SARDAR PATEL UNIVERSITY

M.Sc. (Instrumentation) Semester I Examination

PS01EINS01 (Instrumentation of Processing Circuits)

Friday, 7th December 2012

10.30 am to 1.30 pm

Total Marks: 70

Que.1 Choose a correct option for the questions given below: 8
1. Which circuit is used for sine to square wave conversion?
   a) Comparator
   b) Adder
   c) Integrator
   d) Differentiator
2. For zero cross detector with non-inverting input if Vin>0V then output is:
   a) 0V
   b) Vin
   c) V+sat
   d) V-sat
3. In the dead zone circuit the second op-amp is configured as:
   a) Comparator
   b) Inverting amplifier
   c) Non inverting amplifier
   d) Rectifier
4. For an non-inverting op-amp actual gain is:
   a) $A_{CL} = \dfrac{(Rf+Ri)/Ri}{1+(A_{OL})(Rf+Ri)/Ri}$
   b) $A_{CL} = \dfrac{(Rf+Ri)/Ri}{(\frac{1}{A_{OL}})(Rf+Ri)/Ri}$
   c) $A_{CL} = \dfrac{(Rf+Ri)/Ri}{1+(\frac{1}{A_{OL}})(Rf+Ri)/Ri}$
   d) None
5. Bandwidth for a bandpass filter is given by
   a) $f_l - f_h$
   b) $f_h + f_l$
   c) $(f_l - f_h)(f_h + f_l)$
   d) None
6. A higher order filter offers
   a) Flat gain closest to the f_c
   b) Steep fall of response after f_c
   c) Both a and b are true
   d) None
7. A multiplier can not be used as
   a) Amplitude modulator
   b) Frequency shifter
   c) Phase detector
   d) All of the above
8. Free running frequency of PLL LM 565 is given by
   a) $f_{out} = \dfrac{1.2}{4R_1 C_1} \, Hz$
   b) $f_{out} = \pm \left[\dfrac{f_L}{2\pi 3.6 10^3 C_2} \right]^{1/2} Hz$
   c) $f_{out} = \dfrac{8C_2}{4R_1 C_1} \, Hz$
   d) None is correct option

Que.2 Answer any seven in brief: 14
A. Briefly explain Positive voltage level detector.
B. Explain briefly the working of an audio mixer.
C. Explain the Mean Absolute Value (MAV) for different waveforms in brief.
D. Explain the frequency response curve of a typical op-amp.
E. Categorize different types of filters and explain in brief.
F. Draw the circuit diagram of a -60db/decade low pass filter and also mention expressions to calculate the values of R and C in the circuit.
G. Explain the noise in operational amplifier output.
H. Explain frequency shifting using multiplier LM 633.
I. Draw and explain the block diagram of Phase locked Loop.

Que.3	A	Describe with necessary diagrams any 3 applications of zero cross detector.	6
	B	Write short notes on:	
		1. Multichannel amplifier	3
		2. Window detector	3

OR

	B	Write short notes on:	
		1. Precision comparator 111/311	3
		2. Non-inverting Zero-Crossing Detector	3

Que.4	A	Give a detailed account on Instrumentation amplifier. Also explain role of sense and reference terminals.	6
	B	Write short notes on:	
		1. Phase shifter circuit	3
		2. Peak detector	3

OR

	B	Explain in detail dead zone circuit with positive and negative output.	6

Que.5	A	Explain the simplified design procedure and filter response of a low-pass Butterworth - 60dB/decade filter. Also calculate values of necessary components to design a filter with cut-off frequency 1kHz.	6
	B	Explain the phase angle detection theory, phase angle meter working for phase angles less than and greater than 90^0.	6

OR

	B	What is band pass filter? With help of necessary diagrams explain design of wideband and narrowband filters.	6

Que.6	A	With necessary diagrams explain phase detectors for PLL. Also explain monolithic PLL.	6
	B	1. Write a short note on Standard amplitude modulation.	3
		2. Draw the block diagram of ICL8038 and explain it in brief.	3

OR

	B	Write short notes on:	
		1. Frequency shifting using AD633	3
		2. Sample and hold circuit	3

Best Wishes