College Of Engineering Pune

END SEMESTER EXAM (2010-2011)

SY B. Tech E & Tc

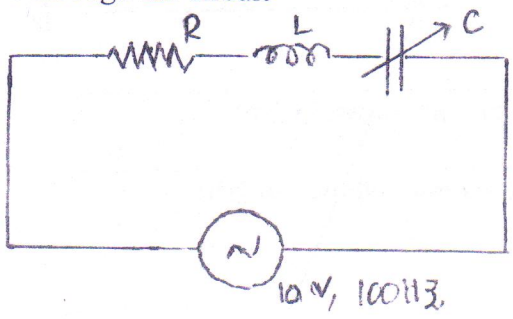
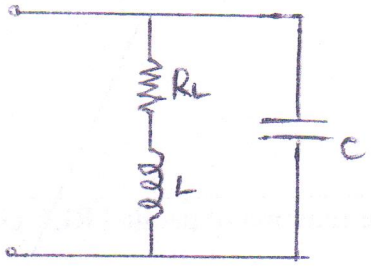
Subject: ET 208 Network Synthesis and Analog filters

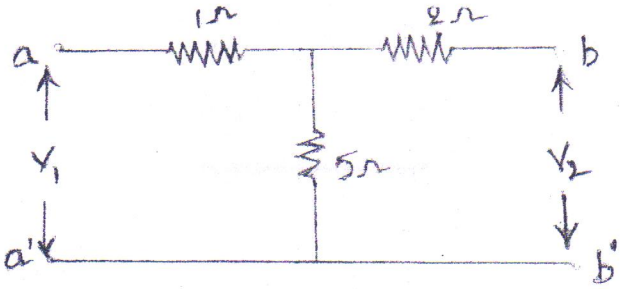
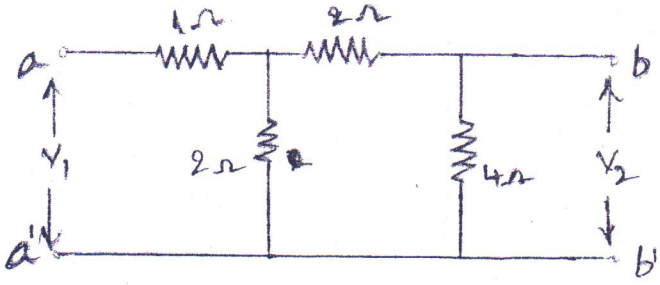
Time: 3 Hr.

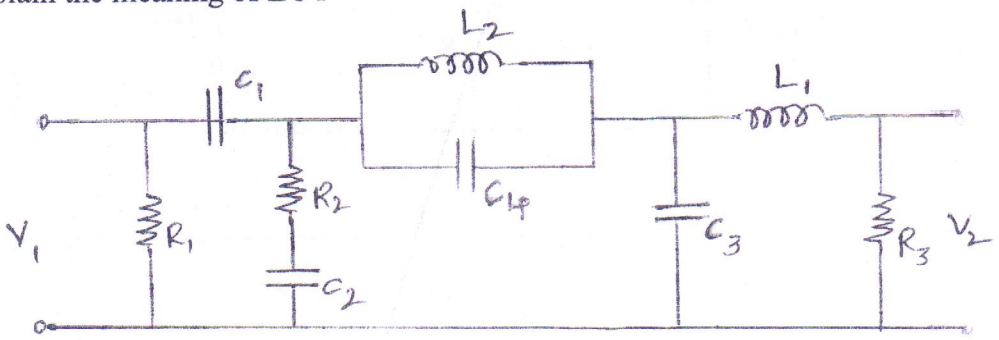
Marks: 50

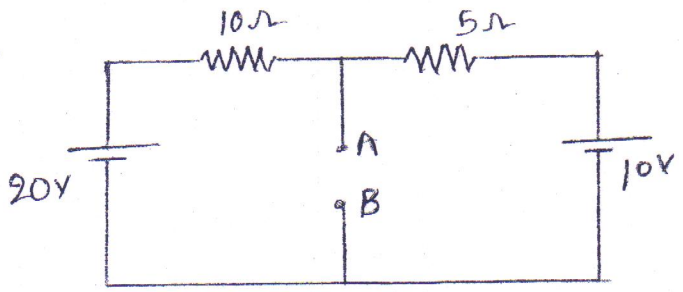
Instruction to candidates:

1) Solve any 5 Questions
2) Neat Diagram must be drawn wherever necessary.
3) Assume suitable data if necessary.
4) Use of non-programmable electronic calculator is allowed.
5) Figures to the right indicate full marks.

Q.1	(a)	In the circuit shown, determine the circuit constants, when the circuit draws a maximum current at 10μF, with a 10V, 100Hz supply, when the capacitance is changed to 12μF the current that flows thorough the circuit becomes 0.707 times its maximum value. Determine Q of the coil at w=900 rad/sec. Also find the max. current that flows through the circuit 	(5)
	(b)	For the circuit f shown an inductance of 0.1H having a Q of 5 is in parallel with a capacitor. Determine the value of capacitance and coil resistance at resonant frequency w = 500rad/sec. 	(3)
	(c)	i) In series RLC circuit, if C is increased what happens to the resonant frequency ii) What is the value of phase angle of series RLC circuit at resonance? iii) In order to tune a parallel resonant circuit to a lower frequency is it necessary to change the capacitance? How? iv) What is the impedance of an ideal parallel resonant circuit without resistance in either branch?	(2)

Q.2	(a)	Find the transmission circuit parameters for the circuit shown 	(1)
	(b)	Find the Y parameters for the circuit 	(3)
	(c)	Find 'h' parameters of the circuit shown in 2(b).	(3)
	(d)	Find the 'z' parameters of the circuit shown in 2(b).	(3)
Q.3	(a)	Check whether the following polynomial is Hurwitz $P(s) = S^4 + 3S^2 + 2$	(1)
	(b)	Y(s) is a driving point admittance function of parallel RLC circuit $Y_S = \frac{S^2 + 53 + 4}{S}$ Find the poles, zeros & values of R,L,C.	(1)
	(c)	Find Foster II form of the function in RC realisation $Y(s) = \frac{S(S+2)}{(S+1)(S+3)}$	(4)

	(d)	The L –C driving point impedance of an LC nework is given by $$Z(s) = \frac{2s^5 + 12s^3 + 16s}{s^4 + 4s^2 + 3}$$ Determine Cauer I and Cauer II network.	(4)
Q.4	(a)	Synthesize $$Z_{21}(S) = \frac{2}{S^3 + 3S^2 + 4S + 2}$$ Hint : Consider Z OT^s Realise the LC circuit as current source and load termination of 1Ω	(6)
	(b)	Explain the meaning of ZOT  Find all ZOT^S of the circuit.	(2) (2)
Q.5	(a)	Compare Butter worth filter & Chebysher filter w.r.t. ripple in pass band, transition band & order.	(2)
	(b)	Determine the order 'N' of the Butterworth filter for given specifications. Pass band: $$-1 < |H(j\Omega)|_{dB} \leq 0 \quad for\ 0 \leq \Omega \leq 1404\,\pi\ rad/sec$$ $$\Omega p = 1404\pi$$ Stop band $|H(j\Omega)|_{dB}\ for\ \Omega \geq 8268\,\pi\ rad/s$ $$\Omega_S = 8268\,\pi$$ Hint $N > \frac{\log(10^6 - 1)}{2\log(\Omega_S / \Omega_S)}$	(8)

Q.6	(a)	Design a Butter worth Low pass filter with first order for given (i) Pass band gain = $20\log (Av_{o)} = 10$ dB (ii) Cut off frequency 1 KHz	(4)
	(b)	Define 'Q' Factor for a capacitor. What is its value for an ideal capacitor?	(2)
	(c)	What is meant by minimum & maximum phase functions?	(2)
	(d)	Find Theremin's and Norton's equivalent of the following circuit. 	(2)

COLLEGE OF ENGINEERING, PUNE

Department of Mathematics

S.Y.B.Tech E&TC

MA 223-Engineering Mathematics-IV

End-Semester Examination

Date: 28th Apr. 2011

Time: 3 Hrs.

Max. Marks : 50

Instructions :

1. **Solve Section I and II on separate answer sheets.**
2. Figures to the right indicates maximum marks for that resp. question.
3. All symbols have their usual meanings.

SECTION-I

Q.1. A) A Contagious disease(say flu) spreads throughout community by infected people coming into contact with other people. The rate at which disease spreads is modeled as $\frac{dx}{dt} = kxy$, $k > 0$. where $x(t)$ is number of people suffering from disease and $y(t)$ is number of people who have not yet been exposed. Apply this modeling to a community with fixed population of n people. If one infected person is introduced into the community , then write differential equation governing the spread of the disease in this community with initial condition. [1]

B) Determine uniform matrix norm of $A = \begin{bmatrix} 8 & 2 & 10 \\ -9 & 1 & 3 \\ 15 & -1 & 6 \end{bmatrix}$ [1]

C) Find Hessian Matrix for the function $f(X)$ evaluated at (1,1,1). [2]

$f(X) = 2x_1^2 + 2x_2^2 + x_3^2 + 2x_1x_2 - 2x_1x_3$

D) Let $x = x^*$ be stationary point of $f(x)$, [2]

i) if $f^{(1)}(x^*) = f^{(2)}(x^*) = \cdots = f^{(19)}(x^*) = 0$ and $f^{(20)}(x^*) < 0$

then $x = x^*$ corresponds to point of relative_____.

ii) if $f^{(1)}(x^*) = f^{(2)}(x^*) = \cdots = f^{(58)}(x^*) = 0$ and $f^{(59)}(x^*) > 0$

then $x = x^*$ corresponds to point of _____.

Q.2. Use L-U Decomposition method to solve the given System of Linear Equations [5]

$$\begin{bmatrix} 3 & -0.1 & -0.2 \\ 0.1 & 7 & -0.3 \\ 0.3 & -0.2 & 10 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7.85 \\ -19.3 \\ 71.4 \end{bmatrix}$$

Q.3. Consider the system of Linear equations $A_n X = B$, where A is strictly diagonal dominant. Then Show that Jacobi Iterative method converges for any initial starting vector $X^{(0)}$. [4]

OR

Q.3. Find Point of Maxima Or Minima if any. [4]

$f(x) = 4x^3 - 18x^2 + 27x - 7$

Q.4. Solve the System of Differential Equation using Runga Kutta 4th Order Method. [5]

$\frac{du}{dx} = -0.5\,u \;\; ; \;\; \frac{dv}{dx} = 4 - 0.3\,v - 0.1\,u \;\; ; \;\; subjected\ to\ u(0) = 4,\ v(0) = 6$

Find $u(0.5)\ and\ v(0.5)$ with step size of $h = 0.5$

Q.5. Using Least square method, find the parabola of the form $y = a - bx - cx^2$ [5]

which fits most closely with the given observations.Hence find **y(1.4)**

x	-3	-2	-1	0	1	2	3
y	4.63	2.11	0.67	0.09	0.63	2.15	4.58

Q.6. Use Heun's Method to solve $\frac{dy}{dx} = 4\,e^{0.8x} - 0.5\,y\ with\ y(0) = 2$ [5]

from $x = 0\ to\ x = 2$ with step size of 1.

Q.7. Thc total masss of a variablc dcnsity rod is given by $m = \int_0^L \rho(x)A(x)dx$ where [5]

m is mass, $\rho(x)$ is density, $A(x)$ is cross sectional area and x is distance along rod.

The following data has been measured for a 16 m rod. Determine the mass using

Simpsons $\frac{3}{8}$*th rule.*

$x(m)$	0	2	4	6	8	10	12	14	16
$\rho\ (g./cm^3)$	4	3.95	3.89	3.80	3.60	3.41	3.3	3.25	3.2
$A(cm^3)$	100	103	106	110	120	133	150	161	170

SECTION-II

DATA-STRUCTURES

Q.8. What are different types of sorting? Which one should be used when? Why? [5]

Q.9. What is a Binary tree? [4]

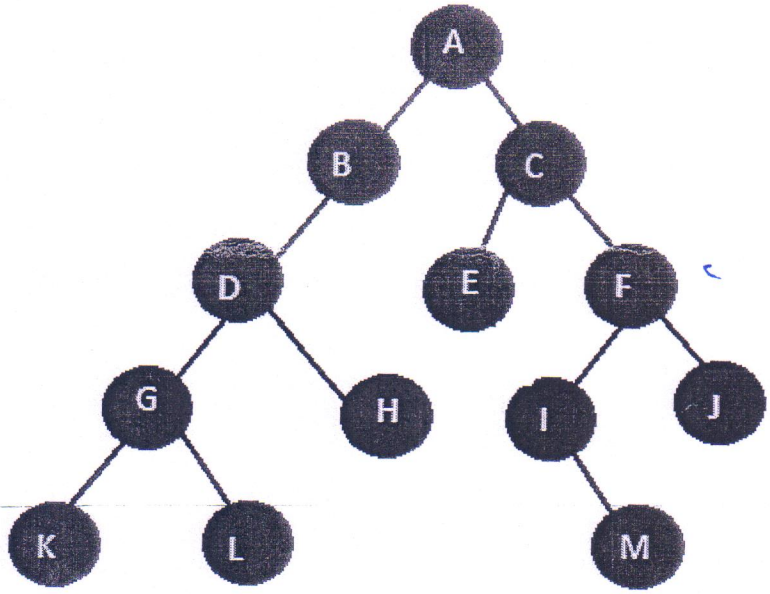
Write code to create a Binary Search Tree.

Or

What is a Queue structure?

Write code to add, delete an element from the queue and to display the entire queue.

Q.10. Traverse below tree in preorder and postorder [2]



Q.11. Describe binary search method. Write a function for binary search, taking the key to be searched(k) and an array of size n, in which the key is to be searched, as the input arguments and returning the position of the key if found or -1 if the key is not found. [4]

----------X----------O----------X----------O----------

Total No. of Questions: 3

Total No. of Pages: 2

College of Engineering Pune
Electronics and Telecommunication Department
(S.Y.B.Tech) Analog Communication Systems
ESE-Semester (2011)

Time: 3 hrs] [Max. Marks: 50

Date: 30/04/2011

Instructions to candidates:

1) Attempt all questions.
2) Figures to the right indicate full marks.
3) Use of logarithmic tables and non-programmable electronic calculator is allowed.

Q 1 a) List the basic functions of a radio transmitter and the corresponding functions of the receiver. (5)

b) The RF amplifier of a receiver has an input resistance of 1000Ω and equivalent shot noise resistance of 2000Ω, a gain of 25 and a load resistance of 125kΩ. Given that the bandwidth is 1.0 MHz and the temperature is 20°C, calculate the equivalent noise voltage at the input to this RF amplifier. If this receiver is connected to an antenna with an impedance of 75Ω, Calculate the noise figure. (5)

c) Show how to derive the equation normally used to describe a non-linear resistance. Show mathematically what happens when two frequencies are added and then passed through a non linear resistance. (5)

d) Describe frequency and phase modulation. Give mechanical analogies for each. (5)

Q 2. a) Define signal to noise ration and noise figure of a receiver. When might the latter be a more suitable piece of information than the equivalent noise resistance? (5)

b) When a broadcast AM transmitter is 50 percent modulated, its antenna current is 12 A. What will the current be when the modulation depth is increased to 0.9? (5)

c) The centre frequency of an LC oscillator to which a capacitive reactance FET modulator is connected is 70 MHz. The FET has g_m which varies linearly from 1 to 2 mS and a bias capacitor whose reactance is 10 times the resistance of the bias resistor. If the fixed (5)

tuning capacitance across the oscillator coil is 25 pF calculated the maximum available frequency deviation.

Q 3 a) A SSBSC (J3E) transmitter operating at 16 MHz has a frequency stability of 1 part per million, what is the maximum frequency error that the output of this receiver could have in reproducing this transmission? (5)

b) Draw the practical circuit of a balanced ratio detector and show how it is derived from the basic circuit. Explain the improvement effected by each circuit. (5)

c) Calculate the image rejection of a receiver having an RF amplifier and an IF of 450kHz if the Qs of the relevant coils are 65, at an incoming frequency of (a) 1200kHz (b)20MHz. (5)

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College of Engineering, Pune

END SEMESTER EXAM Feb 2011

(SY B Tech)- (Electronics and Telecommunication)

(EC-206)- (Integrated Circuits and Applications)

Day & Date- 3rd May & Tuesday | Max. Marks-50

Timing – 2 pm -5 pm | Duration – 3 hrs.

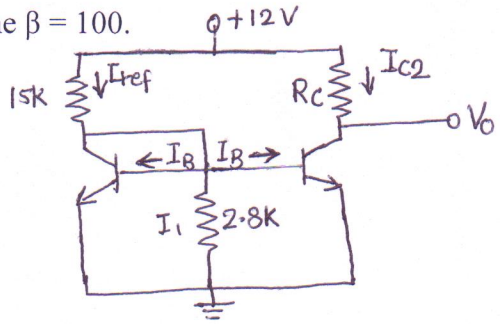
Instructions:

1. Each question is compulsory and the part B of each question has an option.
2. Figures to the right indicate full marks.
3. Assume suitable data wherever necessary.
4. Draw neat figure wherever required.

Q. 1 A. For the given current mirror circuit find 05

a) I_{C1} and I_{C2}

b) R_C so that $V_o = 5$ V, assume $\beta = 100$.



B. Draw the circuit diagrams of Widlar and Wilson current sources and state their advantages .Comment on the relationship of current and Emitter area of Q1 and Q2. 05

OR

B. Explain the terms with respect to an OPAMP: 05

a) I/P offset voltage
b) I/P offset current
c) I/P bias current
d) CMRR
e) SVRR

Give its typical values for opamp IC 741.

Q. 2 A. Design an opamp based integrator for $f_{max} = 1$KHz. Draw the appropriate circuit diagram and sketch the frequency response for the designed circuit. 05

B. Explain the three opamp instrumentation amplifier with appropriate 05

circuit diagram and give selection criteria of each opamp.

OR

B. Sketch one circuit diagrams for half wave and one for full wave precision rectifier with appropriate transfer curves. 05

Q.3 A. Design PLL circuit for free running frequency of 5KHz.(Assume $\pm V_{cc}$ = ± 12V) The capture range is ±20Hz. 05

B. With appropriate circuit diagram discuss the PLL as frequency multiplier. 05

OR

B. Discuss types of analog and digital phase detectors used in PLL chip. 05

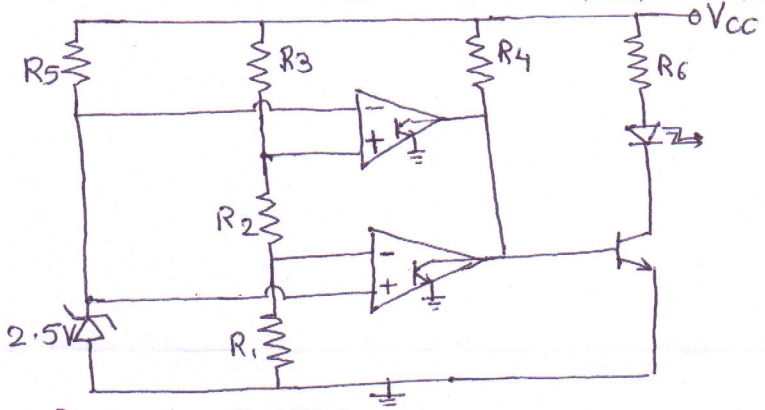
Q.4 A For a SAR type 4 bit ADC input applied is 4.2V, find the equivalent binary output. Assume V_{FSR} = 12 V. 05

B Discuss the errors in DAC and the solutions to those errors. 05

OR

B Explain the Dual slope ADCs with appropriate circuit diagrams, equations and graphs. 05

Q.5 A. Specify suitable component values so that the LED shown in the diagram glow for V_{cc} within band 5V ± 5%, which is the band required for TTL circuits. Assume V_{LED} = 1.5V, I_{LED} = 10mA and $I_{B(2N2222)}$ = 1mA,Iz = 1mA. 05



Power supply monitor LED glows as long as V_{cc} is within specifications

B. Discuss the log amplifier with saturation current and temperature compensation. 05

OR

B. Discuss the wave shaping network in waveform generator IC 8038.Is it possible to operate the IC 8038 as sweep generator? If YES write the procedure. 05

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