U.S.N.										

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

Autonomous Institute Affiliated to VTU

October 2024 Supplementary 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.

			CO	PO	Marks
		UNIT – I			
1	a)	Discussing the concept of virtual short, derive an expression for the gain of a non-inverting amplifier.	*CO1*	-	**6**
	b)	Derive an expression for the gain of an instrumentation Amplifier.	*CO2*	*PO1*	**8**
	c)	Explain the working of a Sample and Hold circuit with relevant waveforms.	*CO2*	*PO1*	**6**
		OR			
2	a)	Define the following parameters of OP-Amps, also specifying their ideal and typical practical values (i) PSRR (ii) CMRR (iii) Slew Rate	*CO1*	-	**6**
	b)	Explain the working of a full-wave precision rectifier circuit.	*CO2*	*PO1*	**8**
	c)	Design a voltage to current converter to drive a floating load of R_L= 200 Ω with a constant current of 10 mA.	*CO4*	*PO3*	**6**
		UNIT – II			
3	a)	Design a Schmitt trigger for UTP = + 5V and hysteresis = 0.40 V. Assume the OP-Amp to be powered by a ± 15V power supply.	*CO4*	*PO3*	**8**
	b)	Implement an Op-Amp based monostabe multivibrator to obtain a pulse of width T_p= 5.0 ms.	*CO2*	*PO1*	**6**
	c)	Design a Wien bridge oscillator for a frequency of 2.0 kHz, and an approximate peak-to-peak output voltage of 26V.	*CO4*	*PO3*	**6**
		UNIT - III			
4	a)	Design a voltage regulator using LM723 to obtain V_o= 20V and a load current of I_{o_max}= 1000 mA.	*CO4*	*PO3*	**6**

		b)	Discuss to contrast the working principles and features of linear power supplies with switch-mode power supplies.	***CO1***	**-**	**6**
		c)	Design a II – order Butterworth low-pass filter for a cut-off frequency of 1.0 kHz, and obtain its frequency response. Assume the damping coefficient $\alpha = 1.414$.	***CO4***	***PO3***	**8**
			UNIT – IV			
	5	a)	Consider a 4-bit example and using suitable circuit analysis for a minimum of 2 nodes in the ladder, discuss how digital to analog voltage conversion is achieved using an R-2R ladder DAC.	***CO2***	***PO1***	**12**
		b)	Discuss the working principle of a counter-type of ADC with suitable timing diagrams to show that the digital count is proportional to the analog input voltage.	***CO2***	***PO1***	**8**
			OR			
	6	a)	Analyze the working of 3-bit parallel comparator (Flash) ADC with circuit diagram and truth table.	***CO 3***	***PO 2***	**10**
		b)	Discuss the working principle of a 4-bit successive approximation ADC, assuming $V_{REF} = 10.0V$ when $V_{in} = 6.50V$.	***CO 3***	***PO 2***	**10**
			UNIT – V			
	7	a)	With the help of a functional block diagram, explain the pin-functions of the 555 timer.	***CO3***	***PO2***	**8**
		b)	Design an astable multivibrator using 555 timer to obtain a rectangular waveform at $f_o = 2$ kHz, and duty cycle = 70 %. Assume C=0.1μF.	***CO4***	***PO3***	**6**
		c)	Explain the principle of operation of a Phase-locked loop with a block diagram.	***CO3***	***PO2***	**6**

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