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B.M.S. College of Engineering, Bengaluru-560019

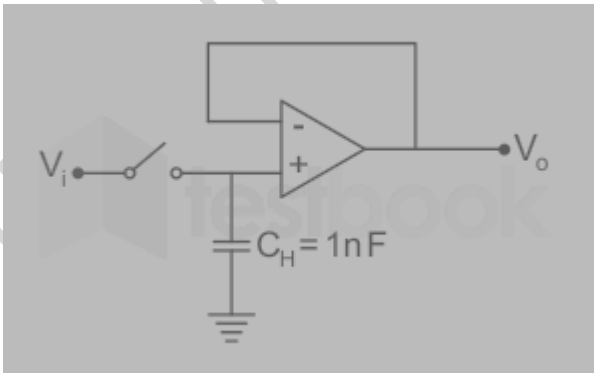
Autonomous Institute Affiliated to VTU

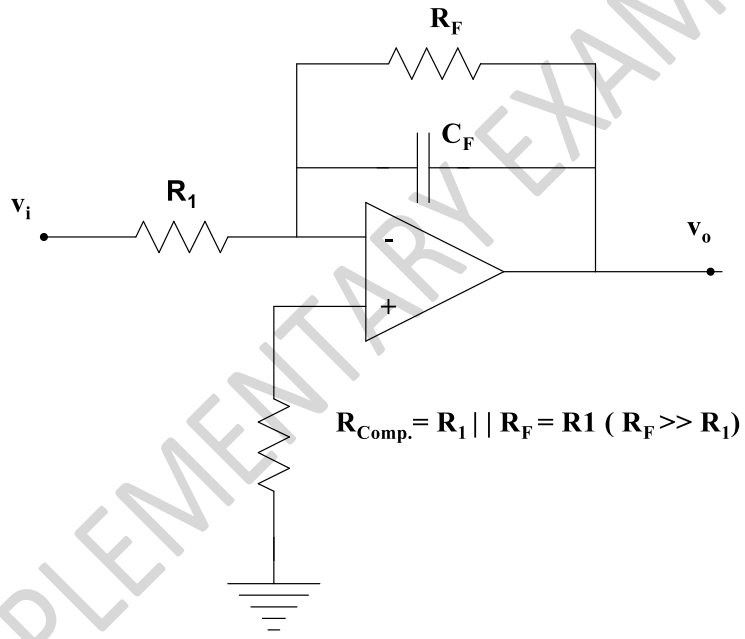
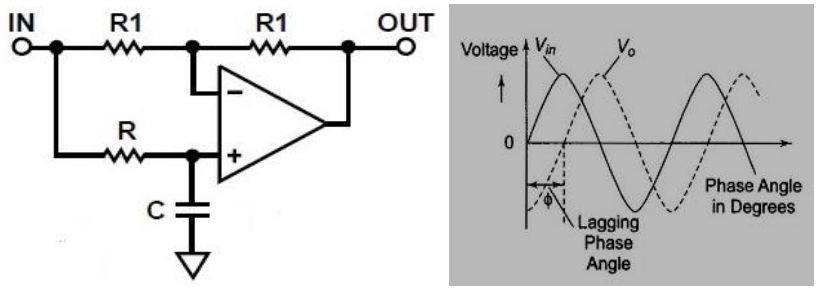
October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Cluster (EIE/MD) **Duration: 3 hrs.**
Course Code: 23ES4PCLIC **Max Marks: 100**
Course: Linear Integrated Circuits

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		MODULE - I	CO	PO	Marks
1	a)	Explain the following Characteristics of op-amp i) input bias current ii) input offset current and iii) input offset voltage.	CO1	PO1	**06**
	b)	Draw the circuit of a voltage to current converter and explain the working if the load is i) floating and ii) grounded.	CO2	PO1	**08**
	c)	The figure shown below is a sample and hold circuit used at a sampling rate of 1 kHz with an A/D converter having conversion time 200 μ sec. The op-amp has an input bias current of 10 nA. Find the maximum hold error (in mV).  Fig. 1 c	CO3	PO1	**06**
		OR			
2	a)	Explain the operation of difference amplifier and derive the equation for the output voltage.	CO1	PO1	**06**
	b)	What are the advantages of instrumentation amplifier over differential amplifier? Draw the circuit diagram and prove that the gain of the instrumentation amplifier is $(1+2R'/R)$ times the differential gain.	CO2	PO1	**08**
	c)	List out the op-amp circuits applications using diodes. Explain AC applications of any one of those circuits.	CO3	PO1	**06**

			MODULE - II			
	3	a)	List important applications of comparator.	*CO3*	*PO2*	**04**
		b)	A Schmitt trigger with the upper threshold level VUT = 0 V and hysteresis with VH = 0.2 V converts a 1 kHz sine wave of amplitude 4 Vpp into a square wave. Calculate the time duration of the negative and positive portion of the output waveform	*CO3*	*PO2*	**08**
		c)	With a functional diagram explain the working of 555 timer.	*CO3*	*PO2*	**08**
			MODULE - III			
	4	a)	Design a second order low pass filter circuit to have a cutoff frequency of 1 kHz.	*CO3*	*PO3*	**06**
		b)	Consider a practical integrator circuit shown in Figure 4 b. For the component values R1 = 10 kΩ, RF = 100 kΩ, CF = 10 nF, determine the lower frequency limit of integration and study the response for the inputs (i) sine wave, (ii) step input (iii) square wave.  Fig. 4 b	*CO3*	*PO3*	**10**
		c)	All pass filters are also called delay equalizers or phase detectors, justify. And for given circuit Fig 4. c, with its output waveforms modify the circuit to obtain positive phase shift.  Fig.4 c	*CO3*	*PO3*	**04**

			MODULE - IV			
	5	a)	Draw the scheme showing application of A/D and D/A converter and explain.	*CO4*	*PO4*	**10**
		b)	Explain the working of dual slope ADC.	*CO4*	*PO4*	**10**
			OR			
	6	a)	Explain the following with respect to D/A and A/D converters range of specification: (i) Resolution (ii) Linearity (iii) Accuracy and (iv) settling time.	*CO4*	*PO4*	**08**
		b)	Explain the working of flash type ADC (flash converter) with the help of comparator and the truth table.	*CO4*	*PO4*	**06**
		c)	Calculate the values of the LSB, MSB and full-scale output for an 8-bit DAC for the 0 V to 10 V range.	*CO4*	*PO4*	**06**
			MODULE- V			
	7	a)	Draw the Phase Locked Loop (PLL) block diagram and explain. Also define for the: i) Lock-in Range ii) Capture Range.	*CO4*	*PO4*	**10**
		b)	Explain the applications of PLL in Frequency multiplication, division, and translation.	*CO4*	*PO4*	**10**

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