1100ECT301112401

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Name:

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (R, S) /S5 (WP) (R) /S3 (PT) (S,FE) Examination November 2024 (2019)

Course Code: ECT 301

Course Name: LINEAR INTEGRATED CIRCUITS

Max. Marks: 100

PART A

Duration: 3 Hours

	(Answer all questions; each question carries 3 marks)	Marks
1	Determine the output voltage of a differential amplifier for the input voltages	3
	of 300 μ V and 240 μ V. The differential gain of the amplifier is 5000 and the	
	value of CMRR is 100.	
2	Explain any 6 ideal Op-amp characteristics.	3
3	Design an Op-amp circuit with 4 inputs V_1 , V_2 , V_3 , V_4 so as to provide output	3
	Vo as $Vo = 2V_1 - 3V_2 + 4V_3 - 5V_4$	
4	Draw the circuit diagram of a precision half wave rectifier and explain its	3
	working.	
5	Design a Butterworth active low pass filter for a cut-off frequency of 15.9 kHz	3
	with a stop band attenuation of -40dB/decade.	
6	Design a notch filter to eliminate 120 Hz frequency.	3
7	Explain the basic building blocks of a PLL IC.	3
8	Explain how a 555 timer IC can be configured as a square wave generator.	3
9	Compare flash ADC and Successive Approximation ADC.	3
10 -	Mention any three types of DAC.	3.

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

- 11 a) Derive the expression for Common Mode Rejection Ratio for a Dual Input 9 Balance output Differential Amplifier.
 - b) Explain the transfer characteristics of a dual input balanced output differential 5 amplifier.

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With the help of a block diagram, explain the internal schematic of 741C op-5 12 a) amp

b) Draw the circuit diagram of a basic current mirror circuit. Prove that reference 9 current and output current are the same for the current mirror circuit.

Module -2

- Draw the circuit diagram of an ideal active op-amp differentiator. Derive an 9 13 a) expression for the output voltage. Plot the input and output waveforms for a step input.
 - b) Illustrate how can a multiplication operation be implemented using op-amps.

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- Draw the circuit diagram of an inverting Schmitt trigger and explain its 9 14 a) working. Plot the transfer characteristics.
 - b) Most of the sensor outputs in modern systems are generally very low amplitude signals, which is not sufficient to drive the next stage of the system. Suggest an op-amp circuit which can be used for such low level signal amplification with high CMRR and high input impedance. Justify your suggestion.

Module -3

15	a)	Explain the working of an astable multivibrator using op-amps. Derive an	9
		expression for the frequency of oscillation.	
	b)	Explain Barkhausen criteria for sustained oscillations.	5
16	a)	List the advantages of Active filters.	5
	b)	Design a second order wide band pass filter having $f_L = 400$ Hz and $f_H=2KHz$	9
		and pass band gain of 4. Plot the frequency response and calculate the Q factor	
		of the filter.	
		Module -4	
17	a)	With the help of a block diagram, explain the internal schematic of 555 IC.	4
	b)	Explain the working of a monostable multivibrator using a 555 IC. Also derive	10
×		the expression the pulse width.	
18	a)	With the help of a block diagram of IC 565, explain the basic operation of	8
		PLL.	
	b)	Explain the terms related to PLL	6
		(a) Lock Range (b) Capture Range (c) Pull in Time.	

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Module -5

19	a)	With the help of a block diagram, explain the internal schematic of IC 723.	5
	b)	With neat circuit diagram, explain the working of a low voltage regulator with	9
		a current limiting protection using LM723C IC.	
20	a)	With the help of a circuit diagram, explain the working of a binary weighted	8
	Yak	resistor DAC.	
	b)	Explain the sources of error in DAC.	6

C.