Code: 20A04403T

R20

B.Tech II Year II Semester (R20) Regular & Supplementary Examinations April/May 2024

LINEAR AND DIGITAL IC APPLICATIONS

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

	(a)	Give the Classification of IC's.	2M
	(b)	Compare and contrast an ideal op-amp and practical op-amp.	2M
	(c)	Derive the expression for voltage gain of non-inverting amplifier.	2M
	(d)	Write the applications of V-I Converter.	2M
	(e)	What is the need of higher order filters? Give the relationship between order of a filter and roll off rate.	2M
	(f)	Define capture range and lock in range of a PLL.	2M
	(g)	Define the terms related to ADC (i) conversion time, (ii) Percentage Resolution.	2M
	(h)	What are the different features of IC 723?	2M
	(i)	Write about basic CMOS Inverter.	2M
	(j)	Write about Universal Shift Register.	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	(a)	Explain internal circuit of operational amplifier with different stages.	5M
	(b)	Discuss the AC characteristics of an op-amp in detail.	5M
		OR	
3	(a)	Draw and explain the equivalent circuit of an operational amplifier. Give its features.	5M
	(b)	Explain about DC Characteristics of an Op-Amp.	5M
4	(a)	Derive the output voltage V_O of practical integrator circuit.	5M
	(b)	Explain the square wave generator using an op-amp with a neat circuit diagram.	5M
		OR	
5	(a)	Explain working of an instrumentation amplifier with a neat diagram. How is it different from a single op-amp differential amplifier?	5M
	(b)	Explain the operation of Op-Amp based comparator with a neat diagram.	5M
6	(a)	Explain about band reject and all Pass filters.	5M
	(b)	Explain about voltage controlled Oscillator.	5M
		OR	
7	(a)	Compute the free running frequency f_o, lock in range and capture range of PLL565. Assume R_T = 20 KΩ, C_T = 0.01μF, C = 1μF and supply voltage is ± 6v.	5M
	(b)	Draw the circuit of Schmitt trigger using IC555 timer and explain its operation.	5M
8	(a)	Discuss about the three terminal adjustable voltage regulator and write its applications.	5M
	(b)	Explain the working of R-2R ladder DAC with a circuit diagram and write its limitations.	5M
		OR	

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9	(a)	Discuss about Op-Amp based series voltage regulator and write its purpose.	5M
	(b)	Explain the working of dual slope ADC with a circuit diagram and write its applications.	5M
10	(a)	Design and explain the function of a CMOS transistor circuit for 3-input AND gate.	5M
	(b)	What is multiplexer? Draw the logic diagram of 8 to 1 line multiplexer.	5M
		OR	
11	(a)	Draw the circuit of MOD 16 Down ripple counter with D-flip-flops & explain its function.	5M
	(b)	With a neat sketch explain the operation of four-bit parallel adder.	5M

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B.Tech II Year II Semester (R20) Regular & Supplementary Examinations August/September 2023

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(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	State the characteristics of ideal op-amp.	2M
	(b)	Draw the mono stable multivibrator using IC 555.	2M
	(c)	Give the conversion time for successive approximation ADC.	2M
	(d)	Give the important features of an instrumentation amplifier.	2M
	(e)	Define unity gain band width of an op-amp.	2M
	(f)	Which type of ADC is the fastest? Why?	2M
	(g)	Realize EX-OR gate with CMOS circuit.	2M
	(h)	Define slew rate. What causes it?	2M
	(i)	Mention any two applications of multiplier IC.	2M
	(j)	Compare R-2R and weighted resistor types of DACs.	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	Draw Block diagram of Typical Op–Amp With Various Stages and explain in detail.	10M
	OR	
3	With the circuit diagram explain the working of Instrumentation Amplifier.	10M
4	Derive expression for the voltage to frequency conversion factor of a VCO.	10M
	OR	
5	Design an Astable Multivibrator having an output frequency 15 KHz with duty cycle of 40%.	10M
6	Design and explain the operation of All Pass Filter with its characteristics?	10M
	OR	
7	Derive expression for the duty cycle of Astable Multivibrator using IC 555 with a neat circuit and waveforms.	10M
8	Explain the characteristics of three terminal IC Voltage regulator IC273. Design an Voltage regulator using the above IC.	10M
	OR	
9	Explain the operation of parallel comparator type ADC.	10M
10	Design and implement the function Z = A (B+C) in CMOS logic.	10M
	OR	
11	Draw the logic diagram equivalent to the internal structure of an 8-input CMOS NAND gate. Show the transistor circuit for this gate and explain the operation with the help of function table.	10M

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