[60] No. of Printed Pages: 3

SARDAR PATEL UNIVERSITY

M.Sc. (Electronics) First Semester Examination

November 2012

PS01CELE02 : Applications of ICs and Fuzzy Electronics

Monday, December 03, 2012 **Time : 10.30 a.m. to 1.30 p.m.** **Total Marks : 70**

Q. 1	**Give the correct (nearest) answer (statement) to the following Multiple Choice Questions (Statements).**	8x1 = [8]

1) For the Bandpass Filter, Critical frequency f_0 is given by
   a) $f_0 = QxBW$
   b) $f_0 = BW-Q$
   c) $f_0 = BW/Q$
   d) None of the above

2) The Elliptical filters are specified in terms of
   a) fc, n and A_{max}
   b) fc and n
   c) fc,n ,A_{max} and A_{min}

3) In the edge-triggered Phase Detector, the dc output voltage is linear over
   a) $\prod$ radians
   b) $2\prod$ radians
   c) $2\prod/3$ radians

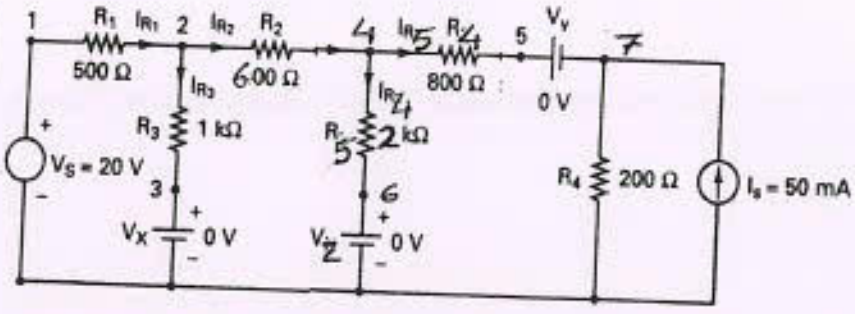
4) Which of the following pSpice commands gives the quiescent point in the dc analysis of a circuit?
   a) .DC
   b) .OP
   c) .TF
   d) .END

5) One of the following operations makes a set less Fuzzy
   a) Concentration
   b) Union
   c) Dilation
   d) Algebric Sum

6) The bounded difference of two fuzzy sets A and B is denoted by C = AΘB, where,
   a) $\mu_C(x) = \min(1, (\mu_A(x) - \mu_B(x))$
   b) $\mu_C(x) = \min(1, (\mu_A(x) + \mu_B(x))$
   c) $\mu_C(x) = \mu_A(x) + \mu_B(x) - \mu_A(x).\ \mu_B(x)$

P.T.O.

	7) The Measure of Fuzziness E(A) is given by a) $E(A) = M(A \wedge \bar{A}) / M(A \vee \bar{A})$ b) $E(A) = M(A \vee \bar{A}) / M(A \wedge \bar{A})$ c) None of the above 8) Which of the following Fuzzy Learning Rule Forgetting is not incorporated ? a) Hebbian b) Grossberg c) None of the above	
Q. 2	**Give short answers to the following: (any seven)** 1) Mention the Drawbacks of Active Filters over Passive Filters. 2) Describe the working of a First Order Active Low Pass Filter. Explain how the Roll Off Rate is 20 db/decade. 3) Discuss various types of approaches for obtaining Higher Order filters with their merits and demerits . 4) For PLL configured using NE 565, using R_1 = 30KΩ, C_1=0.01μF, C_2=10uF, and the Supply Voltage is +/- 10V. Calculate the Free Running Frequency. 5) In a DC circuit, the DC voltage is swept from 5V, 20V, and 30V, connected between nodes 1 and 0, whereas the current source connected between nodes 0 and 4 with current swept from 50 mA, to 100mA to 150mA. Write the pSpice command for the same. 6) Draw the Fuzzy Inverter Circuit for the Current Mode Fuzzy Logic Circuits. 7) Describe the Kohonen Learning Rule for the Neural Network. 8) Draw the truth table of Fuzzy AND operation. 9) For a Fuzzy Set A = [0.3 0.8], find out the measure of Fuzziness.	**7x2 = [14]**
Q.3 (a)	**Draw the circuit diagram of Multiple Feedback Bandpass Filter and deduce the equation for its Transfer Function.**	**[6]**
(b)	**Design a Sallen Key Unity Gain (SKUG) Second Order Low Pass Filter and deduce the equation for its Transfer Function.** **OR**	**[6]**
(b)	**Design a Low Pass Filter for the given specifications :** **f_c = 3 kHz, K = 1.5, Ra = 20 kohm, C= 10nF, Roll Off rate = 40 dB/decade**	**[6]**
Q.4 (a)	**What is a Generalized Impedance Converter (GIC)? Draw the circuit diagram of Grounded Inductor using GIC and deduce the equation for such inductor.**	**[6]**

(b)	With the help of the block diagram and necessary circuit diagram, describe the application of Phase Locked Loop as Frequency Multiplier.	[6]
	OR	
(b)	Using the SKUG configuration, design a Third Order High Pass Butterworth Filter for critical frequency of 2KHz. From the Filter Standard table for Low Pass Butterworth Filter, for n(order) = 3, $f0_1 = 1$, $Q_1 = 1.000$ and $f0_2 = 1$.	[6]
Q.5 (a)	 Simulate the DC Circuit shown in the Figure using the pSpice to calculate all Node Voltages and Currents.	[6] [6]
(b)	Giving the importance of Current Mode Circuits, describe the Fuzzy Logic Circuits for Bounded Difference and AND operation.	[6]
(b)	OR What is Phase Locked Loop (PLL)? Draw the Block Diagram of PLL and describe the function of each block.	
Q.6 (a)	What is Fuzzification? Describe the process of Grade Fuzzification giving suitable example.	[6]
(b)	For Fuzzy Sets given as ~A = 0.4/1 + 0.3/2 + 0.2/3 and ~B =0.31 +0.2/2, perform the following operations: (i) Union (ii) Intersection (iii) Bounded Difference (iv) Algebric Product (v) Concentration of B (vi) Absolute Complement of A.	[6]
	OR	
(b)	What is Neural Network ? Explain the working of Biological Neuron and how a mathematical model can be used to mimic its function.	[6]

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