U.S.N.										

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

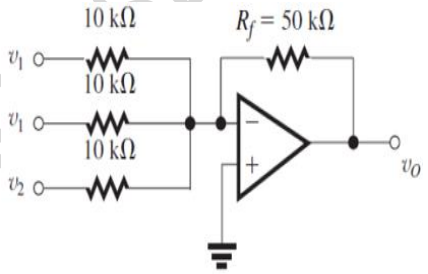
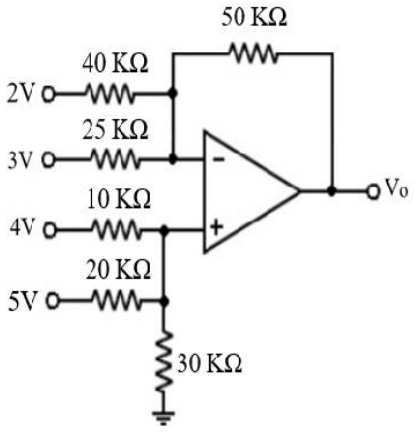
Autonomous Institute Affiliated to VTU

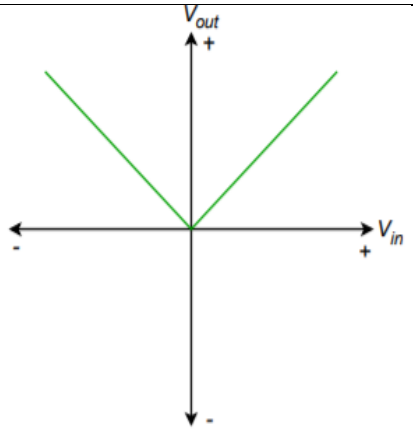
August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 23EC4PCAIC **Max Marks: 100**
Course: Analog 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.

		UNIT – I	CO	PO	Marks
1	a)	Define Slew rate and obtain the relationship between Slew rate and maximum input frequency for a given op-amp excited with sine input signal. Write the typical value of slew rate in a 741 op-amp.	CO1	-	06
	b)	A weighted summer circuit using an ideal op-amp has three inputs using 10 KΩ resistors and a feedback resistor of 50 KΩ. A signal V_1 is connected to two of the inputs while signal V_2 is connected to the third. Express V_o in terms of V_1 and V_2. If V_1 = 1V and V_2 = -1V, what is V_o?  Fig.1	CO 2	PO 1	04
	c)	Analyze the overall transfer function of an amplifier using Pole-Zero compensation technique.	CO 3	PO 2	10
		OR			
2	a)	Explain the working of a peak detector with the corresponding circuit diagram and waveforms	CO 1	-	05
	b)	Find V_o for the adder-subtracter shown in figure 2.  Fig. 2	CO 2	PO 1	08

		c)	Explain a suitable circuit with relevant equations to realize the transfer characteristic shown in figure 3.  Fig. 3	***CO 3***	***PO 2***	**07**
			UNIT – II			
	3	a)	Explain the working of non-inverting comparator for V_{ref} >0 and V_{ref} <0 using OP-AMP with neat circuit diagram and waveforms.	***CO 1***		**06**
		b)	Sketch a regenerative comparator which produces a square wave. Given R_1=56KΩ, R_2=150Ω, $V_{i(p-p)}$=1$V_{(p-p)}$ Sine wave of frequency 50Hz, V_{ref} = 0V and OP-AMP 741 is used with supply voltage are ±15V and saturation voltages are ±13.5V. Determine the threshold voltage V_{UT} and V_{LT}. Draw the input, output waveform. Also plot the hysteresis voltage curve.	***CO 2***	***PO 1***	**07**
		c)	Suggest the oscillator whose amplifier gain should be atleast 3. Justify your answer with necessary derivations and circuit diagram.	***CO 3***	***PO 2***	**07**
			UNIT - III			
	4	a)	Analyze the working of a low voltage regulator circuit utilizing the IC-723. Also design the circuit for the output voltage of 3V. Assume V_{ref} = 7V and R_1=10KΩ.	***CO 3***	***PO 2***	**10**
		b)	Illustrate with a circuit diagram and frequency response, the working of first order low pass filter with variable gain. Derive its transfer function in frequency domain.	***CO 3***	***PO 2***	**10**
			UNIT – IV			
	5	a)	Sketch and explain the working of binary weighted resistor DAC and also give expression for its output voltage. What output voltage would be produced by a 4-bit DAC whose output range is 0 to 10 V and input binary number is 0110.	***CO 2***	***PO 1***	**10**
		b)	Analyze the working of 3-bit parallel comparator (Flash) ADC with circuit diagram and truth table.	***CO 3***	***PO 2***	**10**
			OR			
	6	a)	By applying successive approximation technique, explain how op-amp can be used to convert 212 V to its digital equivalent.	***CO 2***	***PO 1***	**10**

		b)	Illustrate the working of dual slope type ADC with a functional diagram and integrated output waveform. Derive for analog input voltage Va.	***CO 3***	***PO 2***	**10**
			UNIT – V			
	7	a)	Explain the working principle of PLL with neat block diagram including capture range and lock range.	***CO 1***	-	**07**
		b)	Using a 555 timer it is required to obtain a frequency of 1KHz and duty cycle 60% without using any external signal source. Name and design such a circuit. Assume C=0.1µF.	***CO 4***	***PO 3***	**08**
		c)	Design a monostable multivibrator using 555 timer to obtain a pulse width of 10 milli sec. Assume C=1µF.	***CO 4***	***PO3***	**05**

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