SE (Elect), Sem-III, B.T.K.T, 25/6/15
Numerical Techniques.

25/06/15

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(An Autonomous Institute Affiliated to University of Mumbai)

KT - Examination June 2015

Subject: Numerical Techniques
Class: S.E. (Electrical, Sem: III)

Date: 25.06.2015
Total Marks: 100

Note: 1. Solve any **FIVE** questions of the following. All questions carry equal marks.

2. Group the answers to all sub-questions together.

Master.

1. *a* (*i*) Explain the term *Significant Digit*, with suitable examples. **(05)**

(*ii*) Explain different types of errors that may occur in numerical computation and discuss concept of *error propagation.* **(05)**

b Use *Simpson's* $\frac{1}{3}$ *rule* and *Trapezoidal rule* to evaluate $\int_{-1}^{1} \frac{1}{1+x^2} dx$ by taking 8 equal segments. **(10)**

2. *a.* Obtain the smallest positive root of $f(x) = x^3 + x^2 + x + 7 = 0$ correct upto three significant digits, using *bisection method.* **(10)**

b Find a positive root of the equation, $f(x) = x^3 - 2x^2 + 3x - 4 = 0$, at the end of 5th iteration using *Secant method.* **(10)**

3. *a.* Solve following system of equations using *LU decomposition method*: **(10)**

$$12x - 7y + 3z = 8$$
$$x + 7y - 4z = -51$$
$$4x - 4y + 9z = 62$$

b Solve the following system of equations correct up to 3 decimal places using *Gauss-Seidel iterative method* **(10)**

$$7x_1 + 52x_2 + 13x_3 = 104$$
$$83x_1 + 11x_2 - 4x_3 = 95$$
$$3x_1 + 8x_2 + 29x_3 = 71$$

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SE (Elect), Sem-III, A.T.K.T, 25/6/15.
Numerical Techniques

4. *a* Use *Newton's divided difference interpolation* method to find $f(2)$ for data given below: **(10)**

x	1	3	4	6
$y=f(x)$	4	7	8	11

b Obtain the missing term in the data given below using *lagrange's formula.* **(10)**

x	10	15	20	25	30	35
$y=f(x)$	43	-	29	32	-	78

5. *a* Evaluate $\int_1^2 \frac{1}{x} dx$ using *Trapezoidal rule* for $h = 0.25$ **(10)**

b For the data given below find the forward differences and obtain *Newton's forward difference polynomial.* Interpolate this polynomial at x=0.25. **(10)**

x	0.1	0.2	0.3	0.4	0.5
$y=f(x)$	1.40	1.56	1.76	2.00	2.28

6. *a* Use modified Euler's method to solve $\frac{dy}{dx} = x^2 + y$, with the condition $y_0 = 1$ at $x_0 = 0$. Find the value of y at $x = 0.1$. Assume $h = 0.05$ **(10)**

b Using 4th order Runge Kutta method, integrate, **(10)**

$\frac{dy}{dx} = f(x, y) = -2x^3 + 12x^2 - 20x + 8.5$.

Assume step size of 0.5 and an initial approximation of y=1 at x=0.

7. *a.* From the data given below, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x=1.6. **(10)**

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

b Use *Golden Section search* and *Quadratic Interpolation method* to determine the maxima of function, $f(x) = 2\sin x - 0.1x^2$, at the end of 4th iteration. **(05)**
Assume x_0=0, x_1=1, and x_2=4. **(05)**

* Page (2) *

SE(Elect), Sem-III, A.T.K.T, 24/06/2015.
Electrical Machine - I

24/06/15

BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL COLLEGE OF ENGINEERING

Munshi Nagar, Andheri (West),Mumbai 400 058

[An Autonomous Institution Affiliated to University of Mumbai]

KT-EXAMINATION

SEM/CLASS: III/SE (Elect) TOTAL MARKS: 100

SUBJECT: Electrical Machine - I DURATION: 3 HOUR

DATE: 21/06/2015

Note: 1. Answer any five questions.

2. Answer to all sub questions should be grouped together.

3. Figures to the right indicate full marks.

4. Assume suitable data wherever required and justify the same.

Master

Q1 a. Explain the necessary conditions that must be satisfied for parallel operation of single phase transformers with suitable diagram. **(10)**

b Two single phase transformers A and B rated at 250 kVA are operated in parallel. Percentage impedances for A and B are (1+j 6) and (1.2+j 4.8) respectively. Compute the load shared by each when the total load is 500 kVA at 0.8 p.f. lagging. **(10)**

Q2 a. Explain the theory of autotransformer (step up or step down) with neat sketches showing the number of turns, direction of currents and voltages (both in primary and secondary). Prove that for the same output and transformation ratio k=N2/N1, an autotransformer requires less copper than an ordinary two winding transformer. **(10)**

b Obtain the equivalent circuit of a 200/400V, 50Hz, single phase transformer from the following test data:

OC Test	200V	0.7A	70W on L. V. Side
SC Test	15V	10A	85W on H. V. Side

Calculate the secondary voltage when delivering 5 kW at 0.8 p.f. lagging, the primary voltage being 200V. **(10)**

Q3 a. Describe and draw the Torque/Speed, Torque/Slip characteristics of Induction Motor in detail.

(10)

SE(Elect), Sem-III, A.T.K.T, 24/06/2015.
Electrical machine-I

b A 3 ϕ, 6 pole, 50 Hz induction motor has the useful full load torque of 162.84 Nm. The rotor induced e.m.f. is observed to make 90 cycles per minute. Calculate [1] motor output [2] rotor Cu loss [3] motor input and [4] efficiency if mechanical torque lost in windage and friction is 20. 36 Nm and stator losses are 830 W. **(10)**

Q4 a. Explain the methods of speed control of dc shunt motor in detail. Clearly distinguish the application of these methods with respect to speed variation. **(10)**

b A 250 V dc shunt motor has an armature current of 20 A when running at 1000 r.p.m. against full load torque. The armature resistance is 0.5 Ω. What resistance must be inserted in series with the armature to reduce the speed to 500 r.p.m. at the same torque and what will be the speed if the load torque is halved with this resistance in the circuit? Assume the flux to remain constant throughout and neglect brush contact drop. **(10)**

Q5 a. What is armature reaction in case of dc machine? Describe the demagnetising and crossmagnetising effect of armature reaction with neat sketches in detail. **(10)**

b. What is commutation process in dc machines? Describe it through the reversal of current in a coil in detail. **(10)**

Q6 a. Explain different methods of starting of 3 Ω induction motor with neat sketches in detail. **(10)**

b Draw neat diagram of a 4 pole dc machine. Label all its parts and mention the material used and the function of each part. **(10)**

Q7 Write short notes on the following. (Any Four) **(20)**

(a) Difference between Slip Ring Wound Induction Motor and Squirrel Cage Induction Motor.

(b) Crawling phenomenon in case of Induction Motor.

(c) Principle of Induction generator.

(d) Excitation phenomenon in transformers.

(e) Speed control of induction motor.

SE(Elect), Sem-III, A.T.K.T, 24/6/15
Integrated Circuits.

lib 24/06/15

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SARDARPATELCOLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to University of Mumbai)

KT (Second Half 2014-15)

Total Marks: 100 Duration: 3 Hours

CLASS / SEM: S.E. Electrical/SEM III SUBJECT: Integrated Circuits

- Answer **any FIVE** out of SEVEN.
- Answer to all sub questions should be grouped together
- Figures to the right indicate full marks

Master

1	a	Design XS-3 to BCD code converter	10
	b.	Prove De-Morgan's Theorems	04
	c.	Implement OR gate using NAND gates only	04
	d.	List the problems in combinational circuits.	02
2.	a.	Explain the different types of shift registers.	10
	b.	Suppose the receiver receives hamming code data as 1011111. Find out if there is any error or not and correct it if error is present.	10
3.	a	Design a 5 bit parity checker circuit	10
	b.	Explain Master-Slave Flip flop along with waveforms	10
4.	a.	Implement the following $f(A,B,C,D) = \sum m(0,1,3,5,7,8,9,11,13,15)$ using 1. Single 8:1 Mux 2. Single 4:1 Mux	10
	b.	Implement BCD to Seven Segment (common anode type) code converter	10
5.	a.	Explain in detail any two applications of Flip Flops.	10
	b.	Design a mod 5 Synchronous up counter using T flip flops and draw its timing diagram.	10
6.	a.	Design a sequence generator for the following sequence 110100	10

SE (Elect), Sem- III, A.T.K.T, 24/6/15

Integrated Circuits

b. Explain the following terms related to Logic Families 10
   i. Fan out and Fan in
   ii. Noise immunity
   iii. Current and Voltage Parameters
   iv. Speed of operation
   v. Power Dissipation

7. a. Explain what are the problems associated with asynchronous counter and how they can be overcome. 10

   b. Design a controlled addition / subtraction circuit using IC 7483. 10

SE(Elect), sem - III, A.T.K.T.,
Engineering mathematics - III

Lib
22/06/15

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

ATKT

June 2015

Total Marks: **100**

Duration: **3 Hours**

CLASS/SEM: **S.E (ELECTRICAL)/III**

SUBJECT: **ENGINEERING MATHEMATICS III**

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.

Master.

Q.1 (a) Evaluate $\int_A^B (3x^2y - 2xy)dx + (x^3 - x^2)dy$ along $y^2 = x$ from $A(0,0)$ to $B(4,2)$ **6**

(b) Obtain Half range Fourier Cosine series expansion of the following function in $[0,\pi]$ **6**

$f(x) = x(\pi - x), \quad 0 < x < \pi$

(c) Evaluate $\oint_C \frac{z+4}{z^2+2z+5}dz$, where C is the circle $|z+1-i| = 2$ **8**

Q.2 (a) Find Laplace transform of the function $f(t) = te^{2t}\sin t$ **6**

(b) Evaluate $\int_1^{2-i} (3xy + iy^2)dz$, along the straight line joining the points $z = i$ and $z = 2 - i$ **6**

(c) Verify Green's theorem in the plane for $\oint_C (xy + y^2)dx + x^2dy$, where C is the closed curve of the region bounded by the curves $y = x^2$ and $x = y$ **8**

Q.3 (a) Obtain complex form of Fourier series of the function $f(x) = e^{ax} \quad x \in (-\pi, \pi)$ **6**

(b) Prove that $\bar{F} = (2xy + 2xz^2)\hat{i} + (x^2 + 2yz^3)\hat{j} + (3y^2z^2 + 2x^2z)\hat{k}$ is irrotational. Hence find scalar point function ϕ such that $\bar{F} = \nabla\phi$ and evaluate $\int_A^B \bar{F} \cdot d\bar{r}$ along the straight line joining A (1, 2, 0) to B (3, 1, 4). **6**

SE (Elect), Sem-III, A.T.K.T, 22/6/15,
Engineering Mathematics-III

(c) Obtain all Taylor's and Laurent's series expansions of $f(z)=\frac{3z+4}{z^2-7z+6}$ about $z=0$ indicating the region of convergence **8**

Q.4 (a) Obtain Fourier series expansion of the following function **6**

$f(x)=x-x^2, \quad -1<x<1$

(b) Evaluate $L^{-1}\left\{\frac{(s+2)^2}{\left(s^2+4s+8\right)^2}\right\}$ **6**

(c) Obtain Fourier series expansion of the following function in the interval $[0,2\pi]$ **8**

$f(x)=\left[\frac{\pi-x}{2}\right]^2$

Q.5 (a) Evaluate $\oint_C (3x-7y)dx+(3x+5y)dy$ where C is the rectangle whose sides are **6**

$x=-1,\ x=1,\ y=-2,\ y=2$

(b) Evaluate $\oint_C \frac{z-1}{(z-2)(z+1)^2}dz$ where $C:|z-i|=3$ **6**

(c) (i) If $L\{f(t)\}=\frac{s}{2s^2-3s-4}$, find $L\{e^{-3t}f(2t)\}$ (ii) Evaluate $L\left\{\int_0^t e^u \frac{\sin u}{u}du\right\}$ **8**

6(a) Evaluate $\iint_S (\nabla\times\overline{F})\cdot\hat{n}ds$, where $\overline{F}=(x^2+y-4)\hat{i}+3xy\hat{j}+(2xz+z^2)\hat{k}$ and S is the surface of the hemispherical cap $x^2+y^2+z^2=9,\ z\geq 0$ above XY plane. **6**

(b) Evaluate $\oint_C z^4 e^{1/z}dz$ where $C:|z|=1$ **6**

(c) Using method of Laplace Transforms, solve the following differential equation **8**

$\frac{d^2y}{dt^2}-3\frac{dy}{dt}+2y=4e^{2t}$ where $y(0)=-3,\ y'(0)=5$

SE (Civil), Sem- III, A.T.K.T. 22/6/15.
Engineering Mathematics- III.

7(a) Evaluate $L^{-1}\left\{\frac{s^2+6}{(s+1)^2(s-2)}\right\}$ **6**

(b) Express the function $f(x)=\begin{cases}0, & x<0\\ e^{-x}, & x\geq 0\end{cases}$ as a Fourier Integral **6**

(c) Verify Gauss Divergence Theorem for $\overline{F}=(x^2-yz)\hat{i}+(y^2-xz)\hat{j}+(z^2-xy)\hat{k}$ over the surface of the cuboid $0\leq x\leq a,\ 0\leq y\leq b,\ 0\leq z\leq c$ **8**

SE (Elect), Sem- III, A.T.K.T,
Electrical Networks

NB
23/06/15

BharatiyaVidyaBhavan's

SARDARPATELCOLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

First Half 2015

KT Examination

Total Marks :100

Duration : 3 Hours

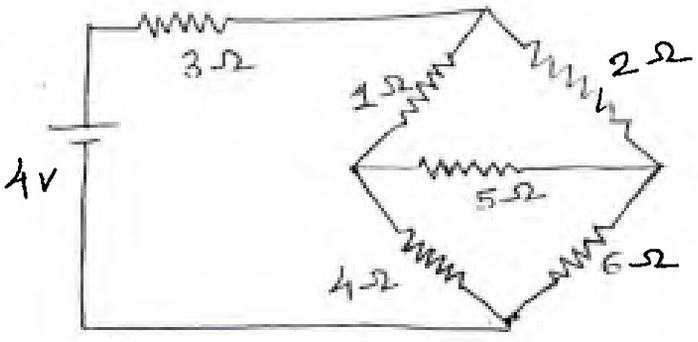
CLASS/SEM: SE/III (Elect)

SUBJECT: Electrical Networks code: EE203

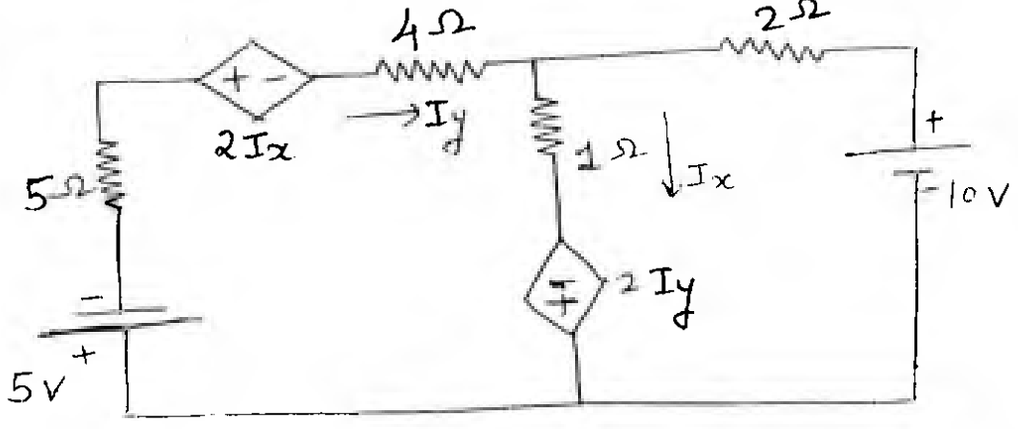
- Attempt any Five questions
- Answers to all sub questions should be grouped together
- Figures to the right indicate full marks
- In the absence of any data, make suitable assumptions and justify the same.

Master.

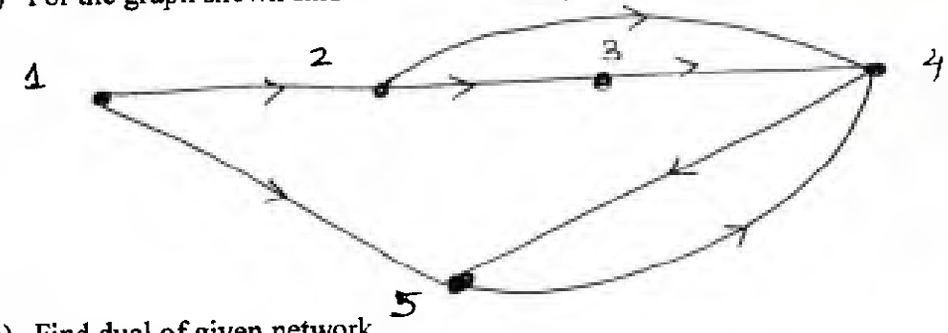
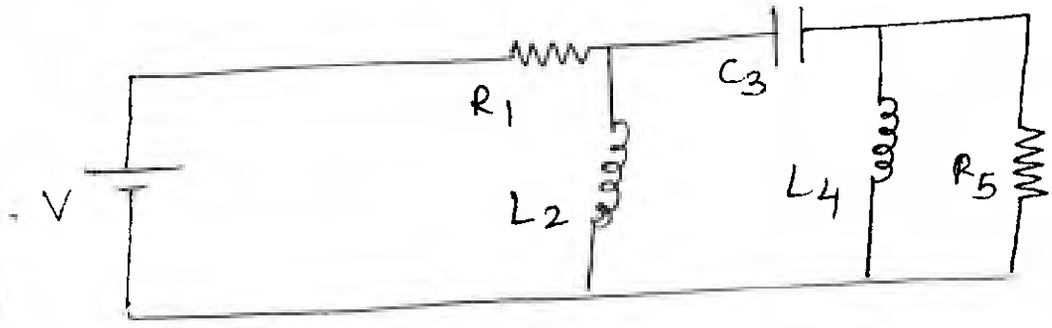
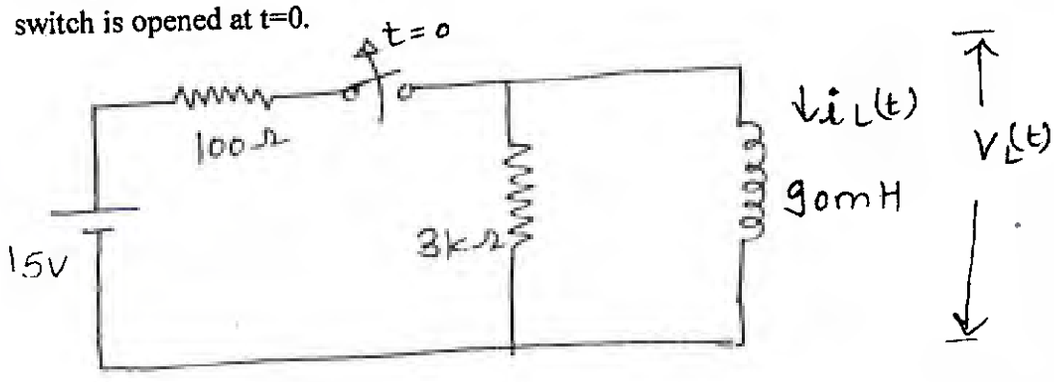
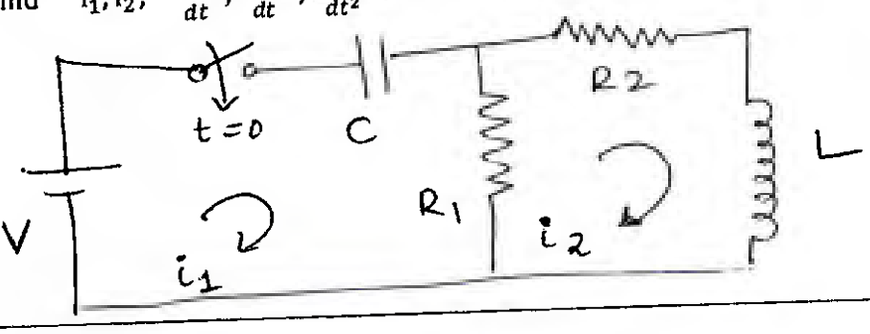
Q.1) a) Find the current supplied by the source. 10



b) Find currents Ix and Iy. 10



SE(Elect), Sem-III, A.T.K.T, 23/6/15.
Electrical Networks

Q.2)	a) For the graph shown find Incidence Matrix, Tie-set matrix and f- cutest matrix. 	10
	b) Find dual of given network 	05
	c) Find initial and final value of f(t) if $F(s) = \frac{2s+1}{s^3+6s^2+11s+6}$.	05
Q.3)	a) For a given network shown below calculate $i_L(t)$ and $v_L(t)$ for all time if the switch is opened at t=0. 	10
	b) For a given network assuming all initial conditions as zero find $i_1, i_2, \frac{di_1}{dt}, \frac{di_2}{dt}, \frac{d^2i_2}{dt^2}$ at t=0+. The switch is closed at t=0. 	10

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SE (Elect), Semm III, A.Y. 14-15, 23/6/15
Electrical Networks.

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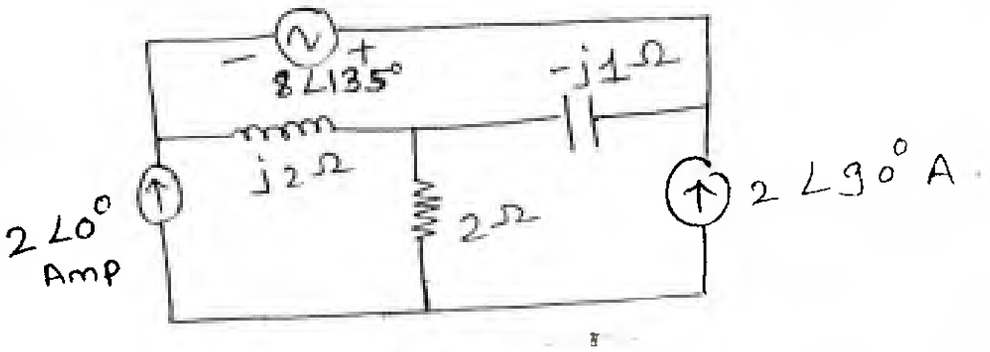
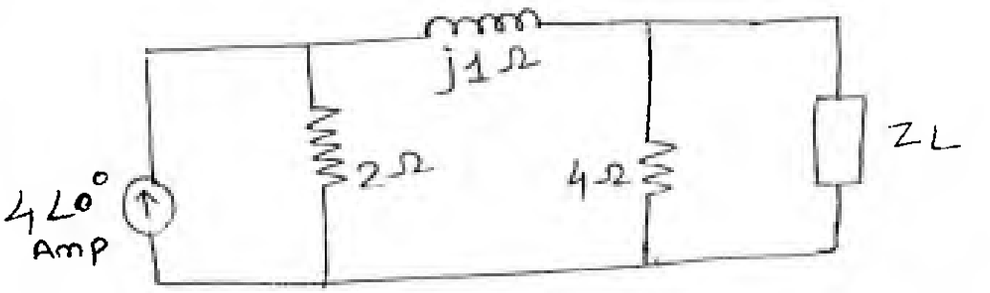
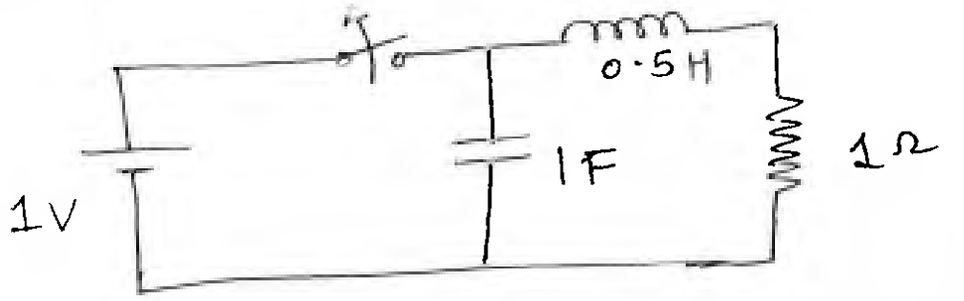
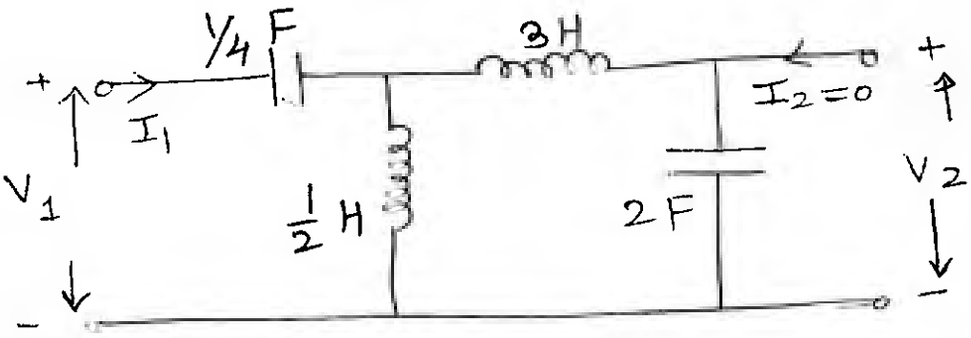
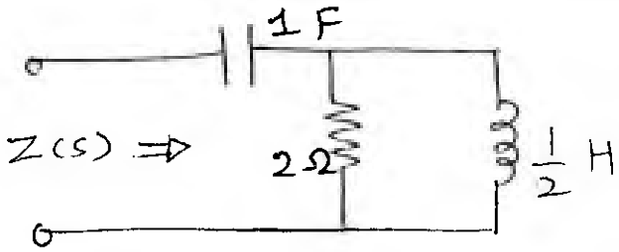
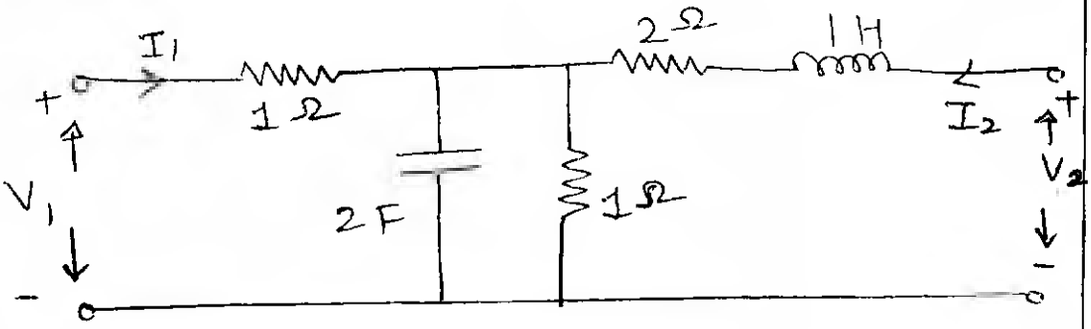
SARDARPATELCOLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Q.4)	a) Determine current through the inductor using superposition theorem. 	10
	b) Find Z_L for maximum power transfer. Also determine the maximum power drawn by the load. 	10
Q.5)	a) Determine f(t) if $F(s) = \frac{s^2-15s-11}{(s+1)(s-2)^2}$.	10
	b) In a network shown below, the switch is opened at t=0. Steady state condition is reached before t=0. Determine i(t). [Use Laplace transform] 	10

Q.6)	a) Evaluate network functions $\frac{V_1}{I_1}, \frac{V_2}{I_1}, \frac{V_2}{V_1}$.	10
		
	b) Determine poles and zeros of impedance of network shown below. Plot pole - zero plot.	10
		
Q.7)	a) Find Z- parameters for a given network.	10
		
	b) Realize the RC impedance in Cauer I and Foster I form.	10

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