A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 94B02

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Biomedical Engineering

19UBM402- Analog And Digital Integrated Circuits

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	List the features of an Instrumentation amplifier.	CO1-U
2.	Find the maximum frequency for a sine wave output voltage of 10 V peak with an op-amp whose slew rate is 1V/μs.	CO2-Ap
3.	Enumerate the advantages of active filters over the passive filters?	CO1-U
4.	What is the drawback in zero crossing detectors? State a method to overcome it.	CO1-U
5.	Draw the pin diagram of 555 timer. Why pin number 5 is grounded through a capacitor?	CO1-U
6.	Mention some typical applications of PLL.	CO1-U
7.	Realize 2 input X-OR gate using NOR gates only.	CO1-U
8.	State the limitations of karnaugh map.	CO1-U
9.	Draw the logic diagram and function table of a SR latch implemented using NAND gates.	CO1-U
10.	What is race around condition? How it is avoided?	CO1-U

PART – C (5 x 16= 80 Marks)

11.	(a)	(i) Elaborate in detail any two performance characteristics of an op-amp for DC input with its limitations. Analyze and suggest the compensation techniques.	CO1- U	(8)

		(ii) Enlighten in detail about an Instrument which has high CMRR, Gain and low output impedance. Derive its output expression and state its advantage and application.	CO3-Ana	(8)
		Or		
	(b)	(i) Draw and explain a positive clamper circuit using operational amplifier.	CO1- U	(8)
		(ii) Design a circuit that converts a square wave to spikes. What are the disadvantages of ideal circuit? Mention the modifications done in the practical circuit.	CO3-Ana	(8)
12.	(a)	(i) Briefly mention the disadvantages of 'zero crossing detector' and explain how they are overcome in 'Schmitt trigger circuit'.	CO1- U	(8)
		(ii) Explain the working principles of successive approximation type ADC.	CO1- U	(8)
		Or		
	(b)	(i) Derive the transfer function of second order Low Pass Filter and plot its frequency response.	CO1- U	(8)
		(ii) Explain the suitable DAC which will overcome the drawbacks of Weighted Resistor type DAC. .	CO1- U	(8)
13.	(a)	With a neat functional diagram, explain the working of 555 timer as mono stable multivibrator and derive an expression for the frequency of oscillation with relevant waveforms.	CO1- U	(16)
		Or		
	(b)	(i) Explain the functionality of analog phase detector of PLL and derive the expression for lock-in range.	CO1- U	(8)
		(ii) Briefly explain the working of a general purpose voltage regulator with necessary diagrams.	CO1- U	(8)

14.	(a)	(i) Simplify the following Boolean function and implement the same using NAND logic.	CO2- App	(12)
		$F(A,B,C,D,E) = \Sigma m\ (1,4,8,10,11,20,22,24,25,26)+d(0,12,16,17)$		
		(ii)| Implement the following Boolean function using suitable multiplexer. $F(A,B,C,D)=\sum m(0,1,3,4,8,9,15)$	CO2- App	(4)
		Or		
	(b)	(i) Simplify the following function using Quine McCluskey method $F(A,B,C,D) = \Sigma m(2,3,7,9,11,13) + \Sigma d(1,10,15)$	CO2- App	(12)
		(ii) Design half adder using only NAND gates.	CO2- App	(4)
15	(a)	Design a Synchronous BCD counter using JK flip-flops.	CO2- App	(16)
		Or		
	(b)	(i) Design PIPO and PISO shift registers using Delay flip-flops.	CO2- App	(8)
		(ii) Implement the following function using PLA: $F(x,y,z) = \sum m(1,2,4,6)$	CO2- App	(8)