03/11/14

BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL COLLEGE OF ENGINEERING

Munshi Nagar, Andheri (West),Mumbai 400 058

[An Autonomous Institution Affiliated to University of Mumbai]

END SEMESTER

SEM/CLASS: III/SE (E/Elect)

SUBJECT: Electrical Machine - I

TOTAL MARKS: 100

DURATION: 3 HOUR

DATE: 03/11/2014

S.E Elect Sem III

master

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.

Q1 a. A 3 phase transformer rated at 1000 KVA, 11/3.3KV has its primary winding star connected and its secondary winding delta connected. The actual resistance per phase of these windings are R_1=0.375Ω, R_2=0.095Ω and leakage reactance per phase are X_1=9.5Ω and X_2=2Ω. Calculate the voltage at normal frequency which must be applied to primary terminals in the order to obtain full load current in the windings when the secondary terminals are short circuited. Also calculate the power input under these conditions. **(10)**

b. 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). Also prove that the transformation ratio of an autotransformer is same as that of a two winding transformer. **(10)**

Q2 a. Two 6600/250V single phase transformers have the following short circuit characteristics: Applied voltage 200V, current 30A, and power 1200W for one of the transformers. The corresponding data for the other transformer are 120V, 20A and 1500W. All values are measured on the hv side with the lv terminals short circuited. Find the current and p.f of each transformer when working in parallel with each other on the high and low voltage side and taking a load of 300KW at a p.f of 0.8 lagging from the high voltage bus bar. **(10)**

b. Explain the excitation phenomenon in transformers with neat diagrams. **(10)**

Q3 a. Describe the constructional features of induction motor and explain why the rotor is forced to rotate in the direction of rotating magnetic field along with its principle of operation. **(10)**

b. A 3ϕ, 4 pole, 1440 rpm, 50 Hz induction motor has star connected rotor winding, having a resistance of 0.2 Ω per phase and a standstill leakage reactance of 1 Ω per phase. When the

stator is energised at rated voltage and frequency, the rotor induced e.m.f at standstill is 120 V per phase. [a] Calculate the rotor current, rotor power factor and torque both at starting and at full load. [b] If an external resistance of 1 Ω per phase is inserted in rotor circuit, calculate rotor current, rotor power factor and torque at the time of starting. **(10)**

Q4 a. Derive the expression of internal torque for a 3ϕ induction motor and show that the maximum internal torque developed by a 3ϕ induction motor does not depend on the rotor circuit resistance. **(10)**

b. A 400V, 3ϕ, 6 pole, 50 Hz induction motor draws a power of 2 kW at no load and at rated voltage and frequency. At a full load slip of 3%, the power input to motor is 50 kW and the stator ohmic loss is 1.5 kW. Neglect I^2R loss at no load. If the stator core loss and mechanical losses are assumed equal, then at a slip of 3% calculate [a] rotor ohmic loss [b] shaft power [c] shaft torque [d] internal torque and [e] efficiency. **(10)**

Q5 a. Explain different methods of speed control of 3ϕ induction motor. **(10)**

b. A 3ϕ, 440V distribution circuit is designed to supply not more than 1200 amperes. Assuming that a 3ϕ squirrel cage induction motor has a full load efficiency of 0.85 and a full load power factor of 0.8 and that the starting current at rated voltage is 5 times the rated full load current, what is the maximum permissible kW rating of the motor, [a] if it is to be started at full voltage? [b] if it is to be started using an auto transformer stepping down the voltage to 80%? [c] if it is designed for use with a star delta starter? **(10)**

Q6 a. What is the role of commutator in a dc motor? Explain the process of commutation in detail. **(06)**

b. What is meant by armature reaction? Show that the effect of armature m.m.f. on the main field, is entirely cross magnetising. **(06)**

c. A dc shunt motor drives a centrifugal pump whose torque varies as the square of the speed. The motor is fed from a 200 V dc supply and takes 50 A from supply when running at 1000 rpm. What resistance must be connected in the armature circuit to reduce the speed to 800 rpm? Armature resistance is 0.1 Ω. Field resistance is 100 Ω. **(08)**

Q7 a. What is the necessity of starter in dc motor? State different starters and explain one of them in detail. **(07)**

b. Explain the terms: [a] Magnetomotive force, [b] Magnetic flux and flux density, [c] Magnetic field intensity, [d] Permeability of free space, [e] Reluctance and Permeance. **(05)**

c. Draw and explain the speed current, torque current and speed torque characteristics of dc shunt and series motor. **(08)**

18/12/14

SE(Elect), Sem-III, Re-exam

BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL COLLEGE OF ENGINEERING

Munshi Nagar, Andheri (West),Mumbai 400 058

[An Autonomous Institution Affiliated to University of Mumbai]

RE-EXAMINATION

SEM/CLASS: III/SE (Elect).

TOTAL MARKS: 100

SUBJECT: Electrical Machine - I

DURATION: 3 HOUR

DATE: 18/12/2014

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 FILE.

Q1 a. Derive an expression for the regulation of a 1 phase transformer, with the help of phasor diagrams, when the transformer is loaded with a lagging p.f. load. Also obtain the expression for resistance drop and % reactance drop. **(10)**

b. Two single phase transformers with equal voltage ratio have impedances of (0.819+j2.5013) Ω and (0.8+j 2.31) Ω with respect to secondary. If they operate in parallel how they will share a total of 2000KW at p.f. 0.8 lag. **(10)**

Q2 a. 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. The magnetic circuit has a cross sectional area of core= 5*5 cm^2, core length = 50 cm, air gap length = 4mm and no. of turns N= 600 turns. For producing a flux density of 1.2T, find the exciting current in the coil. Assume relative permeability of iron =10,000. (Neglect fringing) **(10)**

Q3 a. Describe the constructional features of both squirrel cage induction motor and slip ring induction motor. Discuss the merits of one over the other. **(10)**

b. A 10 kW, 400 V, 3 ϕ, 4 pole, 50 Hz delta connected induction motor is running at no load with a line current of 8 A and an input power of 660 watts. At full load, the line current is 18 A and the input power is 11.20 kW. Stator effective resistance per phase is 1.2 Ω and friction, windage loss is 420 watts. For negligible rotor ohmic losses at no load, calculate, [a] stator core loss; [b] total rotor losses at full load; [c] total rotor ohmic losses at full load; [d] full load speed; [e] internal torque, shaft torque and motor efficiency. **(10)**

TII /SE.CElect), Re-exam

Electrical Machine - I

Q4 a. Explain the phenomenon of cogging and crawling in case of a 3ϕ induction motor in detail. **(10)**

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

Q5 a. Draw neat diagram of a 4 pole dc machine. Label all its parts and mention the material used for each part. **(10)**

b. A 250 V dc shunt motor has an armature resistance of 0.5 Ω and a field resistance of 250 Ω. When driving a constant torque load at 600 rpm, the motor draws 21 A. What will be the new speed of the motor if an additional 250 Ω resistance is inserted in the field circuit? **(10)**

Q6 a. State different types of dc motors and mention their application. **(06)**

b. Describe commutation process in dc machines through the reversal of current in a coil. **(07)**

c. Explain the demagnetising and the cross magnetising effects of armature reaction in case of dc shunt motor. **(07)**

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

(a) Torque speed characteristic of induction motor.

(b) Parallel operation of transformer.

(c) Principle of Induction generator.

(d) Speed control of dc shunt motor.

(e) Excitation phenomenon in transformers.

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31/10/14

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering, Andheri (W), Mumbai 400 058

End Semester Examination

Master

S.E(Elect), Sem-III

Class: S. E. Electrical Sem III **Time: 3 Hr.**
Subject: Electrical Networks **Marks: 100.**

Note: 1) Solve any five.
2) Assume suitable data if necessary.

Q 1) a) Derive the expression for voltage across a capacitor in a source-free RC network with initial voltage across capacitor as Vo. Derive the expression for time constant. (7)

b) The Reduced incidence matrix is given below. Obtain the number of trees possible and draw the network graph. (6)

$$\begin{bmatrix} 1 & 0 & 0 & -1 & -1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & -1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

c) Obtain the dual of the following network. Write the network equations from which dual network is derived. (07)

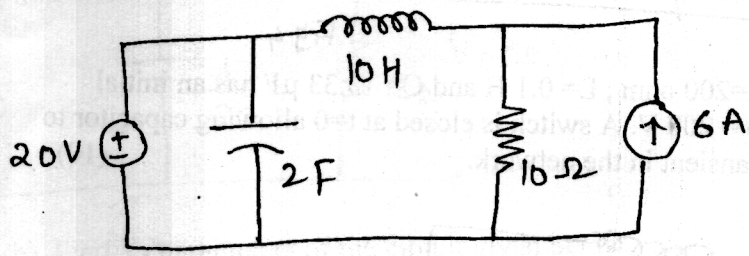


Fig 1

Q.2) a) Find the steady state values of i_L, v_{c1} and v_{c2} in the circuit given below. (10)

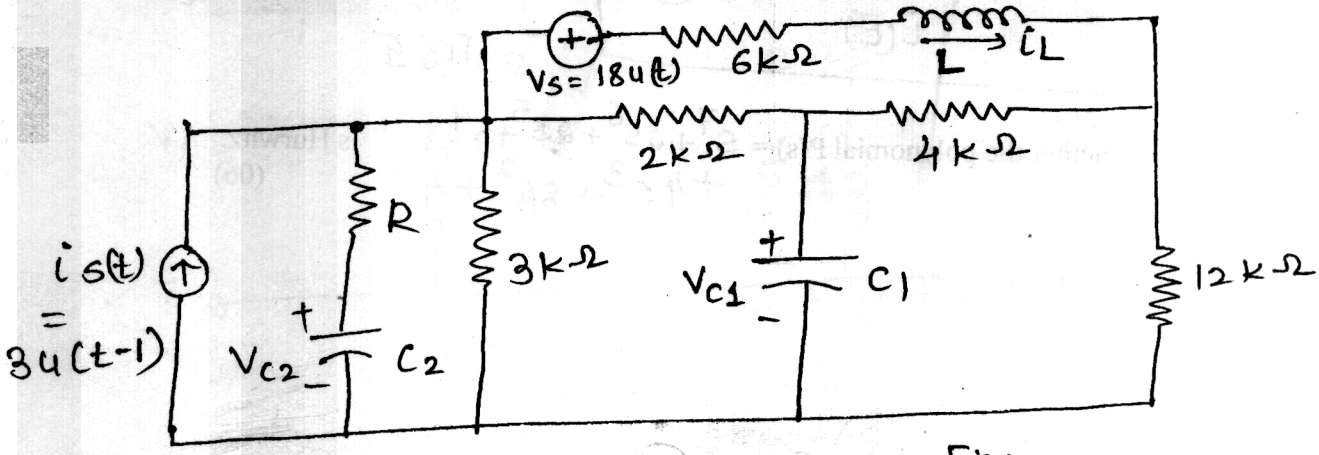


Fig 2

b) A switch in Figure 3 has been closed at t=0. Calculate loop currents i_1 (t) and i_2 (t) using Laplace Transform. (10)

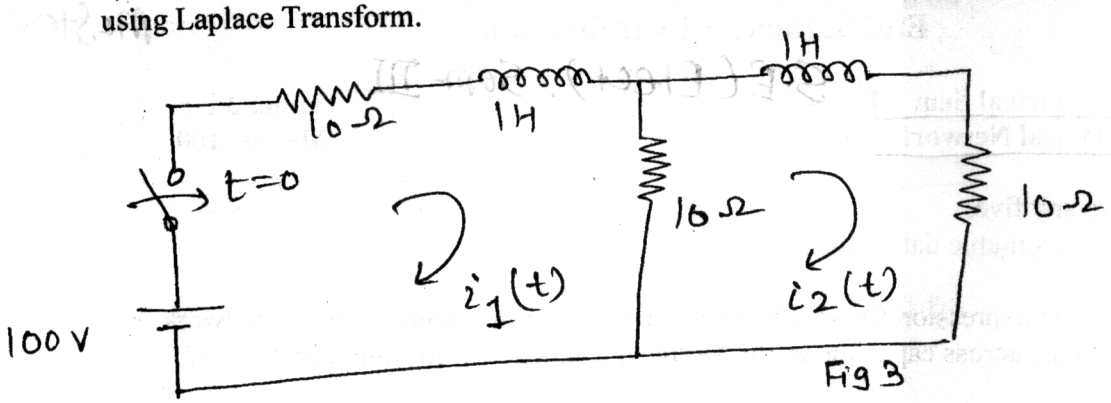


Fig 3

Q.3) a) The switch in Figure 4 has been closed at t=0. Find i and v for all times. (10)

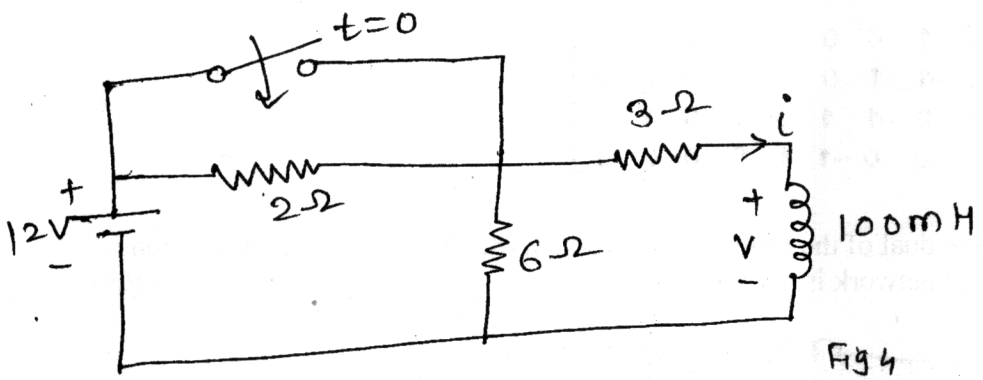


Fig 4

b) A series RLC circuit with R=200 ohm , L= 0.1 H and C= 13.33 μF has an initial voltage across the capacitor Vo = 200 V. A switch is closed at t=0 allowing capacitor to discharge. Obtain the current transient in the network. (10)

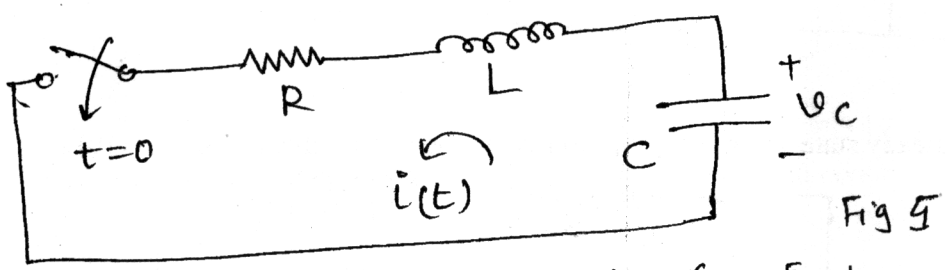


Fig 5

Q.4) a) Test whether the polynomial $P(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 4$ is Hurwitz. (06)

b) A passive network in s-domain is as shown in Figure below. Obtain the network driving impedance and admittance. Draw the pole zero plot of both the functions. (10)

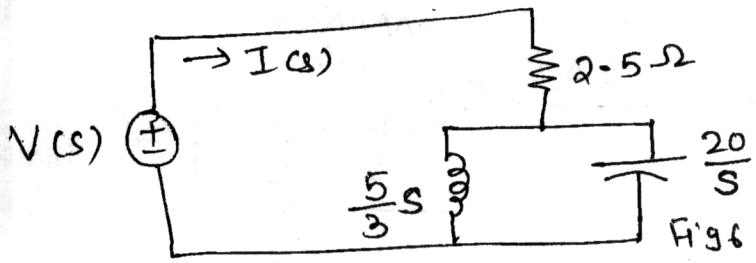


Fig 6

c) Determine the range of K such that the polynomial $P(s) = s^3 + 3s^2 + 2s + K$ is Hurwitz. (04)

Q.5) a) For the two port network shown, find the values of R1, R2 and C, given that the voltage transfer function is $G(s) = \frac{V_o(s)}{V_i(s)} = \frac{0.2}{s^2 + 0.3s + 2}$ (10)

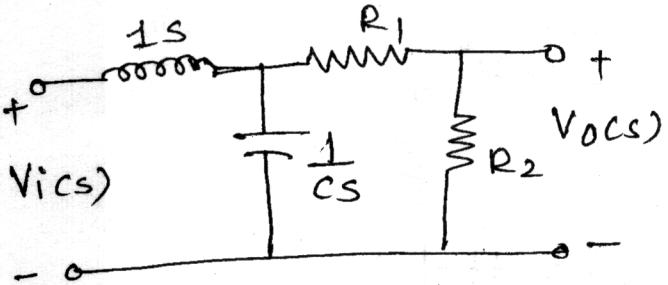


Fig 7

b) Find Y- parameters of the circuit given below. (10)

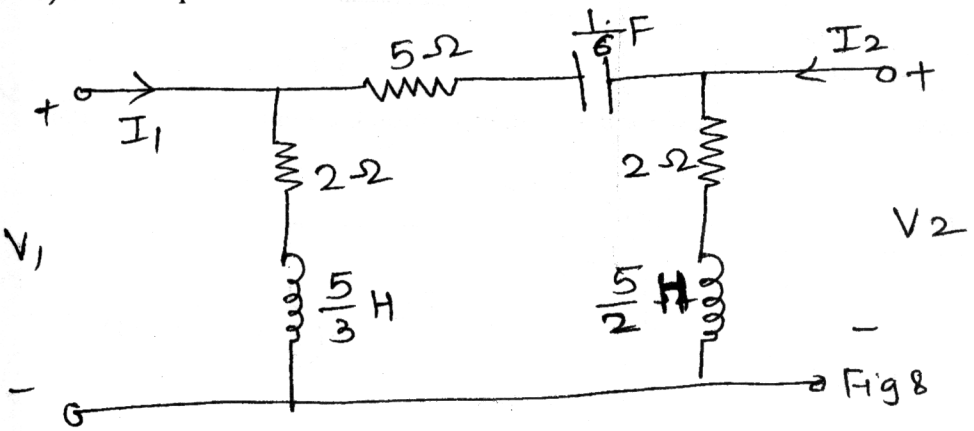


Fig 8

Q.6) a) Obtain the source voltage V in the following network such that the current through 2 + j 3 ohm is zero amp. (10)

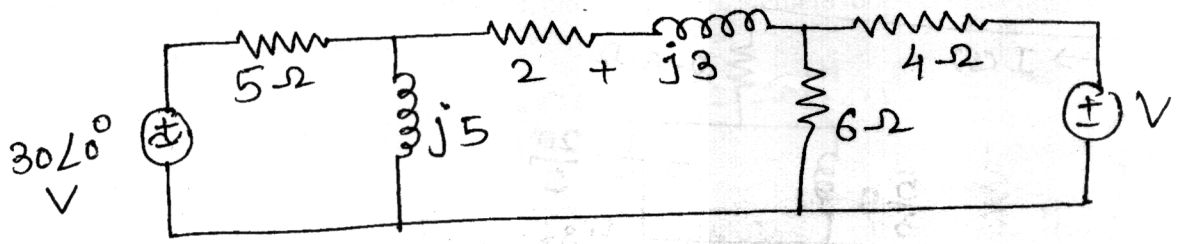


Fig 9

b) Realize R-C impedance in Cauer I and Foster I forms if Z(s) is (10)

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

Q.7) a) Obtain the voltage Vx in the following network. (10)

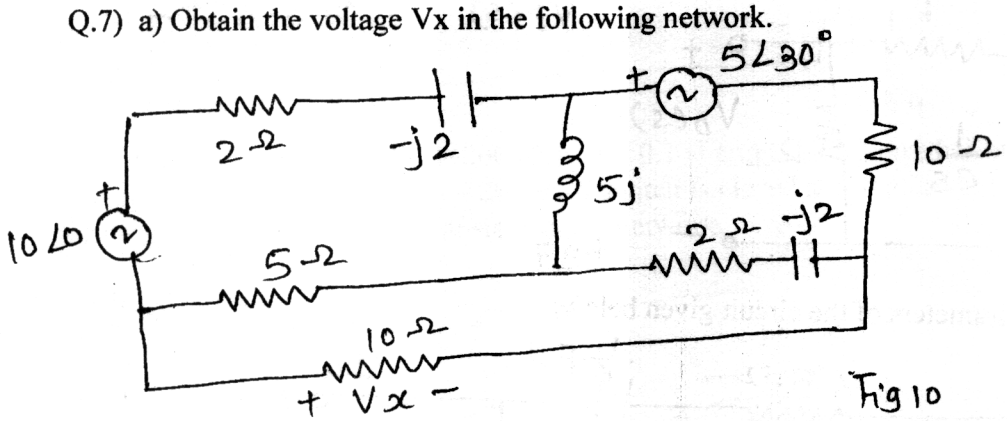


Fig 10

b) Find voltage across 17 k-ohm resistor using superposition theorem. (10)

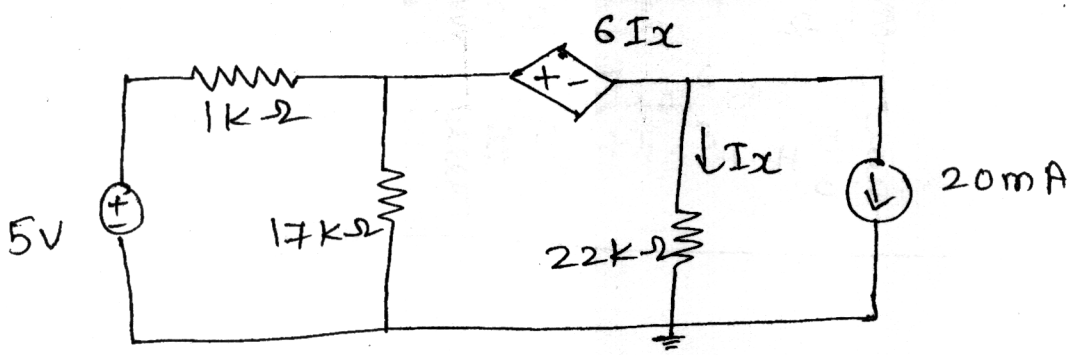


Fig 11.

17/12/14

SE(Elect), Sem-III, Re-exam

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering, Andheri (W), Mumbai 400 058

MASTER FILE.

Re - Examination

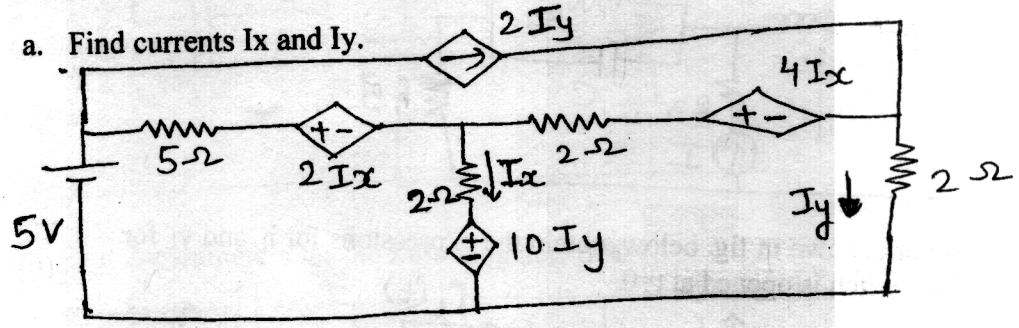
Class: S.E.(Electrical) Sem III | **Time: 3 Hr.**

Subject: Electrical Networks | **Marks: 100.**

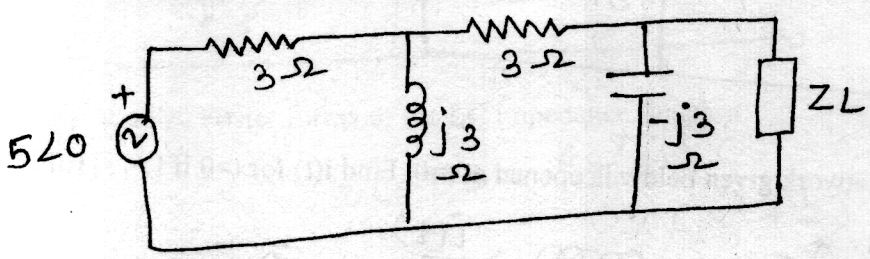
Note: 1) Solve any five.

2) Assume suitable data if necessary.

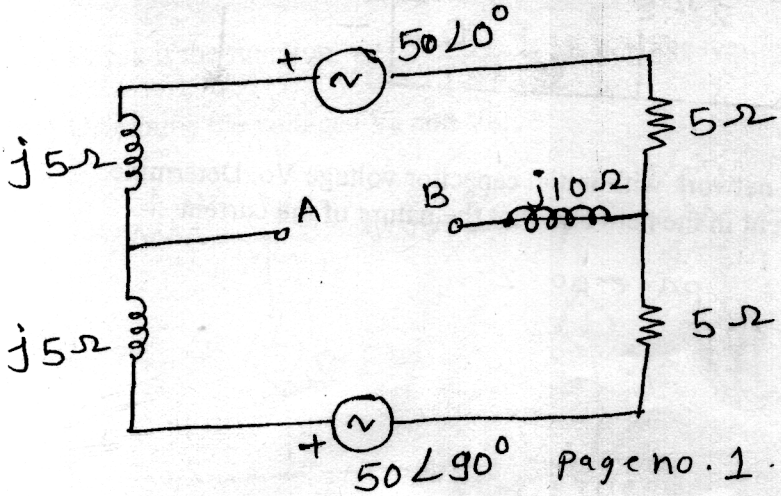
1 a. Find currents Ix and Iy. [10]



b. Find the load impedance such that maximum power is transferred to the load. Calculate the maximum power transfer. [10]



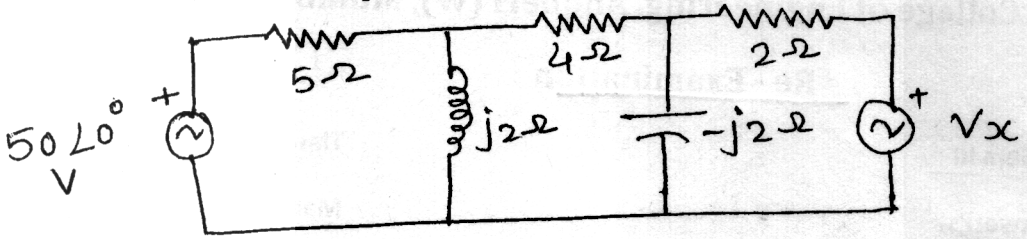
2 a. Find the Norton's equivalent of network across AB. [10]



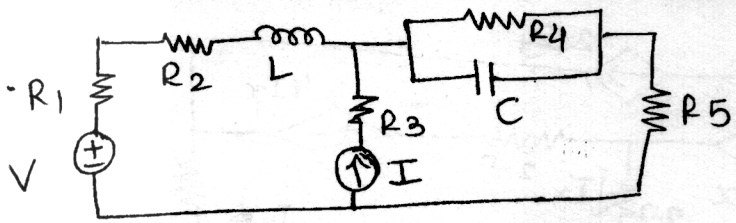
S.E. Electrical - Sem III, Re-exam

Electrical Networks.

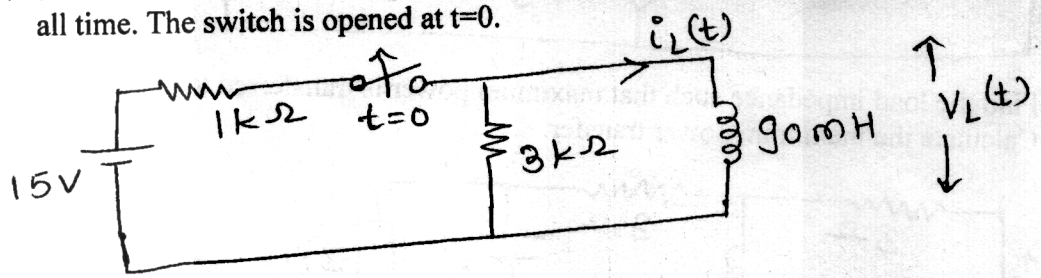
b. In the network shown below, find Vx such that the current through 4 ohm resistor is zero Amp. [10]



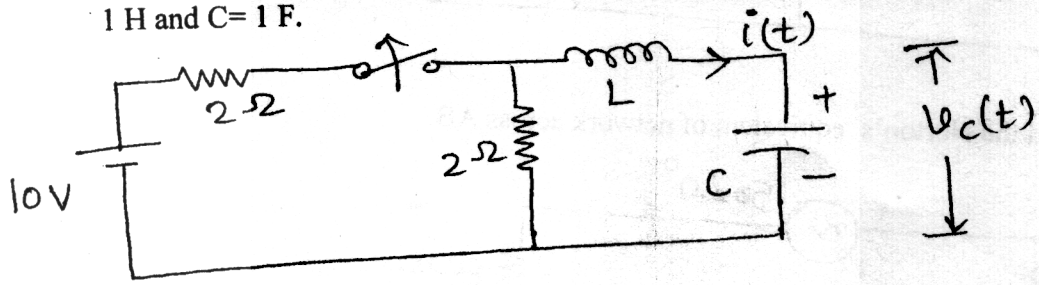
3 a. For the circuit shown below draw the oriented graph and calculate incidence matrix, number of trees possible, f-cutset matrix and tieset matrix. [10]



b. For the network shown in fig. below, obtain the expressions for i_L and v_L for all time. The switch is opened at t=0. [10]



4 a. The switch in the network given below is opened at t=0. Find i(t) for t>0 if L= 1 H and C= 1 F. [10]

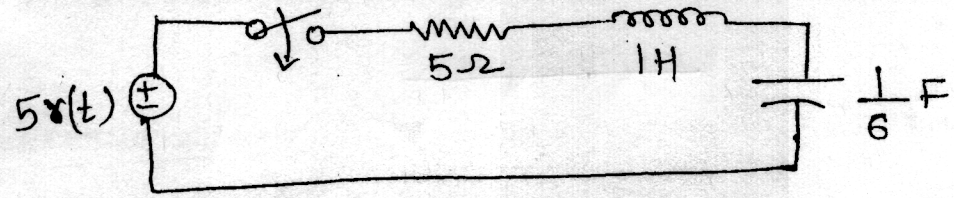


b. Consider a series RLC network with initial capacitor voltage Vo. Determine the expression for current in the network. Plot the nature of the current response. [10]

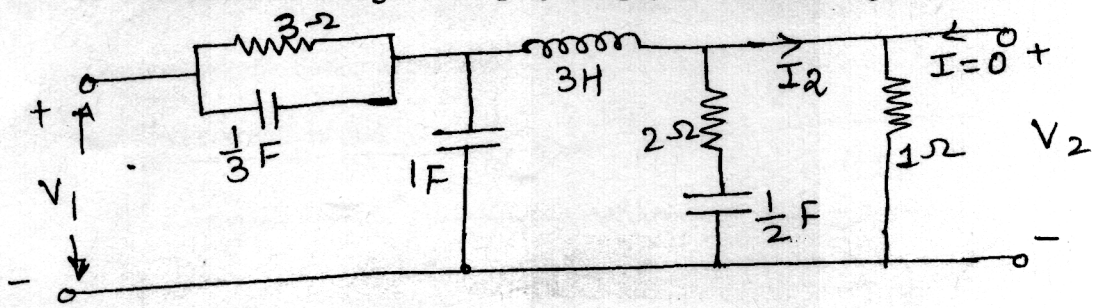
S.E. Electrical - Sem III, Re-exam

Electrical Networks. 17/12/14.

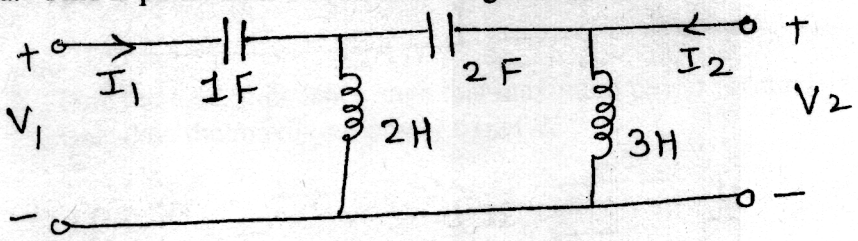
5 a. For the network shown, Determine the current i(t) when the switch is closed at t=0 with zero initial conditions. (Solve using Laplace Transform) [10]



b. Determine the voltage ratio V_2/V_1 and I_2/I_1 for the following network. [10]



6 a. Find Z-parameters for the following network. [10]



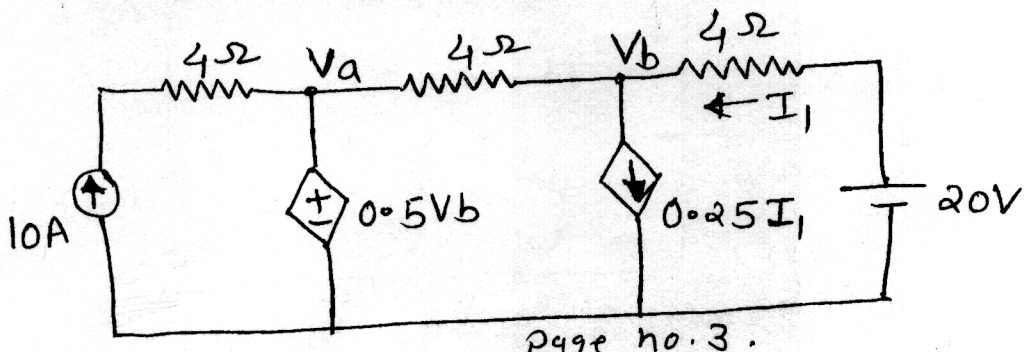
b. Realize Foster forms of the LC impedance function [10]

$$Z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)}$$

7 a. Is the polynomial $s^4+s^3+4s^2+2s+3$ Hurwitz? Justify. [05]

b. Check if the function $\frac{s^2+2s+4}{(s+1)(s+3)}$ is positive real. [05]

c. Determine the voltages Va and Vb. [10]



29/10/14

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to University of Mumbai)

Second Half 2014

Total Marks: 100 S.E. (Elect), Sem- III Duration: 3 Hours

CLASS / SEM: S.E (Electrical) SEM III

SUBJECT: ELECTRONIC CIRCUITS

master

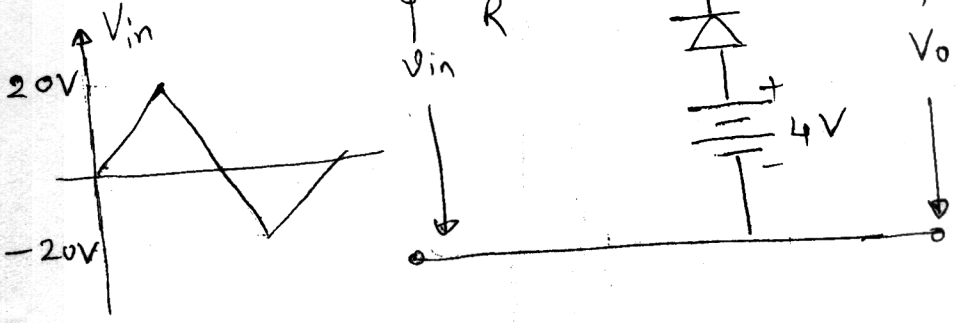
- Attempt **any FIVE** questions out of SEVEN questions.
- Answer to all sub questions should be grouped together.
- Figures to the right indicate **full marks.**

Q.1 State whether following statement are true or false. Justify the same. **20**

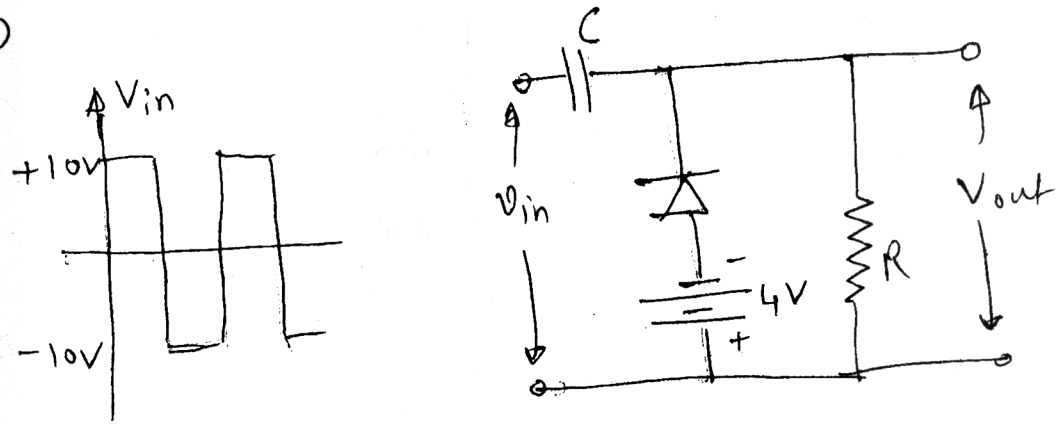
A Opamp as intergrator can be used as low pass filter
B Higher the value of CMRR better is the differential amplifier
C Lesser the value of slew rate better is the opamp
D bandwidth of closed loop opamp is higher than open loop opamp

Q.2 A Draw the output waveforms and explain the same for the circuits shown below. **10**

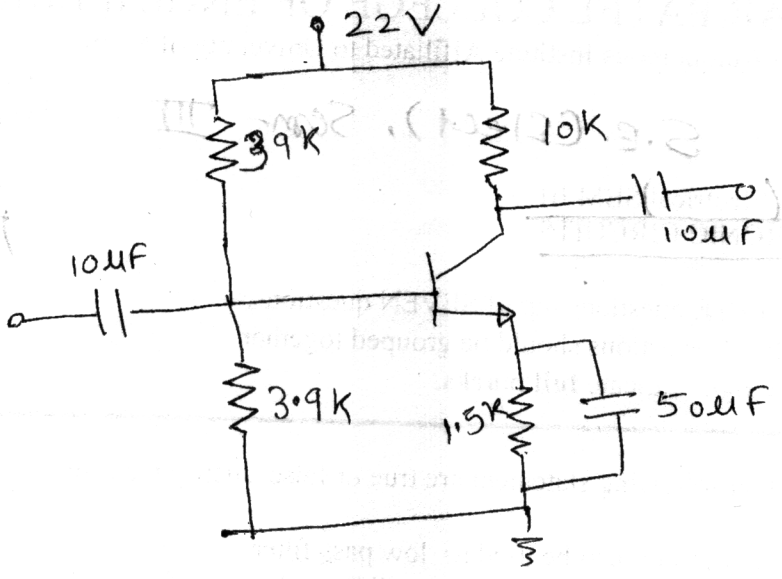
(1)



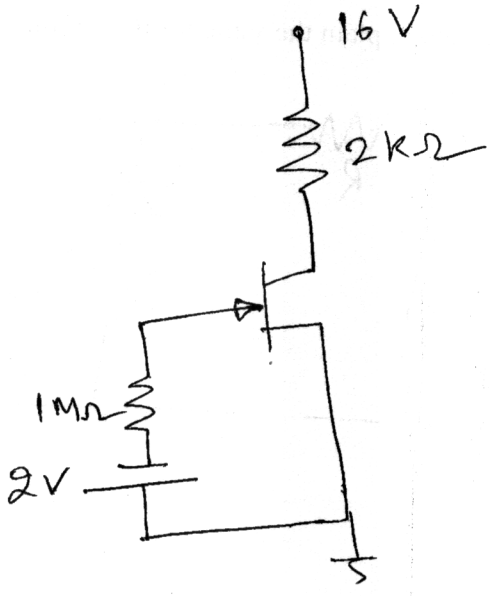
(2)



B Determine V_{CEQ} and I_{CQ}. Given $\beta = 140$ **10**



Q.3 A Determine V_{GSQ}, I_{DQ}, V_{DS}, V_D, V_G, V_S. Given $I_{DSS} = 10mA$, $V_P = -8V$. **08**



B Give comparison between JFET and MOSFET. **06**

C Draw and explain ac equivalent circuit of JFET **06**

Q.4 A With the help of neat circuit diagram explain precision rectifier using OPAMP. **10**

B Explain use of opamp as **10**
(i) Peak detector (ii) I to V converter

Q.5 A Draw circuit diagram with proper values of components to get output as **08**
(i) $V_o = -(V_1 + V_2)$ (ii) $V_o = (V_1 - V_2)$

B Derive expression for CMRR for Double Input Balanced Output differential amplifier. **12**

Q.6 A Explain Successive approximation type A to D conversion technique **10**

B Explain R – 2R ladder type Digital to analog converter. **10**

Q.7 A Explain instrumentation amplifier. **08**

B Explain the OPAMP as a Schmitt Trigger. Draw corresponding waveforms. What is UTP and LTP? **12**

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to University of Mumbai)

Total Marks: 100 SE(Elect), Sem-III, Re-exam, Second Half 2014 Duration: 3 Hours

RE EXAM

CLASS / SEM: S.E. Electrical SEM III SUBJECT: ELECTRONIC CIRCUITS

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

Master

Q.1 State whether the following statements are true/false. Justify the same. **20**

A Open loop opamp is used as amplifier at low frequency.
B Input resistance of MOSFET is higher than that of JFET.
C BJT is referred to as current controlled device whereas FET is referred to as voltage controlled device.
D Schmitt trigger is referred to as a regenerative comparator.

Q.2 A For the fixed bias compensation method, a silicon transistor is used with β = 100. Given V_{CC} = 6V, R_C = 3 K Ω, R_B = 530 K Ω. Draw circuit diagram. Determine the operating point. Calculate Stability factor. **10**

B Draw 'h' parameter small signal low frequency ac equivalent circuit for CE amplifier. Explain each parameter. **10**

Q.3 A Draw block diagram representation of a typical OPAMP and explain the same. **10**

B With the help of neat circuit diagram and waveforms explain how OPAMP works as an integrator. How the circuit is modified for practical integrator? **10**

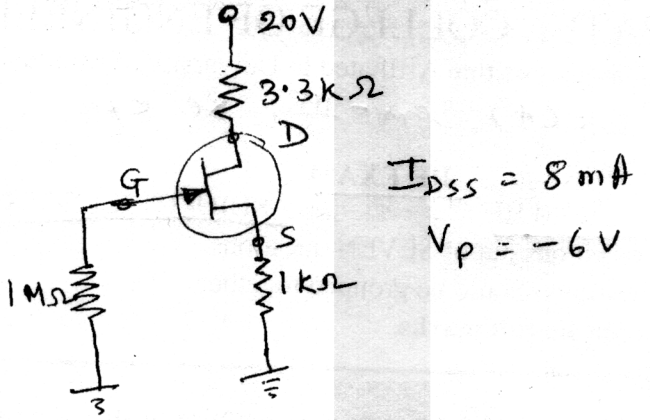
Q.4 A What is the necessity of use of constant current source for differential amplifier? What is current mirror circuit? Why is it used into differential amplifier?. **10**

B Explain the following terms w.r.t. opamp IC 741 **10**

(i) Slew rate
(ii) UGB
(iii) Input resistance
(iv) output resistance
(v) CMRR

Q.5 A Draw neat circuit diagram of OPAMP based V to I convertor with grounded Load. What are its applications? Derive the necessary expression for load current. Is there any limitation on the size of the load? Explain. **10**

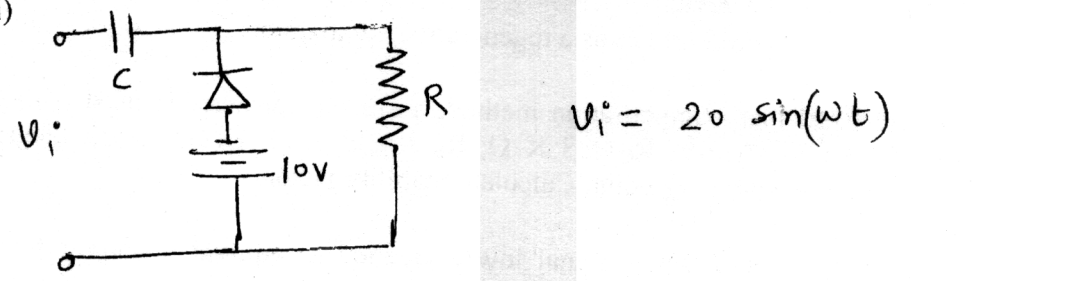
B Determine the quiescent point for the network shown below. 10



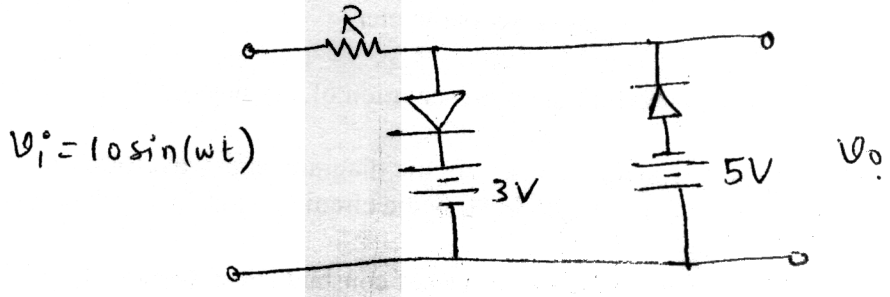
Q.6 A With the help of neat diagram explain Dual slope type of A to D conversion technique. 10

B Determine output voltage for the circuit shown below. 10

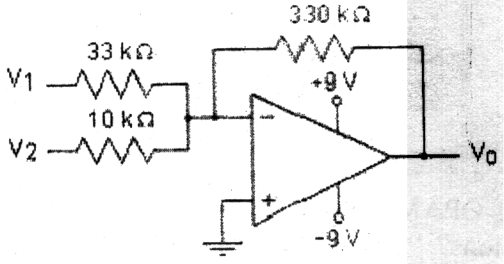
(i)



(ii)

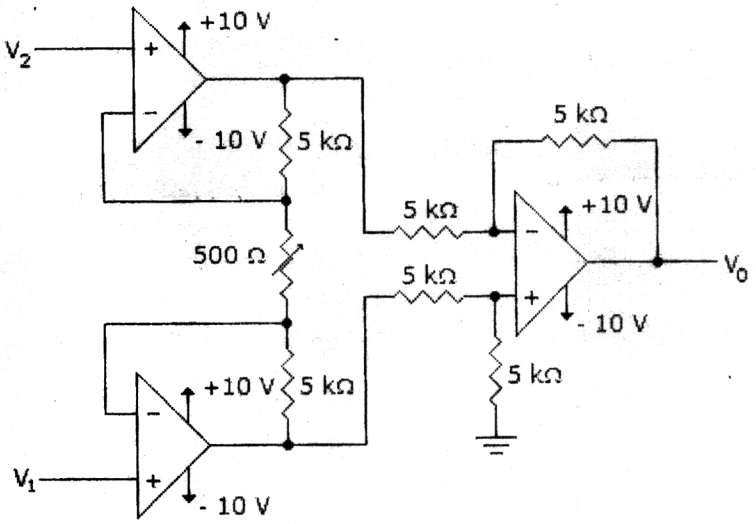


Q.7 A Calculate the output voltage if $V_1 = V_2 = 0.15$ V. 05

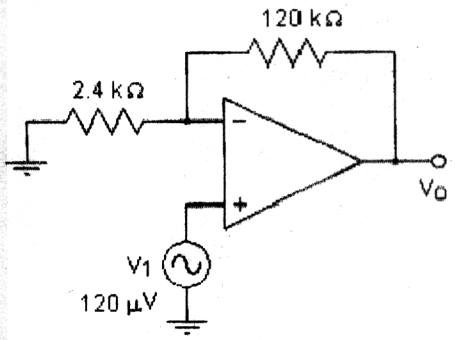


SECE(Elect), Sem-III, Re-exam, Electronics Circuits, 16/12/14

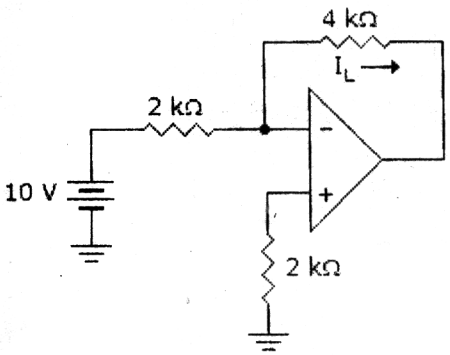
B Calculate the output voltage for this circuit when $V_1 = 2.5$ V and $V_2 = 2.25$ V. **05**



C Calculate the output voltage. **05**



D Calculate I_L for this circuit. **05**



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S.E.

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

S.E. (Elect), Sem - III

October 2014

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 $y^2=2x^3$ from $A(0,0)$ to $B(2,4)$. **6**

(b) Obtain Half range Fourier Sine series expansion of the following function in $[0,1]$ **6**

$$f(x)=\begin{cases}\frac{1}{4}-x & 0<x\le\frac{1}{2}\\ x-\frac{3}{4}, & \frac{1}{2}\le x<1\end{cases}$$

(c) Evaluate $\oint_C \frac{z+3}{2z^2+3z-2}dz$ where $C:|z-i|=3$ **8**

Q.2 (a) Find Laplace transform of the following function **6**

$$f(t)=\begin{cases}\sin t, & 0<t<\pi\\ 0, & \pi<t<2\pi\end{cases}, \qquad f(t)=f(t+2\pi)$$

(b) Prove that $\int_C \log z\, dz = 2\pi i$, where C is the unit circle in the z-plane. **6**

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

of the region bounded by the curves $y^2=x$ and $x=y$

SE (Elect), Sem - III, Engineering Mathematics III

Q.3 (a) Obtain complex form of Fourier series of the following function 6

$f(x)=\cosh 2x+\sinh 2x \quad x\in(-3,3)$

(b) Prove that $\bar{F}=(2xy+z)\hat{i}+(x^2+2yz^3)\hat{j}+(3y^2z^2+x)\hat{k}$ 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 (2, 3, 4). 6

(c) Obtain all Taylor's and Laurent's series expansions of $f(z)=\dfrac{2z-1}{z^2+5z+6}$ about $z=0$ indicating the region of convergence 8

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

$$f(x)=\begin{cases}0, & -2<x<-1\\ 2+x, & -1<x<0\\ 2-x, & 0<x<1\\ 0, & 1<x<2\end{cases}$$

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

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

$$f(x)=\begin{cases}x & 0\le x\le\pi\\ 2\pi-x, & \pi\le x\le 2\pi\end{cases}$$

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 $\oint_C \dfrac{z^3+z+1}{z^2-7z+6}dz$, where C is the ellipse $4x^2+9y^2=1$ 6

(c) (i) If $L\{f(t)\}=\dfrac{s}{2s^2-3s-4}$, find $L\left\{e^{-3t}f\left(\dfrac{t}{3}\right)\right\}$ (ii) Evaluate $L\left\{e^{-2t}\int_0^t \dfrac{\sin u}{u}du\right\}$ 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 $x^2 + y^2 + z^2 = 4$, $z \geq 0$ above XY plane. **6**

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

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

$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x$ where $y(0) = 2$, $y'(0) = -1$

7(a) Evaluate $L^{-1}\left\{\frac{2s^2 + 3}{(s+1)^2(s-3)}\right\}$ **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 $0 \leq x \leq 2$, $0 \leq y \leq 4$, $0 \leq z \leq 3$ **8**

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Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

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

December 2014

A.T.K.T

Total Marks: **100**

Duration: **3 Hours**

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

SUBJECT: **ENGINEEIRNG 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 $\int_A^B (2xy^2+4x^3y)dx+(2x^2y+x^4)dy$ along $2y^3=x^2$ 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 $\oint_C \frac{2z+3}{(z-3)(z^2+2z)}dz$ where $C:|z|=4$ **8**

Q.2 (a) Find Laplace transform of the following function **6**

$f(t)=te^{-3t}\cos(at+b)$, where a and b are constants

(b) Prove that $\int_C \log z \, dz = 2\pi i$, where C is the unit circle in the z-plane. **6**

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

Q.3 (a) Obtain complex form of Fourier series of the following function **6**

$f(x)=\cosh 3x+\sinh 3x \quad x\in(-2,2)$

SE(Elect), Sem - III, A.T.K.T. Engineering Mathematics III

15/12/14

(b) Prove that $\bar{F} = (3x^2z - 6xy)\hat{i} + (4y - 3x^2)\hat{j} + (x^3 - 2z)\hat{k}$ is conservative. 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 (2, 1, 0) B(1, 2, 3). **6**

(c) Obtain all Laurent's series expansions of $f(z) = \dfrac{3z+1}{z(z-1)(z+3)}$ about $z = 0$ indicating the region of convergence **8**

Q.4 (a) Obtain Fourier series expansion of the following function $f(x) = 4 - x^2, \quad 0 \le x \le 2$ **6**

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

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

$f(x) = x\cos x, \quad 0 \le x \le 2\pi$

Q.5 (a) Evaluate $\oint_C (4x + 2y)dx + (7x - 5y)dy$ where C is the circle $x^2 + y^2 = 9$ **6**

(b) Evaluate $\oint_C \dfrac{z^3 + 2z - 1}{z^2 - 7z + 6} dz$, where C is the ellipse $\dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$ **6**

(c) Evaluate $\int_0^\infty e^{-3t} t^2 \sin t \, dt$ **8**

6(a) Evaluate $\iint_S \left(\nabla \times \bar{F}\right) \cdot \hat{n} ds$, where $\bar{F} = (x^2 - y + 3)\hat{i} + 2xy\hat{j} + (2xz + yz)\hat{k}$ and S is the surface of the hemispherical cap $x^2 + y^2 + z^2 = 1, \quad z \ge 0$ above XY plane. **6**

(b) Evaluate $\oint_C z^4 \sin\left(\dfrac{1}{z}\right) dz$ where $C: |z| = 1$ **6**

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

$\dfrac{d^2y}{dt^2} - 4\dfrac{dy}{dt} + 4y = e^{2t}$ where $y(0) = 1, \; y'(0) = -1$

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

15/12/14

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

(b) Express the function $f(x)=\begin{cases}1-x^2, & 0\le x\le 1\\ 0, & x>1\end{cases}$ as a Fourier Sine Integral **6**

(c) Verify Gauss Divergence Theorem for $\overline{F}=(x^2-y)\hat{i}+y\hat{j}+xz\hat{k}$ over the surface of the cylinder $x^2+y^2=4,\ z=0,\ z=4$ **8**

20/12/14

S.E. (Electrical) sem III - Re-exam.

BharatiyaVidyaBhavan's

SARDARPATELCOLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to University of Mumbai)

Re - Exam (First 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 FILE.

1	a	Suppose the receiver receives hamming code data as 1010111. Find out if there is any error or not and correct it if error is present.	10
	b.	Design a binary to gray(4 bit) code converter	10
2.	a.	Explain the Race condition of JK flip flop and how it can be eliminated. Explain the working of Master Slave JK flip flop.	10
	b.	Explain the different types of shift registers.	10
3.	a.	Do the following conversion i. $(23)_{10} = (?)_8$ ii. $(100110)_2 = (?)_{gray}$ iii. $(ADC)_{16} = (?)_{BCD}$	06
	b.	Perform the following i. $(1101)_2 * (101)_2$ ii. $(110101)_2 - (10110)_2$ using 1's complement method.	04
	c.	Implement the following using 8:1 Mux. $f = ABC + BCD + ABC$	10
4.	a.	Implement BCD to Seven Segment (common anode type) code converter	10
	b.	Design a two bit comparator using basic gates.	10
5	a.	Design a mod 10 Ripple counter using T flip flops and draw its timing diagram.	10
	b.	Explain with neat diagram CMOS NAND and NOR gates.	10

S.E. Electrical - Sem III

Integrated Circuits -

6. a. Explain different types of Flip Flops with their truth table. Explain the importance of Clear and Preset inputs. 10

b. Do the following conversion: 10
   i. S-R flip flop to J-K flip flop
   ii. T flip flop to D flip flop

7. Write short note on any two 20
   i. Ring counter
   ii. IC 7485
   iii. IC 7483
   iv. Sequence generator

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BharatiyaVidyaBhavan's

SARDARPATELCOLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to University of Mumbai)

END SEM(First 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.	**Explain the different types of clock available for sequential circuits**	04
	b.	**Design a10 bit comparator using IC 7485.**	12
	c.	**Explain the hazards in the combinational circuits**	04
2.	a.	**Implement the following** $f(A,B,C,D) = \sum m(0,1,3,5,7,8,9,10,12,13,15)$ **using** 1. **Single 2:1 Mux** 2. **Single 4:1 Mux**	10
	b.	**Explain the look ahead carry generator circuit.**	10
3.	a.	**Explain the working of TTL NOR gate.**	10
	b.	**Explain the following terms related to Logic Families** i. **Fan out and Fan in** ii. **Noise immunity** iii. **Current and Voltage Parameters** iv. **Speed of operation** v. **Power Dissipation**	10
4.	a.	**Reduce the following using K-maps and implement using NAND Gates only.** $F(w,x,y,z) = \sum m(1,4,5,6,11,12,13,14,15)$	10
	b.	**Do the following conversion:** i. **S-R flip flop to D flip flop** ii. **J-K flip flop to T flip flop**	10
5.	a.	**Design a sequence generator for the following sequence 101100**	10

SE (Elect), Sem - III, Integrated Circuits. - 7/11/14.

	b.	**Design a 5 bit parity checker circuit.**	**10**
6.	**a.**	**Classify memories and differentiate between EPROM and EEPROM**	**08**
		Design mod 5 synchronous down counter using JK flip flop	**12**
7.	**a.**	**Explain the concept of Bushing in counters with an example.**	**06**
	b.	**Explain the interfacing of the following Logic families TTL driving CMOS**	**04**
	c.	**Explain the debounce switch as an application of flip flop.**	**04**
	d.	**Explain with help of neat diagram Left shift register**	**06**

10/11/14.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(An Autonomous Institute Affiliated to University of Mumbai)

End Semester Examination November 2014

Subject: Numerical Techniques **Date:** November 10, 2014

Class: S.E. (Electrical, Sem: III) **Total Marks:** 100

Master

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

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

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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 root of the equation, $f(x) = \cos x - xe^x = 0$, using (*i*) *bisection method*, (*ii*) *False position method* correct upto three decimal places. **(10)**

b. Using Newton Raphson method, find a root of the following equation, correct upto 3 decimal places $f(x) = x^3 - 3x^2 - 5.5x + 9.5 = 0$. Assume x_0=0 **(05)**

c. 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.* **(05)**

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

$$2x_1 - 5x_2 + x_3 = 12$$
$$-x_1 + 3x_2 - x_3 = -8$$
$$3x_1 - 4x_2 + 2x_3 = 16$$

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

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

Page-(1)

4. *a.* Find the polynomial of degree two to approximate the data given below using the method of *least squares approximation*: **(10)**

x	0	1	2	3	4
$y=f(x)$	1	1.8	1.3	2.5	2.3

b. Obtain the missing term in the data given below using *Lagrange's Interpolation Method:* **(10)**

x	1	2	4	6	5
$y=f(x)$	0	-	1.3863	1.7918	1.609

5. *a.* Use *Newton's forward differences interpolation method* to find a polynomial of degree four from the following data: **(10)**

x	1	2	3	4	5
y	1	-1	1	-1	1

Evaluate value of y at $x = 4.5$

b. 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

6. *a.* Use modified Euler's method to solve $10\frac{dy}{dx} = x^2 + y^2$, with the condition $y_0 = 1$ at $x_0 = 0$. Find the value of y for $0.5 \le x \le 1.0$. Assume $h = 0.05$ **(10)**

b. Using 4^{th} *order Runge Kutta method* find y at $x = 0.2$ from following equation, **(10)**

$$\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2.$$

Assume step size of 0.1 and an initial approximation of $y_0 = 1$ and $\frac{dy}{dx} = 0$ at $x_0 = 0$.

7. *a.* From the data given below, find the value of x for which $f(x)$ is maximum and also find maximum value of $f(x)$. **(10)**

x	1.2	1.3	1.4	1.5	1.6
$y=f(x)$	0.9320	0.9636	0.9855	0.9975	0.9996

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 4^{th} iteration. **(10)**
Assume x_0=0, x_1=1, and x_2=4.

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Page (2)

UB 19/12/14

S.E. (Elect) Sem III - Re-exam - Dec 2014.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(An Autonomous Institute Affiliated to University of Mumbai)

Re - Examination December 2014

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

Date: December 19, 2014.
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 FILE.

1. *a.* Evaluate $\int_1^2 \frac{1}{x} dx$ using *Trapezoidal rule* for $h = 0.25$ **(05)**

b. Evaluate $\int_0^6 \frac{1}{1+x} dx$ using *Simpson's* $\frac{1}{3}$ *rule* diving into 10 subintervals. **(05)**

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

2. *a.* Obtain the root of $f(x) = -0.4x^2 + 2.2x + 4.7$ correct upto four significant digits, using *Newton Raphson method.* **(10)**

b. Obtain the smallest positive root of $f(x) = x \log_{10}(x) - 1.9 = 0$, using *secant method*, at the end of third iteration. **(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 using *Gauss-Seidel iterative method.* **(10)**

$$10x_1 - 2x_2 - x_3 - x_4 = 3$$
$$-2x_1 + 10x_2 - x_3 - x_4 = 15$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27$$
$$-x_1 - x_2 - 2x_3 + 10x_4 = -9$$

page no. 1.

S.E. (Electrical) sem III
Numerical Techniques. 19/12/14.

4. *a.* 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

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.* The following table gives the temperatures recorded in Mumbai from 1st February to 1st July in 1997. **(10)**

Feb	March	April	May	June	July
30.3 °C	32.1 °C	37.2 °C	39.8 °C	35.3 °C	29.8 °C

Find the approximate value of temperature on 15th February, 1997.

b. Use *Newton's divided difference interpolation* formula to evaluate $f(3)$ from the following table: **(10)**

x	0	1	2	4	5	6
$y=f(x)$	1	14	15	5	6	19

6. *a.* Use Euler's method to numerically integrate, **(10)**
$f(x,y) = -2x^3 + 12x^2 - 20x + 8.5$, $y(1)=1$, from $x = 0$, to $x = 0.5$.

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 the value of x for which $f(x)$ is maximum and also find maximum value of $f(x)$. **(10)**

x	1	2	7	8
$y=f(x)$	4	5	5	4

b. Explain the *golden section search* method for minimization. **(05)**
Discuss how an *optima* is calculated. **(05)**

Page no. 2

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