S.Y.B.Tech. Elect. Sem III
Numerical Techniques.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(Govt. Aided Autonomous Institute Affiliated to University of Mumbai)

End Semester Examination November 2015

Subject: Numerical Techniques **Date:** November 28, 2015.

Class: S. Y. B. Tech. (Electrical, Sem: III) **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.

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1. *a.* Evaluate $\int_{-1}^{1} \frac{1}{1+x^2}\,dx$, using *Trapezoidal rule* and *Simpson's Rule* using 8 equal segments. **(10)**

b. Obtain the smallest positive root of $f(x) = x^3 - 2x^2 + 3x - 4 = 0$ at the end of 5th iteration using *secant method.* **(10)**

2. *a.* Using *False Position Method* determine the drag coefficient, c, needed for a parachutist of mass $m = 68.1$ *kg* to have a velocity of 40 *m/sec* after free falling for time $t = 10$ *sec.* The acceleration due to gravity is, $g = 9.8$ *m/sec*^{2}, the drag coefficient lies in range 12 *kg/sec* to 16 *kg/sec* and the velocity of parachutist is given by, $v(t) = \frac{gm}{c}\left[1 - e^{-(c/m)t}\right]$. **(10)**

b. Using Newton Raphson method, find a root of the following equation, assuming initial guess as zero: $f(x) = x^3 - 3x^2 - 5.5x + 9.5 = 0$. **(10)**

3. *a.* Solve the following system of equations using *Gauss elimination method.* **(10)**

$$2x_1 + x_2 - 0.1x_3 + x_4 = 2.7$$
$$0.4x_1 + 0.5x_2 + 4x_3 - 8.5x_4 = 21.9$$
$$0.3x_1 - x_2 + x_3 + 5.2x_4 = -3.9$$
$$x_1 + 0.2x_2 + 2.5x_3 - x_4 = 9.9$$

b. Solve following system of equations using *Gauss – Jordan method*: **(10)**

$$2x_1 + x_2 + 2x_3 + x_4 = 6$$
$$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$$
$$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$$
$$2x_1 + 2x_2 - x_3 + x_4 = 10$$

4. *a.* For the data given below, find the interpolating polynomial using using *Newton's divided difference interpolation* method and determine *f(1.5)* from the polynomial. **(10)**

x	0	1	2	5
$y = f(x)$	2	3	12	147

(1)

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Numerical Techniques. Dt. 28/11/15

b. An experiment carried out gave the temperature readings at time t, as follows: **(10)**

Time (Sec)	0	1	2	3	4	5	6	7	8
Temperature (^oC)	60.00	64.50	72.50	80.00	86.25	92.50	105.00	111.00	118.25

Using this data, obtain the temperature at time 3.5 *sec* and time at temperature 100 ^oC.

5. *a.* Find the parabola of degree for the data given below using least squares approximation method: **(10)**

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

b. Using Newton's *Forward or Backward differences Interpolation method*, find the cubic polynomial governing the data given below and determine, *f(4)* from it. **(10)**

x	0	1	2	3
$y=f(x)$	1	0	1	10

6. *a.* Use *Euler's Predictor-Corrector* method to solve $10\frac{dy}{dx} = x^2 + y^2$ for $0.5 \le x \le 1.0$, assuming $x_0 = 0$, $y_0 = 0$ and $h = 0.5$. **(10)**

b. Using 4th order *Runge Kutta method*, solve the following equations at $x = 0.2$, **(10)**

$$\frac{d^2y}{dx^2} = x\frac{dy}{dx} - y.$$

Assume step size of 0.2 and initial approximations of y_o=1 and $\frac{dy}{dx} = 0$ at x_o=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. Explain the *golden section search* method for minimization. **(05)**
Discuss how *optima* are calculated. **(05)**

(2)

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S.Y.B.Tech Electrical - Sem III
Electrical Networks.

Sardar Patel College of Engineering

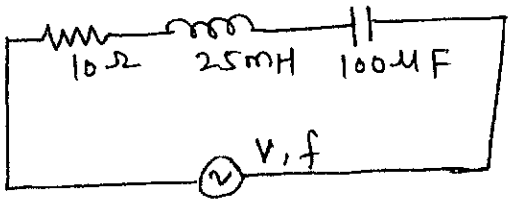
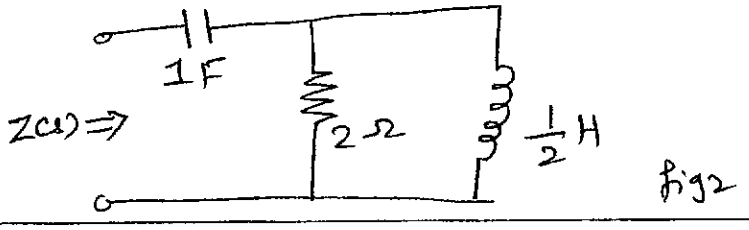
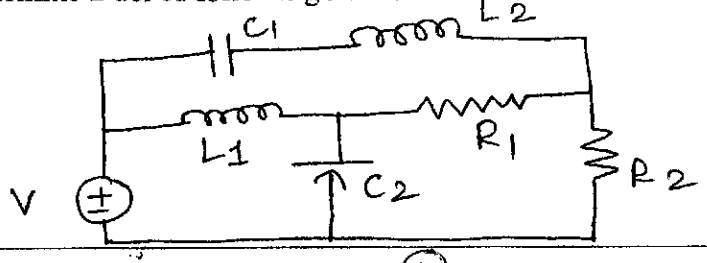
Bharatiya Vidya Bhavan's
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Exam
November 2015

Max. Marks: 100 Duration: 3 Hr.
Class: S.Y.BTech Semester: III Program: Electrical
Name of the Course: Electrical Networks Course Code : BTE203

Instructions:

Master file.

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. In the absence of any data, make suitable assumptions and justify the same.
4. Figures to the right indicate full marks.

Question No.		Max. Marks
Q1(a)	Determine Laplace Transform of $f(t) = e^{-at} \cos wt$.	05
(b)	For an electrical network in Fig. 1, at what frequency resonance will occur? Determine Q-factor.  fig 1	05
(c)	Determine poles and zeros of a impedance function Z(s) where Z(s) is input impedance of following network. Comment on the stability of this network.  fig 2	05
(d)	Determine Duel of following network.  fig 3	05

S.Y.B.Tech. Electrical - Sem III

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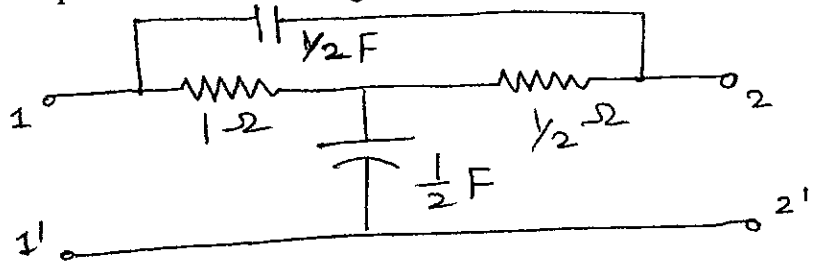
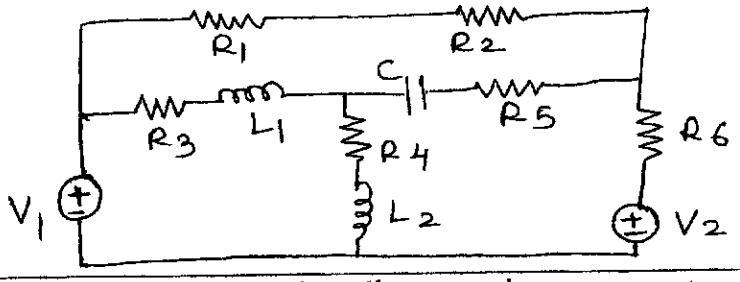
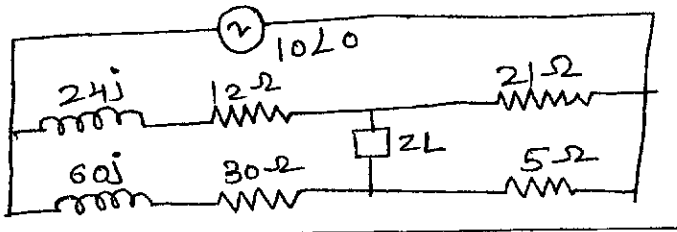
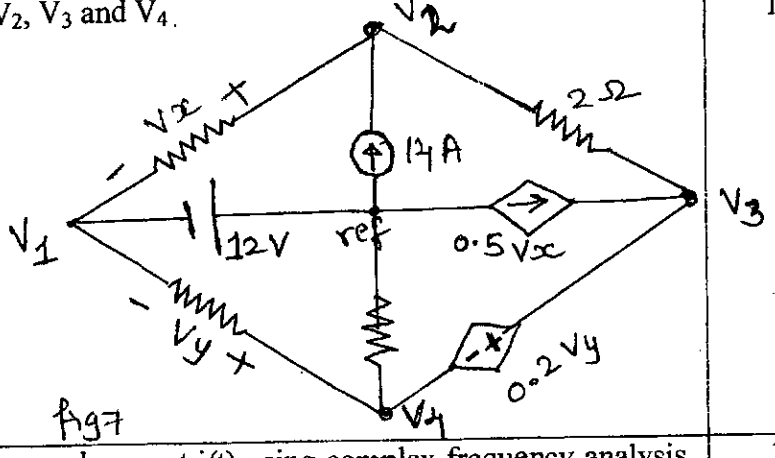
Q2 (a)	Determine Z parameters of following network.  fig 4	10
(b)	For the given network, draw oriented graph. Select a tree and write tie-set and cut-set matrix  fig 5	10
Q3 (a)	Find the value of load impedance that allows maximum power transfer to the load. Calculate maximum power transferred to the load.  fig 6	10
(b)	Evaluate node voltages V_1, V_2, V_3 and V_4.  fig 7	10
Q4 (a)	Determine complex frequency and current i(t) using complex frequency analysis. The network is excited by a voltage source $v(t) = 10\, e^{-t} \cos 2t$.	10

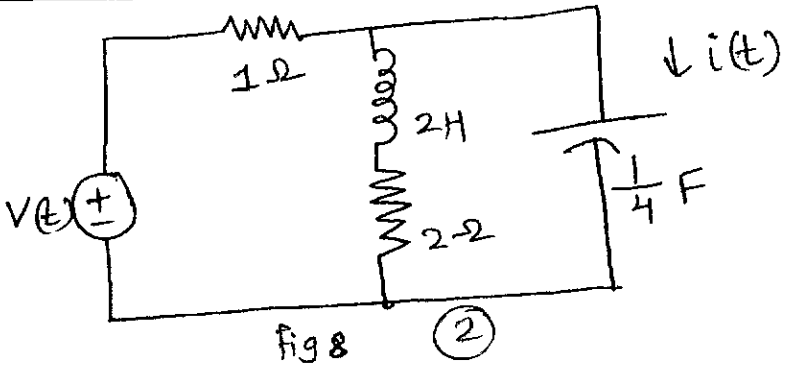
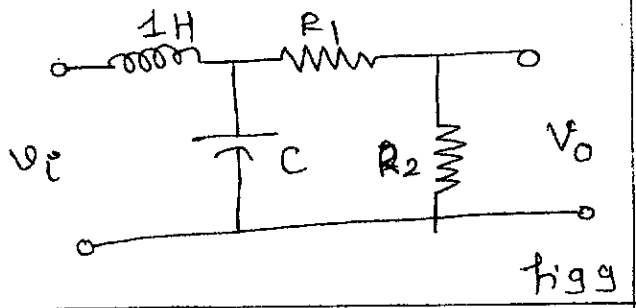
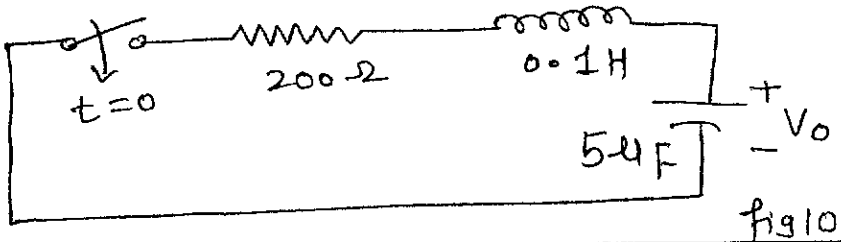
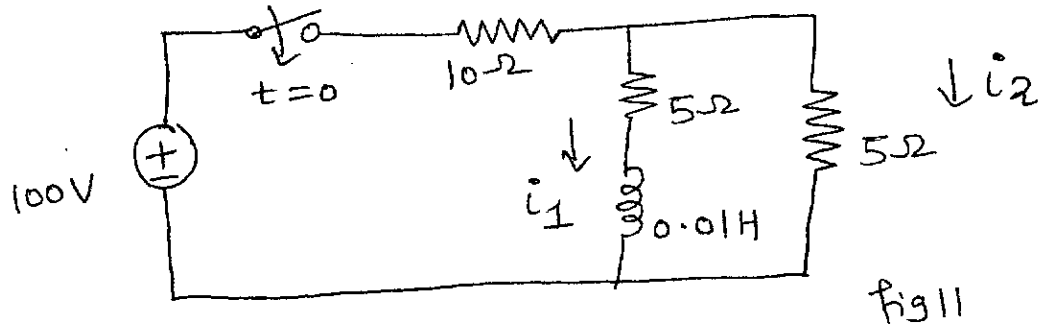
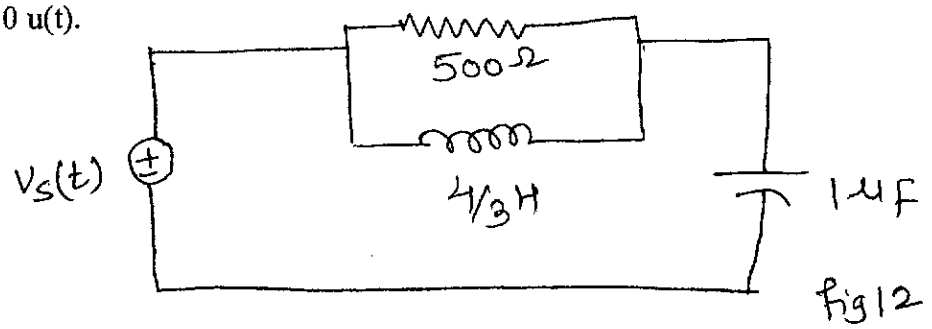


fig 8 (2)

S.Y.B.Tech Electrical - Sem III

Electrical Networks Dt. 20/11/15

(b)	For a given electrical network determine R_1, R_2 and C if voltage transfer function $H(s) = \frac{V_{o(s)}}{V_{i(s)}} = \frac{0.2}{s^2+3s+2}$.  fig 9	10
Q5 (a)	In a RLC circuit shown below, capacitor is initially charged to Vo = 200 V. Find the current i(t) after the switch is closed at t=0.  fig 10	10
(b)	Derive the expression for current and voltage across a capacitor and plot current and voltage as a function of time. Derive the expression for time constant.	10
Q6 (a)	Obtain currents i_1 and i_2 for $t \geq 0$ if switch is closed at t=0.  fig 11	10
(b)	Determine current supplied by the source using Laplace Transform if $v_s(t) = 10\ u(t)$.  fig 12	10
Q7 (a)	Realize the foster and Caur forms of impedance function $Z(s) = \frac{s^2+4s+3}{s^2+2s}$	14
(b)	Test whether $(s) = \frac{s^2+1}{s^2+4s}$ is a positive real function.	06

Library Section
18/11/2015

S.Y.B.Tech. Sem III
Electronic Circuits. Dt. 18/11/15.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam
November 2015

Max. Marks: Duration: 3 hours
Class: S.Y. B. Tech. Semester: III Program: Electrical Engineering
Name of the Course: Electronic Circuits Course Code : BTE202

Master file.

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Q1 Say True or False and justify. (**Solve any Four**)

(a) Differentiator can be used as a high pass filter. 05

(b) An op amp circuit has a closed loop voltage gain of 50. If the opamp has f_{unity} of 15 MHz, then closed loop cut off frequency of opamp is 30 kHz 05

(c) Input resistance of MOSFET is higher than that of JFET 05

(d) Negative half-wave rectifier can be considered as an example of positive series clipper. 05

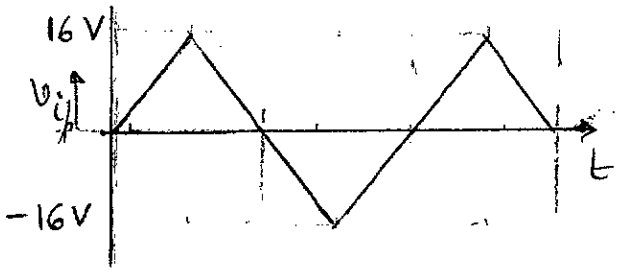
(e) Emitter resistance R_E in differential amplifier can be replaced by constant current source. 05

Q2 Draw circuit diagram with proper values of components to get output as 10

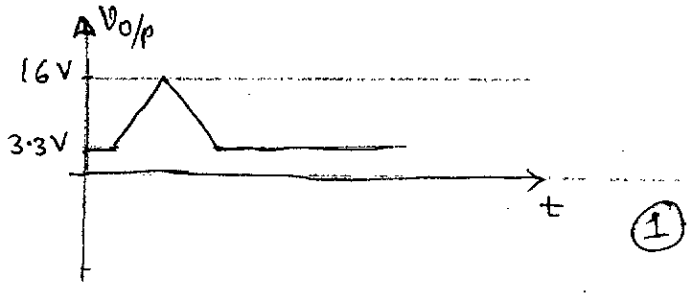
(a) $V_o = -(2V_1 + 3V_2)$ (ii) $V_o = (V_1 - V_2)$

(b) Explain opamp as Schmitt trigger. Draw corresponding waveforms. 10

Q3 (a) For the input and output waveforms given select the proper circuit from (a), (b), (c), (d). 05
Given the input waveform as shown below.



To get the output required as shown

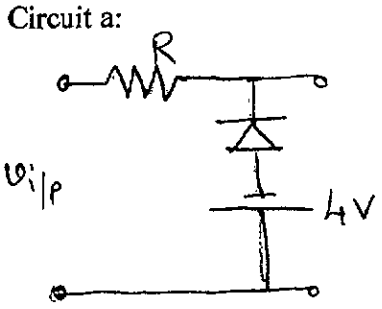


(1)

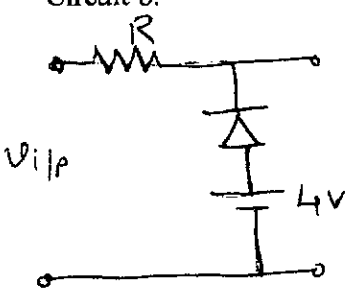
S.Y.B.Tech. Sem III
Electronic Circuits. Dt. 18/11/15

Select the appropriate circuit. (Choose from Circuits a,b,c,d given below). Justify your answer.

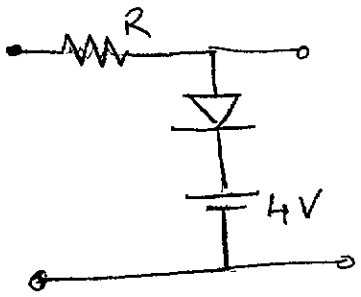
Circuit a:



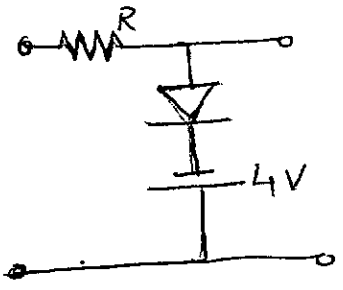
Circuit b:



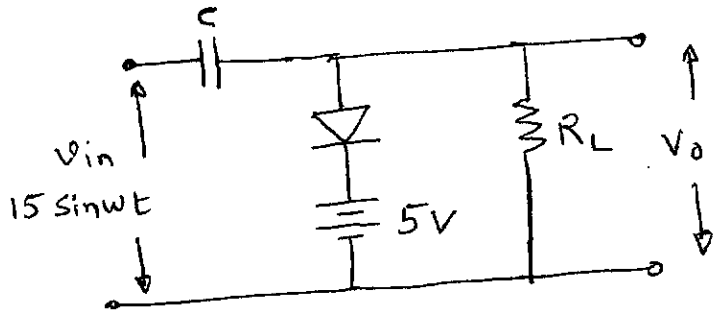
Circuit c :



Circuit d:



(b) Determine output of the circuit shown below. Explain. 05



(c) Explain use of opamp as full wave rectifier. 10

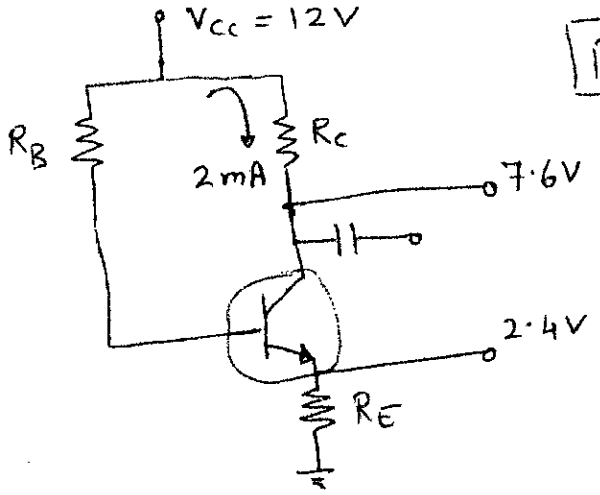
Q4 (a) Derive the expression for CMRR for DIBO Differential amplifier. 10

(b) Explain Dual Slope integrating type A to D conversion technique. 10

S.Y.B.Tech. Sem III

Electronic Circuits Dt. 18/11/15

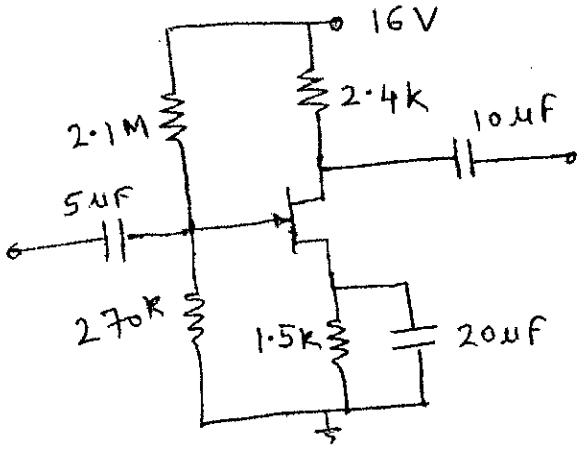
Q5 (a) Determine R_B, R_C, R_E, V_{CE}, V_B for the circuit shown below. 06



β = 80

(b) Explain why fixed bias circuit has a poor stability factor. 06

(c) Determine V_{GSQ}, V_{DSQ}, I_{DQ} for the circuit shown below. 08



I_{DSS} = 8 mA

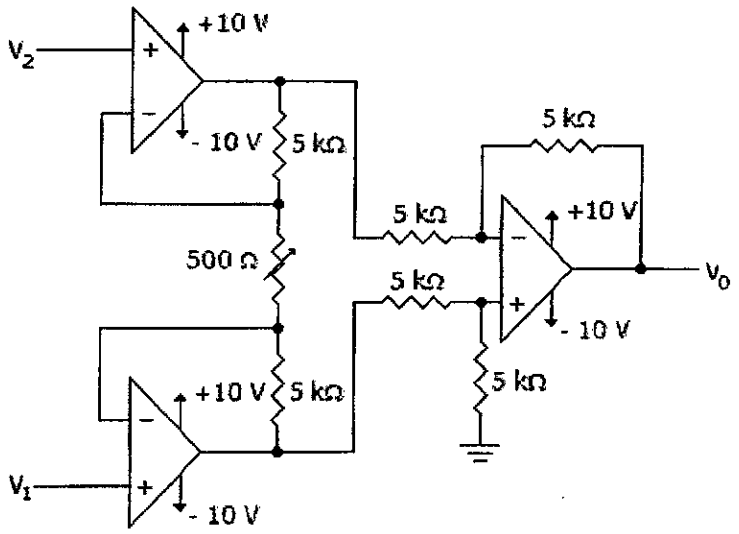
V_P = −4V

Q6 (a) Draw the equivalent circuit of opamp . Explain virtual ground. 05

(b) Calculate the output voltage for the circuit shown below when 05

V_1 = 2.5 V and V_2 = 2.35 V.

S.Y.B.Tech. Sem III
Electronic Circuits. Dt. 18/11/15



(c) Give 'h' parameter small signal low frequency ac equivalent circuit for CE amplifier with a resistive load. Explain the same. 10

Q7 (a) What is the use of swamping resistors? Explain differential amplifier with swamping resistors 10

(b) Explain Weighted resistor DAC 10

S.Y.B Tech - Sem III
Engineering Mathematics - III

2 16
16-11-15

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam
November 2015

Master file.

Max. Marks: 100 Duration: 03 hours

Class: S.Y.Btech Semester: III Program:Electrical

Name of the Course: Engineering Mathematics III

Course Code : BTE201

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Each question has a 6-6-8 marks break up.(Answers to sub questions should be written together)
4. Assume suitable data if necessary.

Question No		Maximum Marks
Q1(a)	Find Laplace transforms of $f(t) = t\left(\frac{\sin t}{e^t}\right)^2$	
(b)	Evaluate by Green's thm $\oint_c e^{-x}(\sin y\,dx + \cos y\,dy)$ where C is the rectangle with vertices (0, 0), (π/0) (π, π/2) & (0, π/2).	
(c)	Obtain the Fourier Series for $f(x) = x^2$ in $(0, 2\pi)$	
Q2(a)	Evaluate $L^{-1}\left\{\frac{1}{S^3(S-1)}\right\}$	
(b)	Prove that $\nabla\left(\frac{\bar{a}\,.\,\bar{r}}{r^n}\right) = \frac{\bar{a}}{r^n} - \frac{n(\bar{a}.\bar{r})\,\bar{r}}{r^{n+2}}$	
(c)	Obtain the Fourier series for $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & -\pi < x < 0 \\ 1 - \frac{2x}{\pi} & 0 < x < \pi \end{cases}$	
Q3(a)	Prove that $\nabla \times \left(\frac{\bar{a} \times \bar{r}}{r^n}\right) = \frac{(2-n)\bar{a}}{r^n} + \frac{n(\bar{a} \cdot \bar{r})\bar{r}}{r^{n+2}}$	
(b)	Obtain the half range sine series for $f(x) = \begin{cases} \frac{2x}{3} & 0 \le x \le \frac{\pi}{3} \\ \frac{\pi - x}{3} & \frac{\pi}{3} \le x \le \pi \end{cases}$	
(c)	Prove that $\int_0^\infty \frac{\sin 2t + \sin 3t}{te^t} dt = \frac{3\pi}{4}$	

S.Y.B.Tech - Sem III - Engineering Mathematics - III

Q4(a) Obtain complex form of the Fourier series for $f(x)=e^{-x} \qquad 0\le x\le 2\pi$

(b) Evaluate $\mathcal{L}\left\{e^{-2t}\dfrac{\sin 2t\cosh t}{t}\right\}$

(c) Verify Divergence Theorem for $\bar{F}=4x\hat{i}-2y^2\hat{j}+z^2\hat{k}$ taken over the bounded by the cylinder $x^2+y^2=4,\ z=0,\ z=3$

Q5(a) Prove that the set of functions $\{1,\sin x,\cos x,\sin 2x,\cos 2x,\text{-----}\}$ is orthogonal over $(0,2\pi)$ and construct a corresponding orthonormal set.

(b) Prove that $\dfrac{\bar{a}\times\bar{r}}{r^n}$ is a solenoidal vector

(c) Evaluate: $\mathcal{L}^{-1}\left\{\dfrac{s^2+2s+3}{(s^2+2s+2)(s^2+2s+5)}\right\}$

Q6(a) Prove using convolution theorem

$$\mathcal{L}^{-1}\left\{\frac{s^2}{(s^2+a^2)^2}\right\}=\frac{1}{2a}(\sin at+at\cos at)$$

(b) If θ is the acute angle between the surfaces $xy^2z=3x+z^2$ and $3x^2-y^2+2z=1$ at point $(1,-2,1)$. Show that $\cos\theta=\dfrac{3}{7\sqrt{6}}$

(c) Verify Stoke's theorem for the vector field $\bar{F}=(x^2-y^2)\hat{i}+2xy\hat{j}$ over the box bounded by planes x = 0, x = a, y = b, z = C if the face z = 0 is cut.

Q7(a) Evaluate: $\mathcal{L}^{-1}\left\{\log\left|\dfrac{s^2+b^2}{s^2+a^2}\right|\right\}$

(b) Find Laplace transforms of $f(t)=\sin\sqrt{t}$

(c) If $f(x)=x \qquad 0\le x\le 2$

Find half range cosine series using Parseval's identity deduce

$$\frac{\pi^4}{96}=\frac{1}{1^4}+\frac{1}{3^4}+\frac{1}{5^4}+\text{------}$$

Library.
6/11/16

S.Y.B.Tech. (Elect) Sem III
Electrical Networks.

Sardar Patel College of Engineering

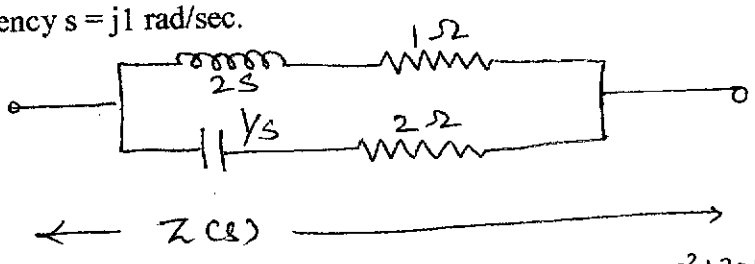
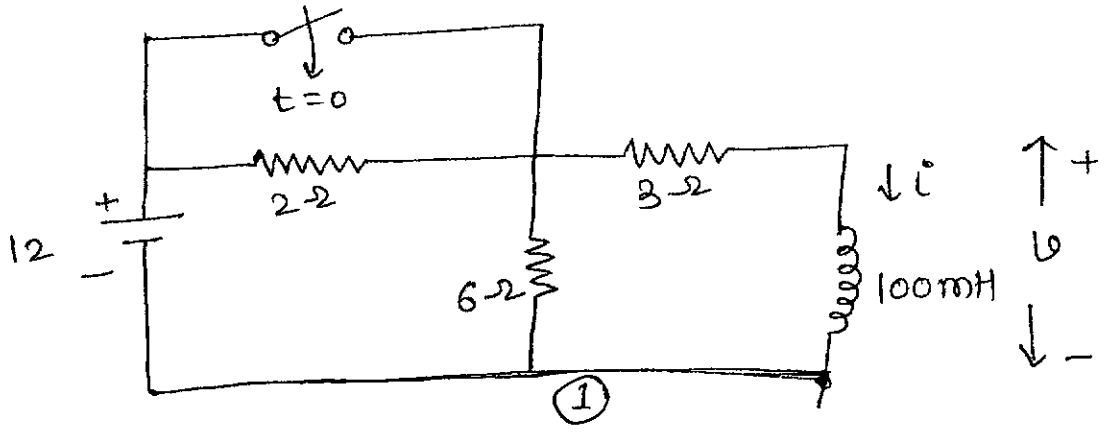
Bharatiya Vidya Bhavan's
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.

Re-Exam
January 2015

Max. Marks: 100 | Duration: 3 Hr.
Class: S.Y.BTech | Semester: III | Program: Electrical
Name of the Course: Electrical Networks | Course Code : BTE203

Master file.

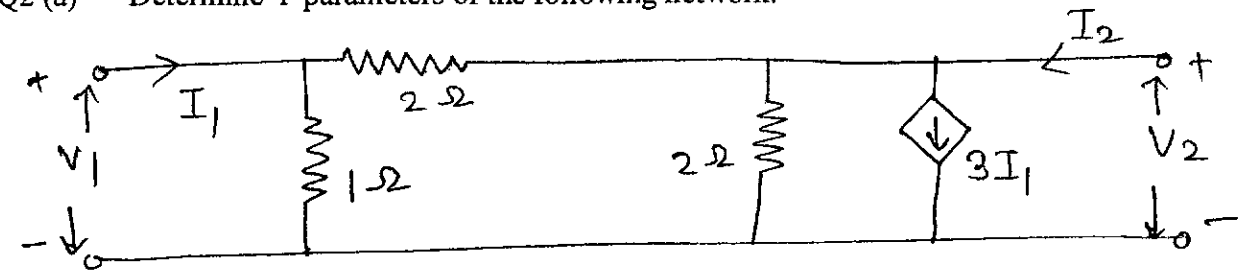
Instructions:
1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. In the absence of any data, make suitable assumptions and justify the same.
4. Figures to the right indicate full marks.

Question No.		Max. Marks
Q1(a)	Given a polynomial $P(s) = s^5 + 2s^4 + 4s^2 + 11\,s + 10$. Apply Routh – Hurwitz criterion and determine number of roots with positive real part, negative real part and zero real part.	05
(b)	For an electrical network in Fig. below, calculate impedance Z(s) at complex frequency s = j1 rad/sec. 	05
(c)	Construct pole – zero plot of a transfer function $H(s) = \frac{s^2+2s+17}{s^2+3\,s+2}$. Comment on the stability.	05
(d)	In the following network, the switch is closed at t=0. Evaluate current i and voltage v at t=0_ and t=∞. 	05

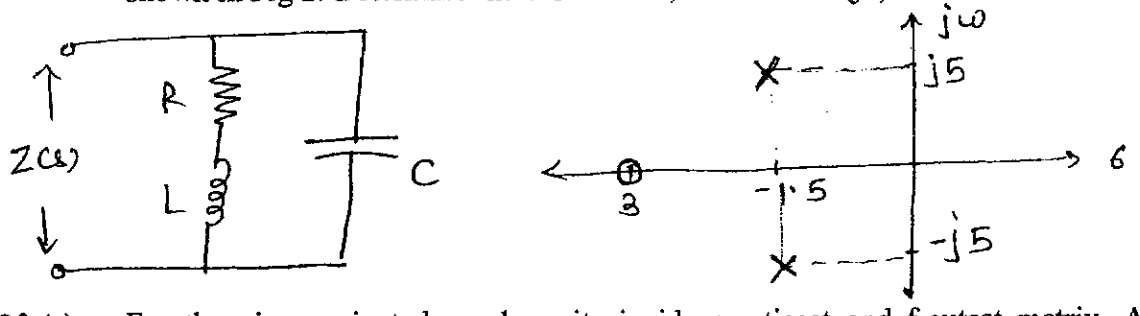
S.Y.B.Tech. (Elect) Sem III

Electrical Networks - Dt. 06/01/16.

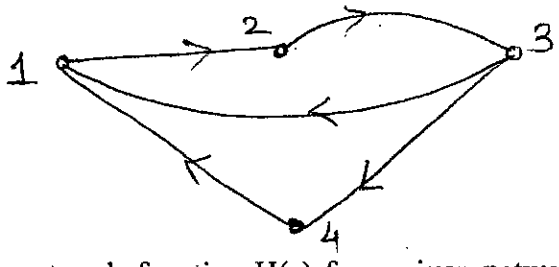
Q2 (a) Determine Y parameters of the following network. 10



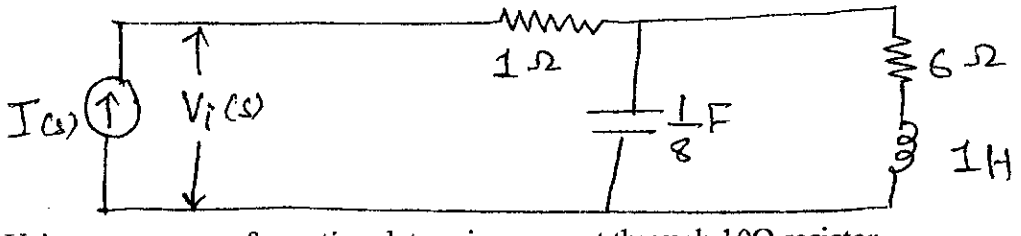
(b) The network shown in Fig 1, has the pole – zero plot of impedance function as shown in Fig 2. Determine the values of R, L and C if Z(j0) = 1. 10



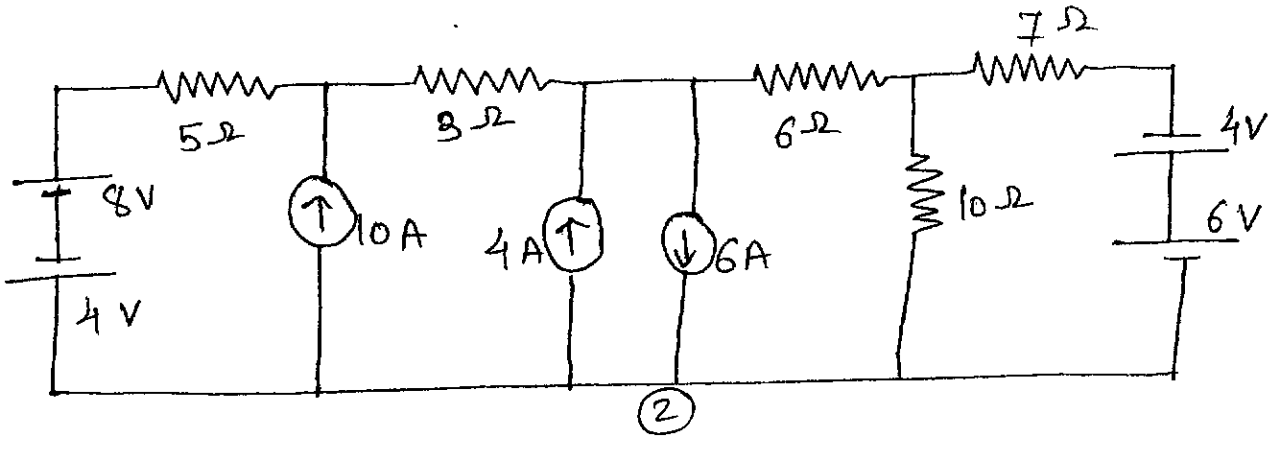
Q3 (a) For the given oriented graph, write incidence, tieset and f-cutset matrix. Also determine the number of trees possible. 12



(b) Obtain the network function H(s) for a given network. The response is voltage Vi(s). Plot pole-zero plot of H(s). Input is current I(s). 08



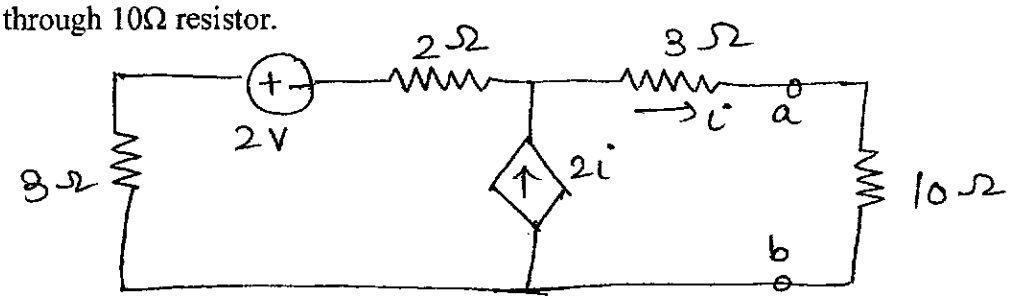
Q4 (a) Using source transformation determine current through 10Ω resistor. 10



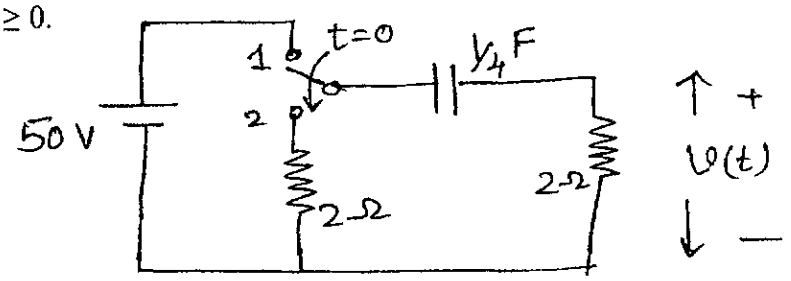
S.Y.B.Tech. (Elect) sem III

Electrical Networks – Dt. 06/01/16.

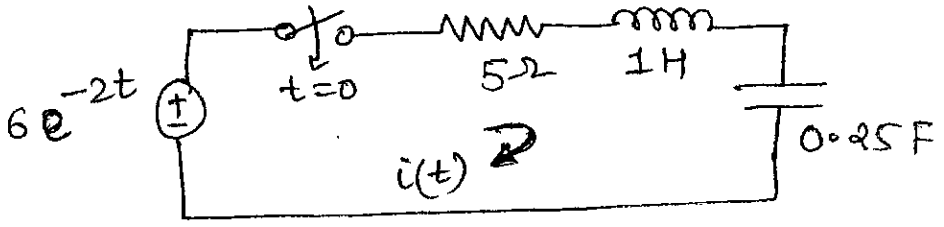
(b) Obtain Norton's equivalent circuit across a-b and hence calculate the current through 10Ω resistor. 10



Q5 (a) In a circuit shown below, the switch is shifted to position 2 at t=0. Find the current v (t) for t ≥ 0. 10



(b) For a network given below, switch is closed at t=0. Determine current i(t) assuming zero initial conditions in the elements. 10

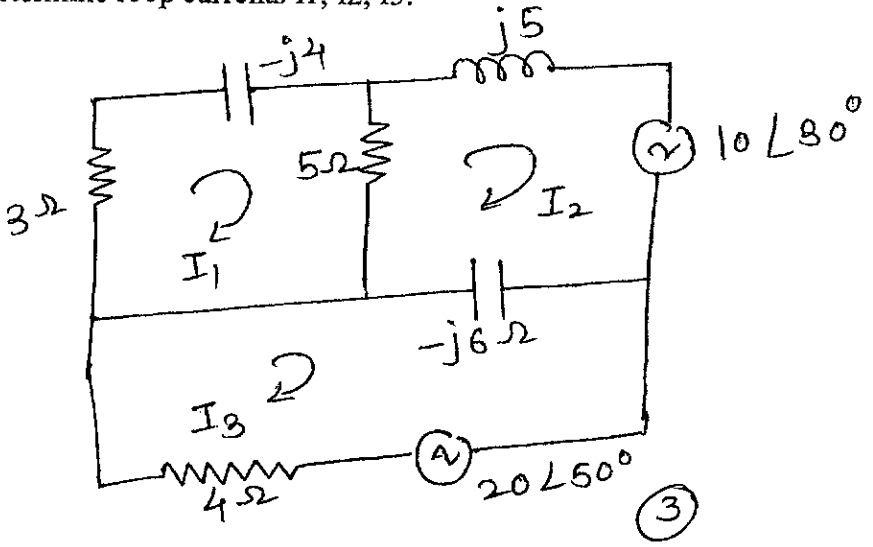


Q6 (a) Realize the Caur I and II forms of impedance function $Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+6)}$. 12

(b) Realize the foster I form of impedance function $Z(s) = \frac{s(s+4)(s+8)}{(s+1)(s+6)}$. 08

Q7 (a) For a series RLC network derive the expression for resonant frequency, half power frequencies and bandwidth. Determine these values if R= 100Ω, L=0.5 H and C= 0.4 μF. 10

(b) Determine loop currents I1, I2, I3. 10



S.Y.B.Tech - Elct- sem III
Integrated Circuits.

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End Semester Exam
November 2015

Max. Marks: 100 | Duration: 3 hrs
Class: S.Y.B.Tech. | Semester: III | Program: Electrical
Name of the Course: Integrated Circuits | Course Code : BTE204

Instructions:

- **Question No 1 is compulsory.**
- Attempt any four questions out of remaining six.
- Draw neat diagrams
- Assume suitable data if necessary

Master file.

1	a.	Explain the working of CMOS NAND gate	05
	b.	Explain elimination of Keyboard debounce as an application of Flip Flop	05
	c.	Design a Half Adder using 1:4 Demultiplexer	05
	d.	Classify Memories	05
2	a.	Reduce the following using K-maps and implement using NAND Gates only. $F(A,B,C,D,E) = \sum m(1,4,5,6,7,9,17,21,25,29)$	10
	b.	Derive the Excitation table of SR,JK,T and D Flip flops from their truth table	10
3	a.	Design a mod 6 Down Ripple counter using JK flip flops and –ve edge triggered clock. Draw its timing diagram.	12
	b.	Design 9 bit odd parity checker using IC 74180	08
4	a.	Design a sequence generator for the following sequence using Left shift register 101100	10
	b.	Design 12 bit comparator using IC 7485	10
5	a.	Explain TTL NOR gate	10
	b.	Design XS-3 to BCD code converter	10

S.Y.B.Tech. Elet - Sem III
Integrated Circuits. Dt. 23/11/15

6	a.	As an application of Shift Registers Explain the working of 4 bit Twisted Ring counter with the timing diagram.	10
	b.	Write short note on Programmable Logic Array	10
7	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 8:1 Mux 2. Single 4:1 Mux	10
	b.	State and Prove De-Morgan's Theorems	04
	c.	Implement OR gate using NAND gates only	04
	d.	Convert $(123.43)_{10}$ to its binary equivalent.	02

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S.Y.B.Tech. Sem III
Electrical Machines - I.

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End Semester Exam
November 2015

Max. Marks: 100 Duration: 3 hours
Class: S. Y. B. Tech. Semester: III Program: B. Tech.
Name of the Course: Electrical Machines - I Course Code : BTE205

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Master file.

Question No		Maximum Marks
Q1	Explain the following. **(Any Four)**	
(a)	Magnetic properties of material.	05
(b)	Parallel operation of single phase transformer.	05
(c)	Cogging phenomenon in induction motor.	05
(d)	Three point starter for dc shunt motor	05
(e)	Transformer harmonics.	05
Q2 (a)	Explain the principle of electromechanical energy conversion and hence the expression of energy stored in magnetic field.	10
(b)	Derive the torque in doubly excited magnetic field with respect to electromechanical energy conversion.	10
Q3(a)	Draw the complete phasor diagram of transformer with resistance and leakage reactance.	04
(b)	A 50 kVA, 2200/110 V transformer when tested gave the following results: O.C. Test (L.V.Side): 400 W, 10 A, 110 V. S. C. Test (H.V.Side): 808 W, 20.5 A, 90 V. Compute all the parameters of the equivalent circuit referred to the H.V. side and draw the resultant equivalent circuit.	08
(c)	Draw and explain the different vector groups in connection with three phase transformer.	08

S.Y.B.Tech. Sem III

Electrical Machines - I - Dt. 26/11/15

Q4(a)	Two 100 kW, single phase transformers are connected in parallel. One transformer has an ohmic drop of 0.5% at full load and an inductive drop of 8% at full load current. The other has an ohmic drop of 0.75% and inductive drop of 2%. Show how will they share a load of 180 kW at 0.9 power factor.	08
(b)	Explain the transformer switching current transients in detail.	06
(c)	Draw the connection diagram of an autotransformer and hence prove that autotransformer uses less copper as compared to two winding transformer.	06
Q5(a)	Three phase, 50 Hz, 8 pole, induction motor has full load slip of 2%. The rotor resistance and stand still rotor reactance per phase are 0. 001 Ω and 0. 005 Ω respectively. Find the ratio of the full load to maximum torque and the speed at which the maximum torque occurs.	06
(b)	Explain the different methods of speed control of three phase induction motor.	08
(c)	Explain the basic principle of operation and construction of three phase induction motor.	06
Q6(a)	A 3-phase, 440V, 50Hz, 4-pole, star connected induction motor has a full-load speed of 1425 rpm. The rotor has an impedance of (0.4+j4) Ω and rotor/stator turn ratio of 0.8. Calculate (i) full-load torque (ii) rotor current and (iii) full load rotor Cu loss (iv) power output if windage and friction losses amount to 500 W (v) maximum torque and (vi) the speed at which it occurs (vii) starting current and (viii) starting torque.	16
(b)	Explain the principle of operation of Induction Generator.	04
Q7 (a)	Draw and explain the N/T, N/Ia, and T/Ia characteristics of DC Series Motor. Also, state the applications of DC Series Motor.	07
(b)	A DC Series Motor takes 40A at 220V and runs at 800 r.p.m. If the armature and field resistance are 0.2 Ω and 0.1 Ω respectively and the iron and friction losses are 0.5 kW, find the torque developed in the armature. What will be the output of the motor?	08
(c)	Explain the method of speed control to control the speed below rated speed for DC Shunt and Series Motor.	05

S.Y.B.Tech.(Elect) sem III
Numerical Techniques.

Re. Exam Lib
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Sardar Patel College of Engineering

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Re-Examination – January 2016

Subject: Numerical Techniques
Class: S. Y. B. Tech. (Electrical, Sem: III)

Date: January 9, 2016.
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.* (*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. Obtain smallest positive root of the following equation using (*i*) False Position Method and **(10)**

(*ii*) Secant method correct up to four decimal places: $x^3 - x - 4 = 0$

2. *a.* Use Simpson's $\frac{1}{3}rd$ rule and Trapezoidal rule to evaluate $\int_0^{12} \log_e(1+x^2)dx$ by taking $n = 6$. **(10)**

Comment on the result.

b. Using Newton Raphson method, find a root of the following equation, assuming initial guess as zero: $f(x) = x^3 - 3x^2 - 5.5x + 9.5 = 0$. **(10)**

3. *a.* Solve the following system of equations using *Gauss elimination method.* **(10)**

$$2x_1 + x_2 + 4x_3 + 7x_4 = 1$$
$$-4x_1 + x_2 - 6x_3 - 13x_4 = -1$$
$$4x_1 + 5x_2 + 7x_3 + 7x_4 = 4$$
$$-2x_1 + 5x_2 - 4x_3 - 8x_4 = -5$$

b. Solve the following system of equations using Gauss – Seidel Iterative method: **(10)**

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$
$$0.1x_1 + 7x_2 - 0.3x_3 = -19.3$$
$$0.3x_1 - 0.2x_2 + 10x_3 = 71.4$$

(1)

S.Y.B.Tech. (Elect) Sem III
Numerical Techniques. Dt. 09/01/16.

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. An experiment carried out gave the temperature readings at time t, as follows: **(10)**

Time (Sec)	0	1	2	3	4	5	6	7	8
Temperature (°C)	60.00	64.50	72.50	80.00	86.25	92.50	105.00	111.00	118.25

Using this data, obtain the temperature at time 3.5 *sec* and time at temperature 100 °C.

5. *a.* 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

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 *Euler's Predictor-Corrector* method to solve $10\frac{dy}{dx} = x^2 + y^2$ for $0.5 \le x \le 1.0$, assuming $x_0 = 0$, $y_0 = 0$ and $h = 0.5$. **(10)**

b. Using *4th 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	7	8
$y=f(x)$	4	5	5	4

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

(2)

* * * * *

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08-01-16

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RE - EXAMINATION

January 2016

Max. Marks: 100 Duration: 3 hours

Class: S. Y. B. Tech. Semester: III Program: B. Tech.

Name of the Course: Electrical Machines - I Course Code : BTE205

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Master file.

S.Y.B.Tech.(Elect) sem III

Electrical Machines – I.

Question No		Maximum Marks
Q1	Explain the following. **(Any Four)**	
(a)	Explain the terms: [1] Magnetomotive force, [2] Magnetic flux and flux density, [3] Magnetic field intensity, [4] Permeability of free space, [5] Reluctance and Permeance.	05
(b)	Necessity of starter in dc motor.	05
(c)	Difference between Slip Ring Wound Induction Motor and Squirrel Cage Induction Motor.	05
(d)	Excitation phenomenon in transformers.	05
(e)	Conditions for Parallel Operation of Transformer.	05
Q2 (a)	Derive the torque in singly excited magnetic field with respect to electromechanical energy conversion.	10
(b)	Explain the principle of electromechanical energy conversion and hence the expression of energy stored in magnetic field.	10
Q3(a)	Draw the complete phasor diagram of transformer with resistance for inductive and capacitive load.	04
(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.	08
(c)	Explain the transformer switching current transients in detail.	08

S.Y.B.Tech.(Elect) sem III - Electrical-Machines - I.
Dt. 08/04/16.

Q4(a)	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. [1] Calculate the rotor current, rotor power factor and torque both at starting and at full load. [2] 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
(b)	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
Q5(a)	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
(b)	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
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)	Draw and explain the speed current, torque current and speed torque characteristics of dc shunt and series motor.	08
Q7 (a)	Explain different methods of starting of 3 Ω induction motor with neat sketches in detail.	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). Prove that for the same output and transformation ratio k=N2/N1, an autotransformer requires less copper than an ordinary two winding transformer.	10

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07/01-16

S.Y.B.Tech. (Elect) Sem III
Integrated Circuits.

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End Semester Exam
November 2015

Max. Marks: 100 Duration: 3 hrs
Class: S.Y.B.Tech. Semester: III Program: Electrical
Name of the Course: Integrated Circuits Course Code : BTE204

Master file.

Instructions:

- **Question No 1 is compulsory.**
- Attempt any four questions out of remaining six.
- Draw neat diagrams
- Assume suitable data if necessary

1. a. **Reduce the following using K-maps and implement the circuit.** **05**
   $F(A,B,C,D) = \sum m(1,4,5,6.7,9,15)$

   b. **Explain the different types of clock available for sequential circuits** **05**

   c. **Explain the concept of Bushing in counters with an example.** **05**

   d. **Explain the working of CMOS NOR gate** **05**

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

   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**

3. a. **Do the following** **10**
      i. **$(101101)_2 = (?)_{10}$**
      ii. **$(AC7)_{16} = (?)_8$**
      iii. **$(10011)_2 - (11001)_2$ using 1's compliment method**
      iv. **$(47)_{10} - (?)_{XS-3}$**
      v. **$(1111)_2 / (11)_2$**

   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**

S.Y. B.Tech. (Elect) sem III
Integrated Circuits - Dt- 07/01/16.

4. a. Implement the following using 8:1 Mux. 10

$$f = ABC + BCD + ABC$$

b. Implement Binary to Gray code converter. 10

5. 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 working of 4 bit Ring counter with the timing diagram 10

6. a. Design a mod 9 ripple counter using T flip flop along with the timing diagram. 10

b. Explain the different types of registers. 10

7. a. Write Short Note on memories 10

b. Explain in detail any two applications of Flip Flops. 10

Lib – Re-Exam
05-01-16

S.Y.B.Tech. (Elect) sem III
Electronic Circuits. Dt. 05/01/16.

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Re Exam
January 2016

Max. Marks: 100 | Duration: 3 hours
Class: S.Y. B. Tech. | Semester: III | Program: Electrical Engineering
Name of the Course: Electronic Circuits | Course Code : BTE202

Master file.

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Q1 **Solve any Four** **20**

(a) Compare JFET and MOSFET.

(b) Draw equivalent circuit of opamp

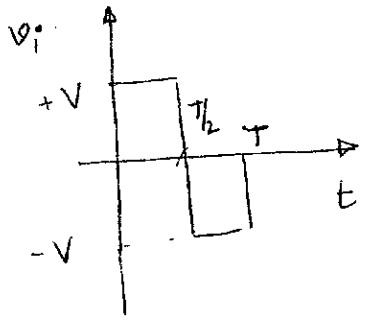
(c) What is slew rate of the opamp?

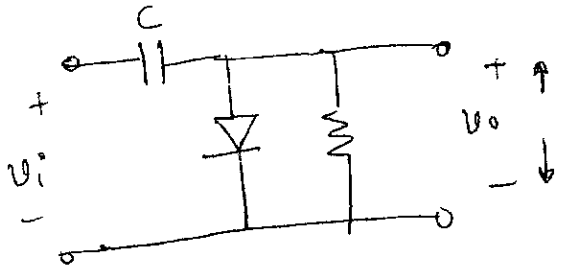
(d) Explain use of opamp as peak detector.

(e) Explain use of swamping resistors with differential amplifier.

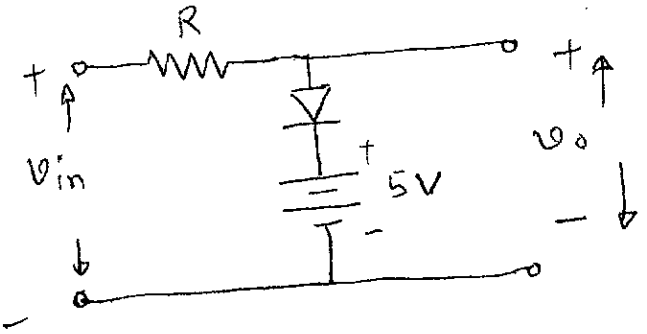
Q2 (a) Sketch the output for the circuit shown in figure below **10**

(i)





(ii) $v_{in} = 10 \sin \omega t$



S.Y.B.Tech. (Elect) sem III.
Electronic Circuits. Dt. 05/01/16.

(b) Draw block diagram representation of a typical OPAMP and explain the same. **10**

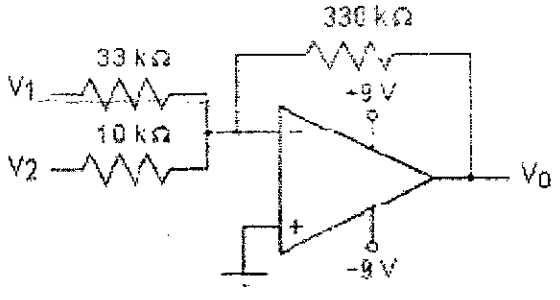
Q3 (a) For the fixed bias compensation method, Given V_{CC} = 12V, R_C = 1 K Ω, R_B = 100 K Ω, V_{CE} = 6V. Draw circuit diagram. Determine I_b, I_c and hence β. Calculate Stability factor. List other biasing methods used for BJT.Compare them with respect to stability factor. **10**

(b) Describe 'h' parameters for BJT. Explain how they can be calculated using BJT characteristics. **10**

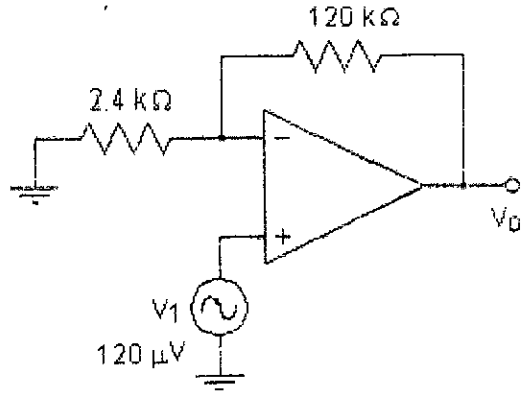
Q4 (a) Describe the method to calculate CMRR for Differential amplifier using experimental set up. Justify the need to improve its value. Which are the methods used to improve CMRR. Explain any one. **15**

(b) Draw and explain ac equivalent circuit of JFET. **05**

Q5 (a) Calculate the output voltage if $V_1 = V_2 = 0.2$ V. **05**

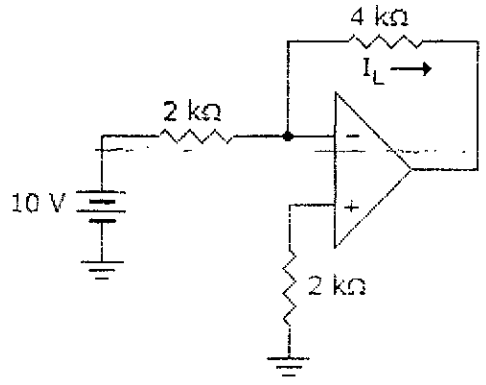


(b) Calculate the output voltage. **05**



S.Y.B.Tech.(Elect) Sem III
Electronic Circuits. Dt. 05/01/16.

(c) Calculate I_L for this circuit. **05**



(d) Explain the term UGB for an opamp. An opamp has closed loop voltage gain of 100, UGB of 1MHz, Determine the closed loop cut off frequency ? **05**

Q6 (a) With the help of neat circuit diagram and waveforms explain how OPAMP works as an integrator. Justify its use as Low Pass filter. **10**

(b) With the help of neat diagram explain successive approximation type of A to D conversion technique. **10**

Q7 Write short notes on (**any Two**) **20**

(a) Opamp as instrumentation amplifier

(b) R - 2R type DAC

(c) OPAMP as a Schmitt trigger

(d) Potential divider bias for BJT

S.Y.B.Tech. Sem III (Elect) Engineering Mathematics - III

Lib 04-01-16 - Re-Exam

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Re-Examination

November 2015

Max. Marks: 100 Duration: 03 hours

Class: S.Y.Btech Semester: III Program:Electrical

Name of the Course: Engineering Mathematics III

Course Code : BTE201

Master file.

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Each question has a 6-6-8 marks break up.(Answers to sub questions should be written together)
4. Assume suitable data if necessary.

Question No		Maximum Marks
Q1(a)	Find $L\left\{\frac{\cos 2t \sin t}{e^t}\right\}$	
(b)	Verify Green's theorem in the plane for $\oint_c (3x^2-8y^2)dx+(4y-6xy)dy$ where C is the boundary of region defined by $y=\sqrt{x}$ & $y=x^2$.	
(c)	Obtain the Fourier Series for $f(x)=x$ in $(0,2\pi)$	
Q2(a)	Evaluate: $L^{-1}\left\{\frac{3s+1}{(s+1)^4}\right\}$	
(b)	Prove that $\nabla(\bar{a}\,.\,\bar{r})=\bar{a}$, where $\bar{a}$ is a constant vector.	
(c)	Obtain the Fourier series for $f(x)=\begin{cases}1+\frac{2x}{\pi} & -\pi<x<0\\ 1-\frac{2x}{\pi} & 0<x<\pi\end{cases}$	
Q3(a)	Prove that $\nabla\times\left(\frac{\bar{a}\times\bar{r}}{r^n}\right)=\frac{(2-n)\bar{a}}{r^n}+\frac{n(\bar{a}\cdot\bar{r})\bar{r}}{r^{n+2}}$	
(b)	Obtain the half range sine series for $f(x)=\begin{cases}\frac{2x}{3} & 0\le x\le\frac{\pi}{3}\\ \frac{\pi-x}{3} & \frac{\pi}{3}\le x\le\pi\end{cases}$	
(c)	Show that $\int_0^\infty e^{-2t}\sin^3 t\,dt=\frac{6}{65}$	

Dt 04/01/16.

Q4(a) Obtain complex form of the Fourier series for $f(x)=e^{ax} \qquad x\in(-\pi,\pi)$

(b) Evaluate $\mathcal{L}\left\{e^{-2t}\dfrac{\sin 2t\cosh t}{t}\right\}$

(c) Verify Divergence Theorem for $\vec{F}=(x^2-yz)\hat{i}+(y^2-zx)\hat{j}+(z^2-xy)\hat{k}$ taken over the rectangular parallelopiped $0\le x\le a,\ 0\le y\le b,\ 0\le z\le c$.

Q5(a) Show that the functions $\varphi_1(x)=1 \quad \varphi_2(x)=x \& \varphi_3=\dfrac{1}{2}(3x^2-1)$ are orthogonal over $(-1,1)$

(b) If $\vec{a}$ is a constant vector and $\vec{r}=xi+yj+zk$ prove that $curl(\vec{a}\times\vec{r})=2\vec{a}$

(c) Find $\mathcal{L}^{-1}\left\{\dfrac{2s^2-4}{(s+1)(s-2)(s-3)}\right\}$

Q6(a) Prove using convolution theorem

$$\mathcal{L}^{-1}\left\{\frac{1}{(s^2+a^2)^2}\right\}=\frac{1}{2a^3}(\sin at-at\cos at)$$

(b) Find the angle between the surfaces $x^2+y^2+z^2=9 \& z=x^2+y^2-3$ at the point $(2,-1,2)$

(c) Verify Stoke's theorem for the vector field $\vec{F}=(2x-y)\hat{i}-yz^2\hat{j}-y^2z\hat{k}$ over the upper half surface of $x^2+y^2+z^2=1$ bounded by its projection on the XY-plane.

Q7(a) Evaluate: $\mathcal{L}^{-1}\left\{\log\left|\dfrac{s^2+b^2}{s^2+a^2}\right|\right\}$

(b) Find Laplace transforms of $f(t)=\sqrt{1+\sin t}$

(c) By using the sine series for $f(x)=1$ in $0<x<\pi$ .Hence using parseval identity show that $\dfrac{\pi^2}{8}=1+\dfrac{1}{3^2}+\dfrac{1}{5^2}+\dfrac{1}{7^2}+....$