(Please write your Enrolment No. immediately) Enrolment No. _____

MID TERM EXAMINATION

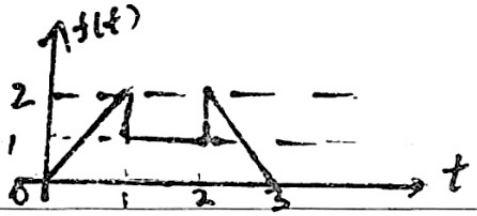
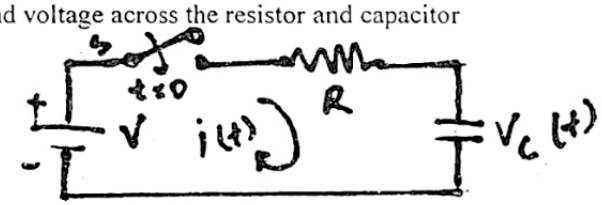
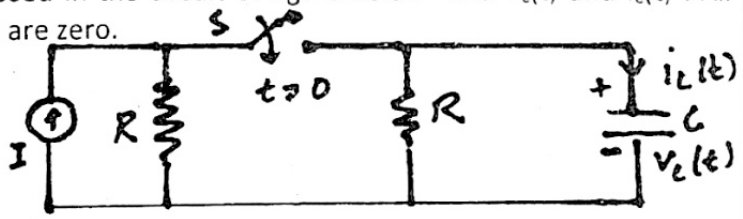
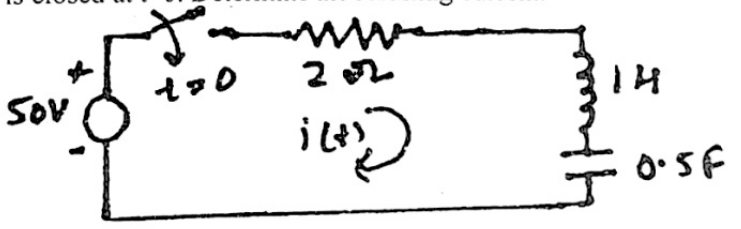
B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

IV Semester, May, 2023

Paper Code: EEC- 203/208 **Subject:** CIRCUIT AND SYSTEM

Time: 1½ Hrs. **Max. Marks:** 30

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

Q. No.	Question	Max. Marks	CO(s)
1 (a)	What is an LTI system?	2	CO 1
(b)	Derive relationship between z and Laplace Transform	2	CO 1
(c)	Differentiate between Linear and Non-linear system?	2	CO 1
(d)	Differentiate between Time variance and Time invariance systems?	2	CO 1
(e)	Write the properties of Impulse function.	2	CO 1
2 (a)	What do you mean by z – transform ? Find the Z-transform of $x(n) = \cos(n\omega)u(n)$.	2	CO 1
(b)	Synthesis the given waveform 	5	CO1
3 (a)	What do you mean by Laplace transform Find the Laplace transform of the function $f(t) = \sin\omega t$ for $0 < t < T/2$	5	CO1
(b)	Consider a RC circuit as shown below. The switch S is closed at time t=0. Find the current i(t) through and voltage across the resistor and capacitor 	5	CO2
4 (a)	At t=0, S is closed in the circuit of figure below find $V_c(t)$ and $I_c(t)$. All intial condition are zero. 	5	CO3
(b)	In the series RLC circuit shown below. There is no initial charge on the capacitor. If the switch S is closed at t=0. Determine the resulting current. 	5	CO3

(Please write your Enrolment No. immediately) Enrolment No. _____

SUPPLEMENTARY MID TERM EXAMINATION

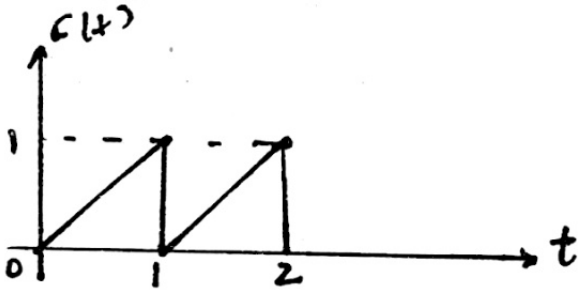
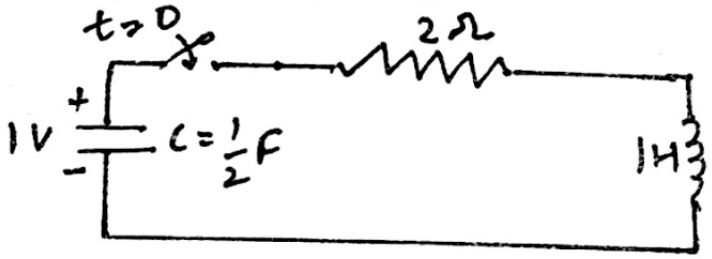
B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

IV Semester, May, 2023

Paper Code: EEC- 203/208 **Subject:** CIRCUIT AND SYSTEM

Time: 1½ Hrs. **Max. Marks: 30**

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

Q. No.	Question	Max. Marks	CO(s)
1 (a)	What are dependent and independent source?	2	CO 1
(b)	Derive relationship between z and Laplace Transform	2	CO 1
(c)	Differentiate between lumped and distributed elements?	2	CO 1
(d)	Differentiate between unilateral and bilateral elements?	2	CO 1
(e)	Write the properties of Ramp function.	2	CO 1
2 (a)	What do you mean by z – transform? Find the Z-transform of $x(n) = \sin(n\omega)u(n)$.	2	CO 1
(b)	Synthesis the given waveform 	5	CO1
3 (a)	What do you mean by Laplace transform Find the Laplace transform of the function $f(t) = \cos\omega t$.	5	CO1
(b)	Consider a series RLC circuit with the capacitor initially charged to voltage of 1V as indicated below. Find the expression i(t). 	5	CO2
4 (a)	Explain about the transient response of series RL circuit to the DC excitation for zero initial conditions.	5	CO2
(b)	A resistance R and 5μF capacitor are connected in series across a 100 V DC supply. Calculate the value of R such that the voltage across the capacitor becomes 50 V in 5 sec after the circuit is switched on.	5	CO2

(Please write your Exam Roll No.) *Exam Roll No.* .....

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] JULY-2023

Paper Code: EEC-208 ***Subject: Circuits & Systems***

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.No1 which is compulsory. Select one question from each unit.

Q1 Attempt all questions:

a) What is resonance? Explain series and parallel resonance. **(5)**

b) Enlist properties of LTI systems. **(5)**

c) Explain different types of interconnections of two 2-port networks. **(5)**

UNIT-I

Q2 a) Discuss different types of systems. **(5)**

b) Explain Time and Frequency Scaling properties of Z-Transform. **(5)**

c) Find the Fourier Transform of the function given below: **(5)**

$$x(t) = \sin(\omega_o t)\cos(\omega_o t)$$

OR

Q3 a) Write the matrix state equations for series RLC circuit with AC excitation source. **(5)**

b) Calculate the Fourier Series coefficients of the continuous-time periodic signal x(t). **(5)**

$x(t) = 1+\sin(\omega_o t)+2\cos(\omega_o t)+\cos(2\omega_o t+\pi/4)$

c) Explain Time-differentiation and Time-integration property of Laplace Transform. **(5)**

UNIT-II

Q4 a) Explain transient response of Series RLC circuit with DC excitation. **(7)**

b) In the network shown in figure 1, Switch S is closed at t=0, a steady state current having previously been attained. Solve for the current as a function of time using **Classical method.** **(8)**

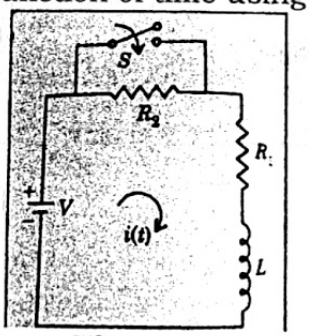


Figure-1

P.T.O.

P-1/2

OR

Q5 a) Define Transient Response. Explain transient and steady state initial conditions and procedure to evaluate these conditions. **(7)**

b) In the network shown in figure 1, Switch S is closed at t=0, a steady state current having previously been attained. Solve for the current as a function of time using **Laplace Transform.** **(8)**

UNIT-III

Q6 a) Explain Y-D and D-Y transformation. **(6)**

b) Explain all the passive filter circuits and their frequency response for ideal and practical circuits. **(9)**

OR

Q7 a) Discuss The venin's and Norton's theorems. **(4)**

b) Three impedances $Z_{AB} = (10 + j0)\Omega$, $Z_{BC} = (8 + j6)\Omega$ and $Z_{CA} = (5 - j5)\Omega$are delta connected to a symmetrical 3-phase 400 V 50 Hz supply of phase sequence ABC. Calculate the phase and the line currents and total active power consumed. Also draw phasor diagrams. **(11)**

UNIT-IV

Q8 a) For the network shown in figure 2, write f-cut set and f-loop matrix for the tree having 3H inductor and 2F capacitor as twigs. Also write the matrix cut-set equations. **(9)**

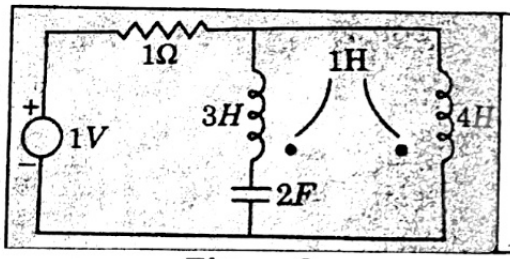


Figure 2

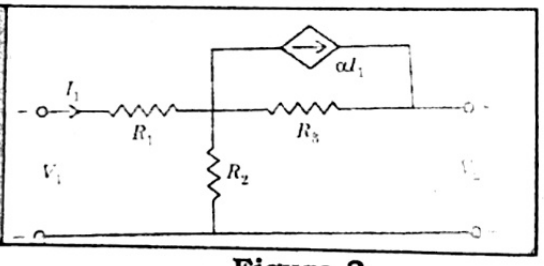


Figure 3

b) Find the hybrid parameters for the network shown in figure 3. **(6)**

OR

Q9 a) What is Hurwitz Polynomial? Explain properties of Hurwitz Polynomial. **(4)**

b) For the network shown in figure 4, find Z, Y, h, g, T and T' parameters. **(11)**

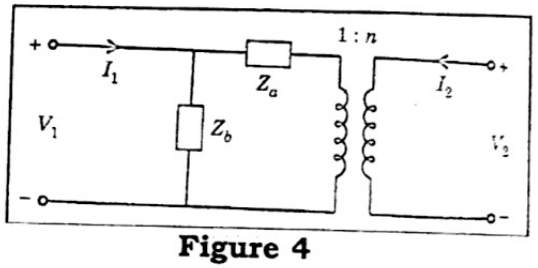


Figure 4

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P-2/2

FEC-908

(Please write your Exam Roll No.)

Exam Roll No. 2021503021

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] FEBRUARY 2023

Paper Code: EEC-213 **Subject: Circuits & Systems**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data if any.

Q1 Attempt all questions:- **(5x5=25)**

(a) What are the different types of signals. Classify them.?

(b) Prove $f(0^+) = \lim_{s\to\infty} SF(s)$ and hence find $f(0^+)$ for $f(s) = \frac{2(s+1)}{s^2+2s+5}$

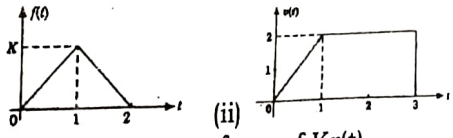
(c) What are passive filters. Discuss their properties and uses.

(d) Check wheather the given polynomial is Hurwitz or not
$P(s) = s^4+s^3+5s^2+3s+4$

(e) Define z transform. Find the z transform of unit step function.

UNIT-I

Q2 (a) Synthesize the following signals:- **(3x2=6)**

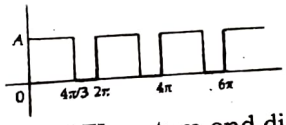


(i) (ii)

(b) Find the laplace transform of Kr(t) **(2.5)**

(c) solve the differential Equation; **(4)**
$x''+3x'+2x = 0$, $x(0^+) = 2$, $x'(0^+) = -3$

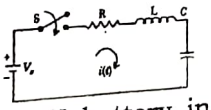
Q3 (a) Find the coefficient of exponential Fourier series of the given below figure: **(6)**



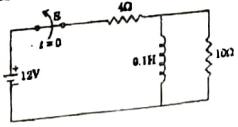
(b) Define LTI system and discuss its properties. **(6.5)**

UNIT-II

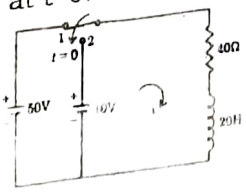
Q4 (a) In RLC series circuit given below given that Vs = 2V , R = 6Ω , L = 2H , C = 0.25F. Find $i(0^+)$, $\frac{di}{dt}(0^+)$, $\frac{d^2i}{dt^2}(0^+)$ *and* $i(t)$ **(8)**



(b) The 12V battery in fig. below is disconnected (opened) at t=0. Find the inductor current and voltage as a function of time. **(4.5)**

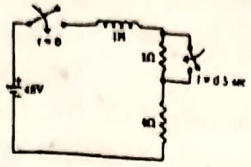


Q5 (a) The switch in figure below has been in position 1 for a long time; it is moved to 2 at t=0. Obtain the expression for i, for t>0. **(5)**



P.T.O.

(b) Fig . below shows first order R-L series circuit with R=5Ω, L=1H , Vs = 48V. Find: **(7.5)**



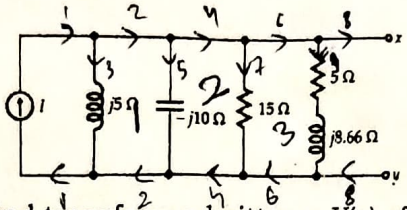
a) The expression for i(t) , $V_R(t)$, VL(t) and $\frac{dI}{dt}$ *for* $t \geq$ b) $\frac{dI}{dt}$ *at* $t = 0$

c) The time at which $V_R = V_L$ **(d)** The resistance is decreased from 5 to 4Ω at t=0.5sec determine i(t).

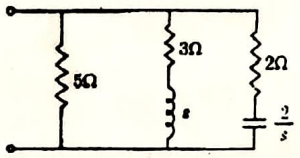
UNIT-III

Q6 (a) Define Thevenin's theorem for ac circuits. **(9)**

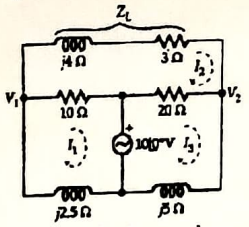
If I = $33\angle -13°$A , find the Thevenin's equivalent circuit to the left of terminals x-y in the network shown below



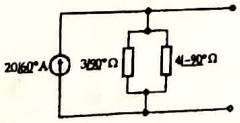
(b) Find transform admittance Y(s) of the network given below; **(3.5)**



Q7 (a) Find the current through Z_L using mesh analysis for the network shown below; **(6.5)**



(b) Convert the below given current source to voltage source; **(6)**



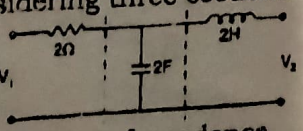
UNIT-IV

Q8 The reduced incidence matrix of a graph is given. Draw the graph and obtain the f-loop and f-cut-set matrices. **(12.5)**

$$A = \begin{array}{c} \\ a \\ b \\ c \end{array} \begin{array}{c} \begin{array}{ccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array} \\ \begin{bmatrix} 0 & 0 & 1 & 1 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & -1 & 1 & 1 \\ -1 & 0 & -1 & 0 & 0 & -1 & 0 \end{bmatrix} \end{array}$$

Q9 (a) Find the condition of symmetry of Z-parameters. **(4)**

(b) Determine transmission parameters of a T-network shown in fig. below considering three sections . Assuming connected in cascade manner **(6)**



(c) Define Image Impedence. **(2.5)**

Mid Term Examination Duration:1.5hrs

Subject : Circuit and Systems Code:ETEE-207

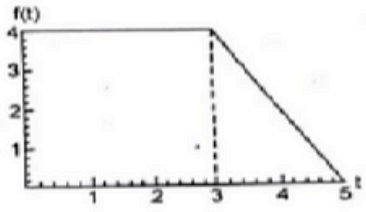
Instructions: Write your name and roll no on your answer sheet. Attempt all the questions.However,internal choice is provided.

Q1-15 are multiple choice questions carrying 1 marks each

Section -1(15 Marks)

1. The area of unit impulse function is defined as (1)
   a) $\int_{-\infty}^{+\infty} \delta(t)dt = 0$
   b) $\int_{-\infty}^{+\infty} \delta(t)dt = 1$
   c) $\int_{0}^{+\infty} \delta(t)dt = 1$
   d) $\int_{0}^{+\infty} \delta(t)dt = 0$
2. The non linear network does not satisfy which of the following property (1)
   a) Homogenity
   b) Superposition
   c) Both Homogenity and Superposition
   d) Homogenity,associative and superposition

3 The Laplace transform of thefollowing waveform is (1)



a) $4/s + 4e^{-3s}/s + e^{-3s}/s^2 + 2e^{-3s}/s + 1/s^2$
b) $4/s - 4e^{-3s}/s + 2e^{-3s}/s - 4e^{-5s}/s$
c) $4/s - 2e^{-3s}/s^2 + 2e^{-5s}/s^2$
d) $4/s - 4e^{-3s}/s - 2e^{-3s}/s$

4. The sum of even and odd part of signal e^{jt} is (1)

a) cos(t)+ j sin(t)

b)cost (t) –j sin(t)

c) sin(t) +j cos(t)

d) sin(t) -j cos(t)

5. Find the value of R when it is connected in series with 5μF capacitor and 100V supply such that voltage across capacitor becomes 50V in 5 sec after the circuit is switched on? (1)

a) $1.35*10^6\ \Omega$

b) $1.45*10^5\ \Omega$

c) $1.35*10^5\ \Omega$

d) $1.45*10^6\ \Omega$

6. The transient and steady state response of an ideal capacitor with no initial charge is (1)

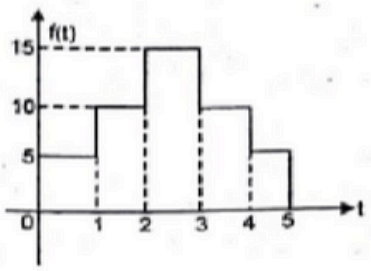
a) a open circuit and short circuit respectively

b) it will act as voltage source and open circuit respectively

c) It will act as a short circuit and a voltage source respectively

d) a short circuit and open circuit respectively

7) The mathematical equation for the following signal is (1)



a) 5u(t)+5u(t-2)-5u(t-3)-5u(t-4)+10u(t-5)
b) 5u(t)+5u(t-1)+5u(t-2)-5u(t-3)-5u(t-4)-10u(t-5)
c) 5u(t)+5u(t-1)+5u(t-2)-5u(t-3)-5u(t-4)-5u(t-5)
d) 5u(t)-5u(t-1)+5u(t-2)-5u(t-3)-5u(t-4)-5u(t-5)

8) Which of the following is aperiodic signal . (1)

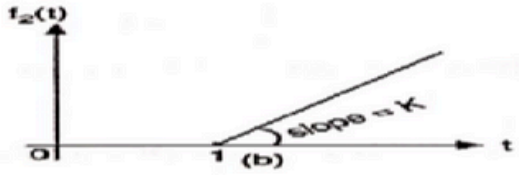
a) $x(t)=2\cos(4\pi t)+3\sin(3\pi t)$

b) $x(t)=5\sin(2\pi t)$

c) $x(t)=e^{-2t}$

d) $x(t)=1+\cos(4t+1)$

9) The below waveform can be expressed in which of the following equation (1)



a) r(t-1)
b) K(t-1)u(t-1)
c) K{u(t-1)}
d) K{u(t-1)-u(t-∞)}

10)The initial and final value of the following function is (1)

$$F(s)= s^2+ 5s+7/ s^2+3s+2$$

a)5,1/2

b) ∞,0

c) ∞,1

d)0, ∞

11) The three standard signals are (1)

a) impulse,step and exponential

b) impulse,step and ramp

c) step,sinosidal and ramp

d) impulse,ramp and exponential

12) Which of the following is the static system (1)

a)y(t)= 2x(t) +x(t-4)+x(t+3)

b) y(t)= x(t)+cos[x(t)]

c) y(t)=x(2t)+ 8x(t-2)+8

d) y[n]= 4x[n]+5x[n+7]

13) The theorem for periodic function when applied on $f_1(t)=\sin\omega t$ with time period T/2 is (1)

a) $\frac{1}{1-e^{-Ts}}F_1(s)$

b)$1-e^{-Ts}\,F_1(s)$

c)) $\frac{1}{1-e^{-2Ts}}\,F_1(s)$

d) $\frac{1}{1-e^{\frac{-Ts}{2}}}\,F_1(s)$

14) The differentiation of r(t-2) gives (1)

a)a unit step signal

b) a shifted unit step signal

c)a impulse signals

d) a sinosoidal signal

15) A 10H inductor, 1Ω resistor and 1μF capacitor are connected in parallel.A combination is driven by a unit step current source.Under steady state condition, current will flow through (1)

a)the inductor

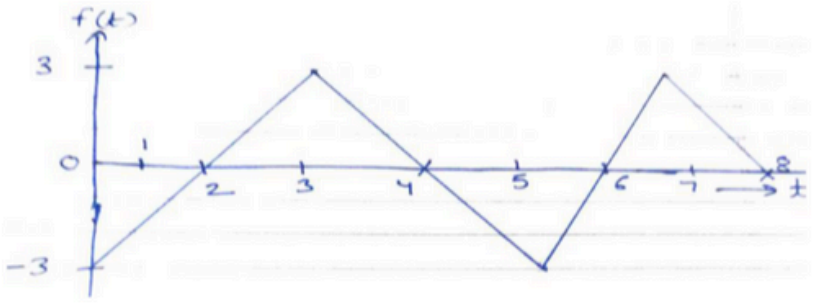
b)the resistor

c) the capacitor

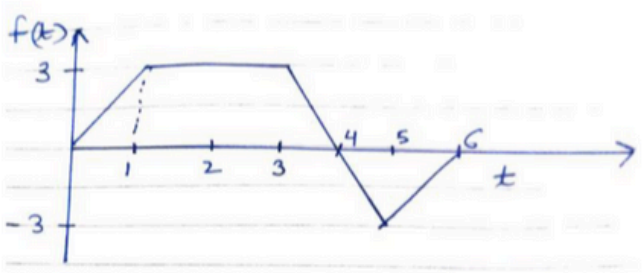
d) all of the three

Section -2(15 Marks)

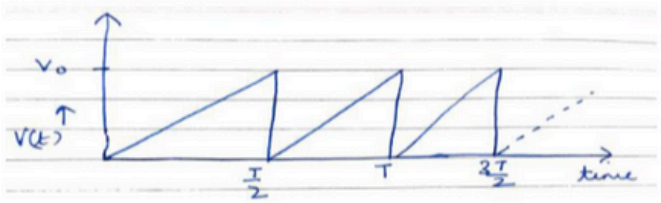
Q16) Synthesize the following waveform and express in terms of standard signals (5)



OR

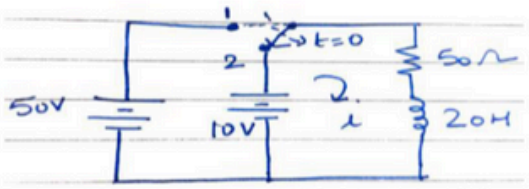


Q17). Find the Laplace transform of the following waveform (5)

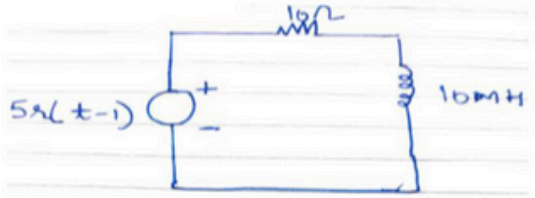


OR

The switch in the figure below has been in position 1 for a long time,it is moved to position 2 at t=0.Obtain the expression for i(t),for t>0.



Q 18)Find the current i(t) in the circuit below using Laplace Transform (5)



OR

Find the expression of i(t) flowing in series RLC circuit with R=3Ω,L=1H ,C=0.5F and 2V battery is applied.