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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. Semester: IV
Branch: ES CLUSTER Duration: 3 hrs.
Course Code: 19ES4CCLIC Max Marks: 100
Course: Linear Integrated Circuits
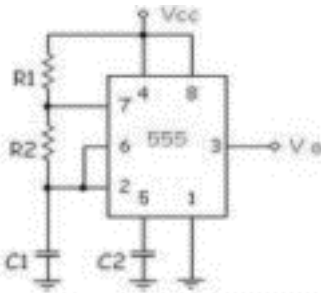
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

				CO	PO	Marks
			UNIT – I	CO	PO	Marks
1	a)		Analyze the working of V to I converter with, a) Floating load and b) Grounded load. Derive the I_L=Load current. Assume that R_f =10kΩ, R_L =2KΩ & V_i=0.5V for the above circuit, find the load current I_L and V_{max}.	CO 3	PO2	**08**
	b)		Explain the effect of input offset current on total output offset voltage for an inverting op-amp.	CO 1	PO1	**05**
	c)		Realize a precision non-saturating half-wave rectifier and explain its operation with relevant waveforms and transfer curve.	CO1	PO1	**07**
			OR			
2	a)		An inverting amplifier using 741C must have a flat response up to 40 kHz. The gain of the amplifier is 10. What maximum peak-to-peak input signal can be applied without distorting the output? Slew Rate of the op-amp is 0.5V/µs.	CO 1	PO1	**06**
	b)		Design an instrumentation amplifier with circuit diagram for a gain of 1000, also derive an expression for the output.	CO 4	PO3	**08**
	c)		Explain the working of sample and hold circuit with input and output waveform.	CO1	-	**06**
			UNIT-II			
3	a)		Design a triangular wave generator so that f_o= 2KHz and $V_{o(p-p)}$ = 7 V. V_{sat} of op-amp =13.5 V, supply voltages = ±15 V.	CO 1	PO1	**07**
	b)		Apply the comparator concept to design a regenerative circuit with UTP=+4V and LTP=+2 V. Assume sinusoidal input signal and V_{sat}=± 10V. Plot the input and output waveforms showing triggering levels. Also plot the hysteresis curve.	CO 2	PO2	**07**
	c)		With design equations explain the working of RC Phase Shift Oscillator of gain 29. Also design the same to oscillate at 100Hz assuming C=0.1uF.	CO2	PO2	**06**
			OR			
4	a)		Derive an equation for obtaining amplitude and frequency of the Monostable multivibrator using analog integrated device.	CO 1	PO1	**10**

		b)	Describe the operation of Schmitt trigger with neat circuit diagram, waveforms. Derive equations for the upper trigger point voltage and lower trigger point voltage.	*CO* 1		**10**
			UNIT - III			
	5	a)	With functional block diagram of IC723 analyze how it can be used as low voltage regulator? For V_o=5V, R_1 =1KΩ, R_2=2.3KΩ. Find R_L.	*CO* 3	*PO3*	**10**
		b)	Analyze the working of first order low pass filter for variable gain with circuit diagram &its frequency response. Derive the transfer function.	*CO* 3	*PO2*	**10**
			OR			
	6	a)	Compare active and passive filters	*CO1*		**10**
		b)	Design a fourth order Butterworth Low pass filter having an upper cut off frequency of 2KHz	*CO3*	*PO2*	**10**
			UNIT – IV			
	7	a)	An 8-bit DAC has a resolution of 12mV/bit. Find the analog output voltage for the inputs a)10101101 b)10110010.	*CO* 2	*PO1*	**04**
		b)	Explain the working of a counter type A/D converter with a neat diagram and waveforms. Mention its advantages and dis advantages.	*CO* 1	-	**08**
		c)	By applying Successive Approximation technique explain using table and relevant block diagram how op-amp can be used to convert 2 V to its digital equivalent.	*CO2*	*PO1*	**08**
			OR			
	8	a)	Explain the working of a sigma delta modulator A/D converter with a neat block diagram.	*CO1*	**-**	06
		b)	A 5 bit DAC produces V_{out} =0.4V for a digital input of 00001.Find the value of V_{out} for an input of 11111.What is its resolution? Describe its stair case signal.	*CO* 2	*PO1*	**06**
		c)	Sketch and explain the working of 4-bit R-2R ladder DAC and also an expression for its output voltage.	*CO1*	*PO1*	**08**
			UNIT-V			
	9	a)	Analyze the working of a PLL with block diagram, relevant waveforms.	*CO* 3	*PO2*	**06**
		b)	Explain the working of Phase detector and draw the input and output waveform of phase detector.	*CO* 2	*PO2*	**06**

				CO3	PO3	08
	c)	Analyze the circuit shown in figure 9c. For V_{CC}=5V, R_1 = 6.8KΩ, R_2= 3.3KΩ, C_1=0.1μF and C2= 0.01μF, calculate the T_{on}, T_{off}, free running frequency f_o and duty cycle D.	Fig. 9c			
		OR				
10	a)	Explain the working of 555 timer as a Monostable mutlivibrator with a neat circuit diagram.	CO2	PO1	10
	b)	Describe the applications of PLL with neat block diagrams	CO1		10

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