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SEAT No. _____

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SARDAR PATEL UNIVERSITY
M.Sc. (Electronics) First Semester
Examination (Under CBCS)
March, 2019

PS01CELE22: Applications of ICs and Fuzzy Electronics

Friday, March 22, 2019

Time: 10.00 a.m. to 1.00 p.m.

Total Marks: 70

Q. 1	<p>Give the correct (nearest) answer (statement) to the following Multiple Choice Questions (Statements).</p> <p>(i) The selectivity Q in a Bandpass filter is given by (a) $Q = f_0/BW$ (c) $Q = f_0 \cdot BW$ (b) $Q = f_0 \cdot BW$ (d) $Q = f_0 + BW$</p> <p>(ii) The Universal Active Filters are (a) State-variable and Biquad Filters (c) Single Op Amp Chebyshev Filters (b) Multiple feedback Band pass Filters (d) none of these</p> <p>(iii) The roll off rate of a 3th order Low Pass filter is (a) -100 dB/decade (c) -80 dB/decade (b) -60 dB/decade (d) 160 dB/decade</p> <p>(iv) A Filter with the flattest passband and flattest stopband is (a) a Bessel Filter (c) an Elliptical Filter. (b) a Butterworth Filter (d) none of these</p> <p>(v) In the Phase Locked Loop, Lock Range is (a) bigger than the Capture range (c) equal to the capture range (b) smaller than the Capture range (d) none of these</p> <p>(vi) A circuit in pSpice ends with a command (a) .END (c) .RST (b) .STOP (d) .SUBCKT</p> <p>(vii) The subset [0.5 0.5] represents a (a) maximally fuzzy set (c) empty set (b) Power set (d) none is correct</p> <p>(viii) The learning model of Artificial Neural Network with the competitive aspect is (a) Hebbian learning (c) Kohonen (b) Grossberg learning (d) both a and b are correct</p>	8x1 = [8]
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{P.T.O}

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Q. 2	<p>Give short answers to the following: (any seven)</p> <ol style="list-style-type: none"> 1) Mention the drawbacks of Passive Filters over Active Filters. 2) Draw the circuit of 2nd order KRC High Pass Filter. 3) Mention the advantages of Cascade approach over RLC ladder simulation approach. 4) Draw the circuit realization of a synthetic inductor. 5) Draw the block diagram of PLL as a Frequency Multiplier. 6) Enlist various modes of simulation for OPAMP in pSpice. 7) If $f(x,y,z) = (x+z).(y+z)$, determine the conditions that must be satisfied by the fuzzy variables x,y and z so that $f(x,y,z)$ belongs to class m i.e. $\alpha_m \leq f(x,y,z) < \alpha_{m-1}$. 8) Draw the truth table of Fuzzy NOT operation. 9) Draw the schematic of McCulloch-Pitts model of Neuron. 	7x2 = [14]
Q.3 (a)	Design a Second Order SKUG Low Pass Filter for $f_0 = 3\text{kHz}$ and $Q=0.707$.	[6]
	(b) What is the difference between the response of a First order and a second order Filter? Justify with necessary equations.	[6]
	OR	
	(b) Design a Multiple Feedback Band pass filter with $f_0 = 300\text{Hz}$ and Bandwidth= 3KHz.	[6]
Q.4 (a)	What is Generalized Impedance Converter? Using necessary equations, describe its realization.	[6]
(b)	Design a 3 rd Order 0.1 dB ripple Chebyshev low-pass filter using KRC Equal Component design aspect for $f_0 = 3\text{ KHz}$.	[6]
	Given from the Standard Filter Table for 3 rd order 0.1 dB ripple Chebyshev low-pass filter, for $n = 3$, $f_{01} = 1.300$; $Q_1 = 1.341$; $f_{02}=0.969$.	
	OR	
(b)	Draw the response curve and explain the characteristics of higher order Butterworth, Bessel and Elliptical Filters.	[6]
Q.5 (a)	Draw the block diagram of PLL. Describe the Free running mode, capture mode and lock mode.	[6]
(b)	Explain various types of Phase Detectors used in PLL.	[6]
	OR	
(b)	Write pspice statements for the following:	[6]
	(i) Resistor- R1 of 500 Ω connected between the nodes 11 and 22; R2 of 800 Ω connected between the nodes 22 and 24,	
	(ii) A DC Voltage Source swept with Voltage $V_s = 5\text{V}, 25\text{V}, 35\text{V}$, for each value of $I_s = 50\text{mA}, 100\text{mA}$ and 150mA for a DC circuit.	
	(iii) Output command to print all node voltages and currents.	
Q.6 (a)	For Fuzzy Sets given as $\sim A = 0.8/1 + 0.6/2 + 0.4/3$ and $\sim B = 0.4/1 + 0.2/2$, perform the following operations: (i) intersection (ii) Bounded Difference (iii) Dilation of A	[6]
(b)	(iv) Algebraic Product (v) Concentration of B (vi) complement of A	[6]
	(b) Describing the working of a Biological Neuron, explain how an Artificial neuron can be used to simulate it.	[6]
	OR	
(b)	Enlist and explain various learning rules used in ANN.	[6]

