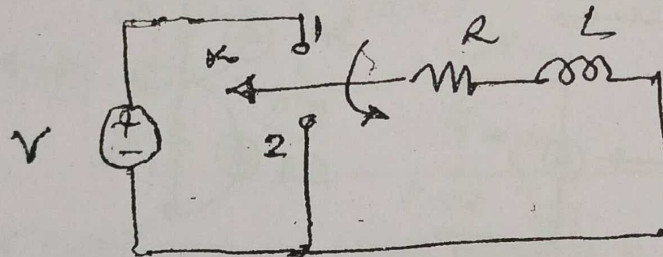
(c) In the circuit given below K is closed at t=0; with zero current in inductor. Find the value of i; It's first derivative and second derivative at t=0. If R=10 Ω, L= 1H, V= 100V.
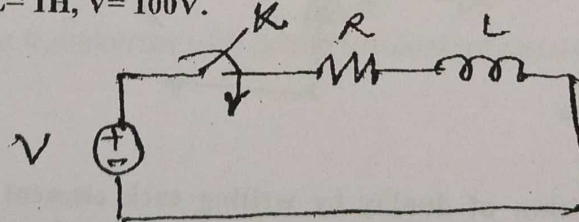
OR

(d) If step input is given to series RLC circuit , write response as selected to the S-plane location of roots. Explain in brief the terms-underdamped, overdamped, critically damped, oscillatory response, damping ratio, natural frequency.

Q.3 (a) Write down four property of Lalace transform. If a RC circuit excited by Vu(t).Write the expression for current. Assume capacitor is uncharged initially.

OR

(b) Solve below equation using laplace transform.
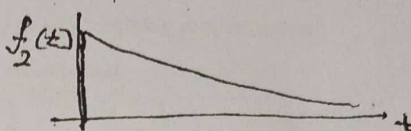
$$\frac{d^2 i}{dt^2} - i = 25 + e^{2t}$$

$$\text{if} \quad i(0^-) = 4 \, A$$
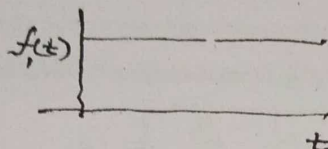
$$\frac{di}{dt}(0^-) = -2 \, A/sec.$$

(c) Draw u(t) & all shifted waveform of it. Also write it's function. 7

OR

(d) Explain the input/output wave form of integrator with vertical projections. Also draw u(t) it's first/second/third integration. 7

Q.4 (a) Convolve two signals given below. Also draw each steps in convolution. 7

OR

(b) Giving suitable example of signal. Explain even/odd functions, recurring/non recurring functions, all algebric manupulation of even and odd functions, signal neither even nor odd, singularities function. 7
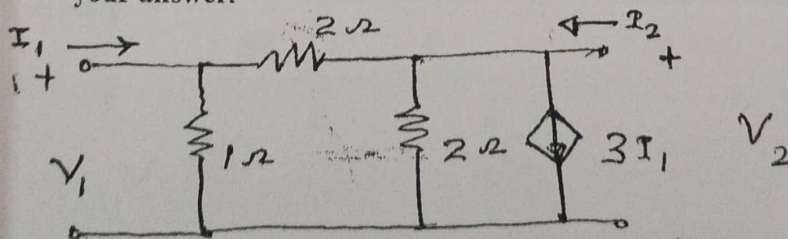
(c) Figure given below shows waveform that occur once. Write an equation for v(t) in terms of steps and related functions. 7

OR
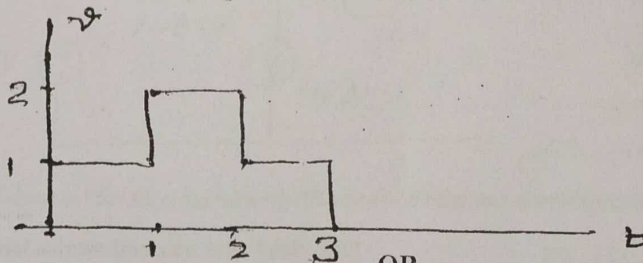
(d) Explain in brief importance of poles & zeros on S-plane. Explain $T(S) = \frac{1}{S+1}$ with poles-zeros and frequency response. 7

Q.5 (a) Calculate Z parameters to show the network symmetry. Comment on your answer. 7

OR

(b) Discuss condition of resonance. Draw minimum impedance circuit. Show voltage/current waveform w.r.t. frequency for selected circuit. 7

(c) Write and explain any three theorms & its importance in solving electrical networks. 7

OR

(d) Write and explain in bref 3-φ voltage generation, Δ and Y connection, CBA, ABC sequence & all form of power in phase. 7