Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B.Tech / B. Arch (Full Time) – ARREAR EXAMINATIONS, NOV / DEC 2024

BIOMEDICAL ENGINEERING
Semester IV
EC5406 - Analog and Digital Integrated Circuits
(Regulation 2019)

Time: 3hrs Max. Marks: 100

CO1	Ability to design new analog linear circuits and develop linear IC based Systems
CO2	Understand the concept of application of ADC and DAC in real time systems and Phase Locked Loop with applications
CO3	Use Boolean algebra and apply it to digital systems
CO4	Design various combinational digital circuits using logic gates
CO5	Bring out the analysis and design procedures for synchronous and asynchronous sequential circuits

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Write the characteristics of an ideal operational amplifier.	2	1	L1
2	What are the functions of Schmitt trigger?	2	1	L2
3	What is D/A converter? Mention it's types.	2	2	L1
4	Draw the block diagram of FSK demodulator.	2	2	L1
5	Convert $(7DE)_{16}$ to decimal number.	2	3	L3
6	List out the advantages of CMOS logic family.	2	3	L2
7	Draw a Full adder circuit using Half adder.	2	4	L2
8	Distinguish between PLA and PAL.	2	4	L2
9	Write the characteristic table and characteristic equation of T Flip flop.	2	5	L1
10	What is Universal Shift Register?	2	5	L1

PART- B (5x 13=65Marks)

Q.No.	Questions	Marks	CO	BL
11 (a) (i)	Explain the working of inverting and Non-inverting amplifier circuit. Derive its' voltage gain with necessary circuit diagrams and Mention some of its' applications.	8	1	L2
(ii)	Explain briefly the concept of operational amplifier based Integrator.	5	1	L2
	OR			
11 (b) (i)	Explain briefly about different types of Active filters with suitable diagrams.	8	1	L2
(ii)	Explain the concept of Triangular Wave Generator.	5	1	L2
12 (a)	Analyze and Explain in detail about the working of Flash type and Successive Approximation A/D converters with necessary circuit diagrams. Mention its' advantages and disadvantages.	13	2	L4
	OR			

12 (b)	What is PLL? Explain in detail about the Closed loop analysis of PLL. List out the Applications of PLL.	**13**	2	4
13 (a) (i)	State and prove DeMorgan's theorem.	**5**	3	L3
(ii)	Obtain simplified SOP using K map and Draw the Logic Circuit. X'Y'Z'+X'YZ'+XY'Z'+XY'Z	**8**	3	L3
	OR			
13 (b) (i)	Simplify the following Boolean function using Quine-McCluskey / Tabulation method. F(A,B,C,D)= Σm(7,9,12,13,14,15) + dc(4,11)	**8**	3	L3
(ii)	Compare different types of logic families.	**5**	3	L3
14 (a)	Design a combinational circuit that converts a 4-bit gray code to a 4-bit binary number. Draw the logic diagram.	**13**	4	L3
	OR			
14 (b)	Design a 8x3 Encoder and 3x8 Decoder with necessary logic diagram.	**13**	4	L3
15 (a)	Draw Master/Slave FF circuit and explain its operation with necessary timing diagram.	**13**	5	L3
	OR			
15 (b)	Design a 4-bit ripple counter with necessary diagrams. Also Differentiate between Ripple Counters and Ring Counters.	**13**	5	L3

PART- C (1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	A sequential circuit with two D flip-flops A and B, two inputs, x and y; and one output z is specified by the following next-state and output equations A(t + 1) = xy' + xB B(t + 1) = xA + xB' z = A (i) Draw the logic diagram of the circuit. (ii) List the state table for the sequential circuit. (iii) Draw the corresponding state diagram.	**15**	5	L6