INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500043

ELECTRICAL AND ELECTRONICS ENGINEERING

TUTORIAL QUESTIONBANK

Course Title	DIGITAL ELECTRONICS				
Course Code	AECB03				
Programme	B.Tech				
Semester	III	ECE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	0	3	0	3
Chief Coordinator	Ms.V.Bindusree, Assistant professor				
Course Faculty	Ms.V.Bindusree, Assistant professor Ms.J.Sravana, Assistant professor				

COURSE OBJECTIVES:

S.No	Description
I	Familiarize the basic concept of number systems, Boolean algebra principles and minimization techniques for Boolean algebra.
II	Analyze Combination logic circuit and sequential logic circuits such as multiplexers, adders, decoders flip-flops and latches
III	Understand about synchronous and asynchronous sequential logic circuits.
IV	Impart the basic understanding of memory organization, ROM, RAM, PLA and PAL.

COURSE OUTCOMES:

1	Understand the basic concept of number systems and integrated circuits.
2	Analyze Combination logic circuit such as multiplexers, adders, decoders
3	Understand about synchronous and asynchronous sequential logic circuits.
4	Analyze analog to digital and digital to analog Converters.
5	Understanding of memory organization, ROM, RAM, CPLD, FPGA, and CCD.

COURSE LEARNING OUTCOMES:

AECB03.01	Understand the basic concept of number systems, Binary addition and subtraction for digital systems.
AECB03.02	Explain 2"s complement representation and implement binary subtraction using 1"s and 2"s Complements.
AECB03.03	Discuss about digital logic gates, error detecting and correcting codes for digital systems.
AECB03.04	Design TTL/CMOS integrated circuits and study the TTL and CMOS logic families.
AECB03.05	Evaluate functions using various types of minimizing algorithms like Karnaugh map or tabulation method
AECB03.06	Design Gate level minimization using KMaps and realize the Boolean function using logic gates.
AECB03.07	Analyze the design procedures of Combinational logic circuits like adder, binary adder, carry look ahead adder.
AECB03.08	Analyze the design of decoder, demultiplexer, and comparator using combinational logic circuit.
AECB03.09	Discuss about MSI chip, ALU design.
AECB03.10	Understand bi-stable elements like latches flip-flop and Illustrate the excitation tables of different flip flops
AECB03.11	Analyze and apply the design procedures of small sequential circuits to build the gated latches.
AECB03.12	Understand the concept of Shift Registers and implement the bidirectional and universal shift registers.
AECB03.13	Implement the synchronous counters using design procedure of sequential circuit and excitation tables of flip – flops.
AECB03.14	Implement the Asynchronous counters using design procedure of sequential circuit and excitation tables of flip – flops.
AECB03.15	Understand the classifications, characteristics and need of data converters such as ADC and DAC.
AECB03.16	Analyze the digital to analog converter technique such as weighted resistor DAC, R-2R ladder DAC, inverted R-2R ladder DAC and IC 1408 DAC
AECB03.17	Analyze the analog to digital converter technique such as integrating, successive approximation and flash converters, Dual slope converter.
AECB03.18	Implement the A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters
AECB03.19	Understand the concept of memory organization, Read only memory and random access memory.
AECB03.20	Discuss and implement combinational and sequential logic circuits using PLA and PLDs.
AECB03.21	Analyze the concepts of CAM, FPGA.

TUTORIAL QUESTION BANK

S. No	Question	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
MODULE I				
PART-A(Short Answer Questions)				
1	Write short notes on binary number systems.	Remember	CO 1	AECB03.01
2	Discuss 1"s and 2"s complement.	Understand	CO 1	AECB03.02
3	Discuss octal number system.	Understand	CO 1	AECB03.01
4	Convert the octal numbers into binary, decimal and Hexadecimal numbers $(45.5)_8$, $(32.2)_8$.	Remember	CO 1	AECB03.01
5	Show an example to convert gray code to binary code.	Understand	CO 1	AECB03.01
6	Describe a short note on four bit BCD codes.	Understand	CO 1	AECB03.01
7	Illustrate about unit –distance code? State where they are used.	Remember	CO 1	AECB03.01
8	List the applications of error correcting codes.	Understand	CO 1	AECB03.03
9	Convert 10101101.0111 to octal equivalent and hexadecimal equivalent.	Understand	CO 1	AECB03.01
10	Give the examples of unit distance codes	Remember	CO 1	AECB03.01
11	Convert $(2365)_8$ into base 5.	Understand	CO 1	AECB03.01
12	Convert $(6545)_8$ into base 3.	Understand	CO 1	AECB03.01
13	Discuss 1"s and 2"s complement methods of subtraction.	Remember	CO 1	AECB03.02
14	Explain with neat diagram interfacing of TTL gate driving CMOS gates.	Understand	CO 1	AECB03.04
15	Convert following hexadecimal number to decimal i) $F28_{16}$ ii) $BC2_{16}$	Understand	CO 1	AECB03.01
16	Convert 10101101.0111 to octal equivalent and hexadecimal equivalent.	Remember	CO 1	AECB03.01
17	Design CMOS transistor circuit for 2-input AND gate.	Understand	CO 1	AECB03.04
18	Describe sourcing current of TTL output?	Understand	CO 1	AECB03.04
19	Discuss the term Voltage levels for logic „1" & logic „0" with reference to TTL gate	Remember	CO 1	AECB03.04
20	Describe the DC Noise margin with reference to TTL gate?	Understand	CO 1	AECB03.04
PART-B(Long Answer Questions)				
1	Give the Boolean expressions used for following gates i) AND ii) NOR iii) EX-OR iv) OR v) EX-NOR.	Understand	CO 1	AECB03.01
2	Define weighted codes and non weighted codes with examples?	Remember	CO 1	AECB03.01
3	Explain what does u mean by error detection and correcting code?	Understand	CO 1	AECB03.01
4	Explain the truth table of X-OR, NAND and NOR gates?	Remember	CO 1	AECB03.01
5	State and prove four Boolean theorems with examples.	Understand	CO 1	AECB03.01
6	What is the gray code equivalent of the Hex Number 3A7? And Find 9"s complement of $(25.639)_{10}$.	Understand	CO 1	AECB03.01
7	Explain error occurred in data transmission can be detected using parity bit?	Remember	CO 1	AECB03.03
8	Explain Self complemented codes.	Understand	CO 1	AECB03.01
9	Convert $(4085)_{10}$ into base-4 and obtain its 9"s complement.	Understand	CO 1	AECB03.01

10	Convert the following Hexadecimal number to their Decimal equivalent $(EAF1)_{16}$.	Understand	CO 1	AECB03.01
11	Design CMOS transistor circuit for 2-input AND gate. Explain the circuit with the help of function table?	Remember	CO 1	AECB03.04
12	Explain sinking current and sourcing current of TTL output? Which of the parameters decide the fan-out and how?	Understand	CO 1	AECB03.04
13	Draw and explain the operation 2 input Transistor Transistor Logic NOR gate with truth table	Understand	CO 1	AECB03.04
14	Explain what do you mean by error detection and correcting code with examples.	Understand	CO 1	AECB03.04
15	State DeMorgan‟s theorem with the help of truth table and circuit diagram?	Understand	CO 1	AECB03.04
16	Explain error occurred in data transmission can be detected using parity bit?	Understand	CO 1	AECB03.04
17	Simplify the expression Z= AB+AB‟+(A‟C‟)‟	Understand	CO 1	AECB03.04
18	Find 10‟s complement of $(25.639)_{10}$.	Understand	CO 1	AECB03.04
19	Add -75, +46 using 1‟s complement arithmetic.	Understand	CO 1	AECB03.04
20	Add -45.75 and+87.25 using 2‟s complement arithmetic.	Understand	CO 1	AECB03.04
PART-C(Problem Solving Critical Thinking Questions)				
1	Given the 8bit data word 01011011, generate the 12 bit composite word for the hamming code that corrects and detects single errors.	Understand	CO 1	AECB03.03
2	Write the first 20 decimal digits in base 3 and base 16.	Understand	CO 1	AECB03.03
3	A device transmits the binary data using even parity, the message is 1011001. Identify the receiver receives the correct data or not.	Understand	CO 1	AECB03.03
4	(a) Find (72532 - 03250) using 9's complement. (b) Show the weights of three different 4 bit self complementing codes whose only negative weight is - 4 and write down number system from 0 to 9.	Understand	CO 1	AECB03.02
5	Differentiate between BCD code and 2421 code and XS-3.	Understand	CO 1	AECB03.01
6	Find 7 bit hamming code for given message 1010 by using odd parity.	Understand	CO 1	AECB03.03
7	Design a CMOS transistor circuit with the functional behavior f(X) = ((A+B‟)(B+D‟)(A+D‟))‟	Remember	CO 1	AECB03.04
8	A single pull-up resistor to +5V is used to provide a constant-1 logic source to 15 different 74LS00 inputs. What is the maximum value of this resistor? How much high state DC noise margin can be provided in this case	Understand	CO 1	AECB03.04
9	Subtract the following binary numbers using 1‟s complement. i) 1011-101 ii) 10110-1011	Remember	CO 1	AECB03.02
10	Generate the weighted codes for the decimal digits using the weights i) 3,3,2,1 ii) 2,4,2,1	Remember	CO 1	AECB03.01
MODULE II				
PART-A(Short Answer Questions)				
1	Define K-map? Name its advantages and disadvantages?	Remember	CO 2	AECB03.06
2	Define Implicant, prime Implicant and Essential prime Implicant?	Remember	CO 2	AECB03.06
3	Design the two graphic symbols for NAND gate?	Understand	CO 2	AECB03.06
4	Design the two graphic symbols for NOR gate?	Understand	CO 2	AECB03.06
5	Sketch the following equation using k-map and realize it using NAND gate? Y=∑m(4,5,8,9,11,12,13,15)	Understand	CO 2	AECB03.06
6	Sketch the following logic function using k-map and implement it using logic gates? Y(A,B,C,D)= ∑m(0,1,2,3,4,7,8,9,10,11,12,14)	Understand	CO 2	AECB03.06

7	Summarize the rules and limitations of K-map simplification?	Remember	CO 2	AECB03.06
8	Analyze the steps for simplification of POS expression?	Understand	CO 2	AECB03.06
9	Realize 16 × 1 Mux using only 2 × 1 Mux	Understand	CO 2	AECB03.08
10	Design logic circuit for parity bit generator	Understand	CO 2	AECB03.07
11	What is decoder? How do you convert a decoder in to a De-Multiplexer	Understand	CO 2	AECB03.07
12	Design BCD to gray code converter and realize using logic gates.	Understand	CO 2	AECB03.07
13	Realize 16 × 1 Mux using only 2 × 1 Mux	Understand	CO 2	AECB03.08
14	Design Full adder using Logic Gates.	Understand	CO 2	AECB03.07
15	Design Half subtractor using NAND Gates	Understand	CO 2	AECB03.07
16	Design Half subtractor using NOR Gates	Understand	CO 2	AECB03.07
17	Explain the design procedure for code converter with the help of example	Understand	CO 2	AECB03.07
18	Design a logic circuit to convert gray code to binary code.	Understand	CO 2	AECB03.07
19	Design a logic circuit to convert binary code to gray code.	Understand	CO 2	AECB03.07
20	Design a Full subtractor using NAND Gates	Understand	CO 2	AECB03.07
PART-B(Long Answer Questions)				
1	A combinational circuit has 4 inputs(A,B,C,D) and three outputs(X,Y,Z)XYZ represents a binary number whose value equals the number of 1's at the input (i) state the min term expansion for the X,Y,Z (ii). state the max term expansion for the Y and Z	Understand	CO 2	AECB03.06
2	Minimize the following function using K-map. F (A, B, C, D) = ∑m (1,3,5,7,9,10,11,12,15)	Understand	CO 2	AECB03.06
3	Summarize the Boolean function F(w, x, y, z) = Σ(1, 3, 7, 11,15) + Σd(0. 2, 5)	Understand	CO 2	AECB03.06
4	Identify all the prime implicants and essential prime implicants of the following functions Using k- map. F(A,B,C,D) = πM(0,1,2,5,6,7,8,9,10,13,14,15).	Understand	CO 2	AECB03.06
5	Design a excess-3 adder using 4-bit parallel binary adder and logic gates. b) What are the applications of full adders?	Understand	CO 2	AECB03.07
6	Explain the operation of 4 to 16 decoder.	Understand	CO 2	AECB03.08
7	Design a 64:1 MUX using 8:1 MUXs.	Understand	CO 2	AECB03.09
8	Design a 2-bit Magnitude Comparator and draw the block diagram?	Understand	CO 2	AECB03.08
9	Explain the design procedure for code converter with the help of example	Remember	CO 2	AECB03.09
10	Design a logic circuit to convert gray code to binary code.	Remember	CO 2	AECB03.09
11	Design a logic circuit to convert binary code to gray code.	Remember	CO 2	AECB03.09
12	Design a logic circuit to convert BCD code to binary code.	Remember	CO 2	AECB03.09
13	Explain the working of carry look-ahead generator.	Remember	CO 2	AECB03.08
14	Design 4 bit parallel adder using full adders. Remember	Remember	CO 2	AECB03.09
15	Explain the operation of 4 to 16 decoder.	Understand	CO 2	AECB03.08
16	Explain the differences between multiplexers and De-multiplexers with the help of neat logic diagrams	Understand	CO 2	AECB03.09
17	Design 4 to 16 decoder using 2 to 4 decoder.	Understand	CO 2	AECB03.08
18	Explain the working of carry look-ahead generator	Understand	CO 2	AECB03.09
19	Define ALU?Explain in detail with the help of circuit diagram.	Understand	CO 2	AECB03.07
20	Explain the design procedure for code converter with the help of example	Understand	CO 2	AECB03.08

PART-C(Problem Solving Critical Thinking Questions)				
1	F(w,x,y,z) = ∑m (1,4,5,6,7,9,14,15) Realize using De-Multiplexer	Remember	CO 2	AECB03.07
2	Design a 4-bit Combinational circuit which generates the output as 2‟s complement of input binary number.	Remember	CO 2	AECB03.07
3	Simplify the following Boolean expressions using K-map and implement it by using NOR gates. a) F(A,B,C,D)= AB‟C‟ +AC+A‟CD‟ b)F(W,X,Y,Z)= w‟ x‟y‟z‟ + wxy‟z‟ + w‟x‟yz + wxyz	Remember	CO 2	AECB03.08
4	Simplify the following using Tabular method. F(A,B,C,D) = ∑(1,5,6,12,13,14)+ d∑ (2,4)	Remember	CO 2	AECB03.08
5	Design a combinatorial circuit that converts a decimal digit from 2,4,2,1 codes to the 8,4,2,1 code?	Remember	CO 2	AECB03.07
6	Design 5-variable k-map. F(A,B,C,D,E)= ∑m(0,1,2,5,6,7,8,9,10,13,14,15,17,19,20)+∑d(3,25,28,30, 31)	Remember	CO 2	AECB03.07
7	4 Design a 4-bit Combinational circuit which generates the output as 1‟s complement of input binary number.	Remember	CO 2	AECB03.08
8	Construct and explain the working of decimal adder.	Remember	CO 2	AECB03.08
9	Realize the Boolean expression for full subtractor.	Remember	CO 2	AECB03.07
10	Use De-Morgan theorem to simplify F=(A+B+C.D.E)	Understand	CO 2	AECB03.07
MODULE III				
PART-A(Short Answer Questions) CIE I				
1	Differentiate combinational and sequential logic circuits?	Remember	CO 3	AECB03.09
2	Differentiate Flip-flop and latch?	Understand	CO 3	AECB03.09
3	Design D-latch using NAND?	Understand	CO 3	AECB03.10
4	Define race around condition? How it can be avoided?	Understand	CO 3	AECB03.10
5	Convert the following JK Flip Flop to using, i) SR ii) T iii) D	Understand	CO 3	AECB03.09
6	Convert the following SR Flip-Flop to using, i) JK ii) D iii) T	Understand	CO 3	AECB03.09
7	Explain what is a synchronous latch?	Understand	CO 3	AECB03.09
8	Construct a latch using universal gates?	Understand	CO 3	AECB03.09
9	Explain what do you mean a stable state?	Understand	CO 3	AECB03.10
10	Define a Flip-Flop?	Understand	CO 3	AECB03.09
PART-A(Short Answer Questions) CIE II				
11	Explain basic difference between a shift register and counter?	Remember	CO 3	AECB03.10
12	Illustrate applications of shift registers?	Remember	CO 3	AECB03.10
13	Define bidirectional shift register?	Remember	CO 3	AECB03.10
14	Define Counter? Applications of counters?	Remember	CO 3	AECB03.11
15	Classify the basic types of counters?	Remember	CO 3	AECB03.11
16	Differentiate the advantages and disadvantages of ripple counters?	Remember	CO 3	AECB03.11
17	Summarize about a dynamic shift register?	Remember	CO 3	AECB03.10
18	Define Synchronous and Asynchronous counter?	Understand	CO 3	AECB03.11

19	Write the differences between synchronous and asynchronous counter?	Understand	CO 3	AECB03.11
20	Define up-down counter?	Understand	CO 3	AECB03.11
PART-B(Long Answer Questions) CIE I				
1	Explain about D and JK flip-flops with functional diagram and Truth tables?	Understand	CO 3	AECB03.09
2	Define T – Flip-flop with the help of a logic diagram and characteristic table?	Understand	CO 3	AECB03.09
3	Define Latch. Explain about Different types of Latches in detail?	Understand	CO 3	AECB03.09
4	Construct the transition table for the following flip-flops i) SRFF ii) DFF	Understand	CO 3	AECB03.09
5	Explain about T And Master Slave Jk flip-flops with functional diagram and Characteristic table?	Understand	CO 3	AECB03.09
6	Explain about RS and JK flip-flops with functional diagram and Characteristic table?	Understand	CO 3	AECB03.09
7	Design a Modulo-10 up Asynchronous counters using T-Flip Flops and draw the Circuit diagram for synchronous mod-10 counter?	Understand	CO 3	AECB03.09
8	Write short notes on shift register? Mention its application along with the Serial Transfer in 4-bit shift Registers?	Understand	CO 3	AECB03.09
9	Write short notes on left shift shift register?	Understand	CO 3	AECB03.09
10	Define T – Flip-flop with the help of a logic diagram and characteristic table?	Understand	CO 3	AECB03.09
PART-B(Long Answer Questions) CIE II				
11	Explain the design of Synchronous Sequential circuit with an example?	Understand	CO 3	AECB03.11
12	Write short notes on shift register? Mention its application along with the Serial Transfer in 4-bit shift Registers?	Understand	CO 3	AECB03.11
13	Explain about Binary Ripple Counter? What is MOD counter?	Understand	CO 3	AECB03.12
14	Design a Modulo-12 up Synchronous counters using T-Flip Flops and draw the Circuit diagram for synchronous mod-12 counter?	Remember	CO 3	AECB03.12
15	Explain the Ripple counter design. Also the decade counters design?	Remember	CO 3	AECB03.11
16	Design a 3 bit ring counter? Discuss how ring counters differ from twisted ring counter?	Understand	CO 3	AECB03.11
17	Design a Johnson counter?	Remember	CO 3	AECB03.11
18	Design Johnson counters and states its advantages and Disadvantages?	Understand	CO 3	AECB03.11
19	Design twisted ring counters and states its advantages and Disadvantages?	Understand	CO 3	AECB03.11
20	Explain with the help of a block diagram, the basic components of a Sequential Circuit?	Understand	CO 3	AECB03.11
PART-C(Problem Solving Critical Thinking Questions) CIE I				
1	Explain the JK and Master slave Flip-flop? Give its timing waveform?	Remember	CO 3	AECB03.10
2	Define JK – Flip-flop with the help of a logic diagram and characteristic table?	Understand	CO 3	AECB03.10
3	Design a sequential circuit with two D flip-flops A and B. and one input x. When, x=0, the state of the circuit remains the same. When, x=1, the circuit goes through the state transition	Understand	CO 3	AECB03.10

	from 00 to 11 to 11 to 10 back to 00.and repeats.			
4	List the characteristic equations for RS,JK,T and data Flip-Flops?	Remember	CO 3	AECB03.10
5	Describe the steps involved in design of asynchronous sequential circuit in detail with an example?	Understand	CO 3	AECB03.10
PART-C(Problem Solving Critical Thinking Questions) CIE II				
6	Design a Twisted Ring counter using JK flip-flop?	Understand	CO 3	AECB03.11
7	Design MOD5 up and Down counter?	Understand	CO 3	AECB03.10
8	Design a MOD-10 synchronous counter using flip flops and Implement it? Also draw the timing diagram?	Understand	CO 3	AECB03.11
9	Design a MOD-8 synchronous counter using flip flops and Implement it? Also draw the timing diagram?	Understand	CO 3	AECB03.11
10	Design and implement 4-bit binary counter (using D flip flops) which counts all possible odd numbers only?	Understand	CO 3	AECB03.11
MODULE-IV				
PART-A(Short Answer Questions)				
1	Illustrate the need of data converters	Remember	CO 4	AECB03.15
2	Illustrate the different type of DAC techniques.	Remember	CO 4	AECB03.15
3	Give applications of data converters.	Understand	CO 4	AECB03.15
4	Give the drawbacks of weighted resistor type DAC	Understand	CO 4	AECB03.16
5	Give the advantages of weighted resistor type DAC.	Understand	CO 4	AECB03.16
6	Calculate the values of the full scale output for an 8 bit DAC for the 0 to 10V range	Understand	CO 4	AECB03.16
7	List the broad classification of ADCs	Understand	CO 4	AECB03.16
8	Explain in brief the principle of operation of successive Approximation	Understand	CO 4	AECB03.15
9	What output voltage would be produced by monolithic DAC whose output range is 0 to 10V and whose input binary is 10111100?	Remember	CO 4	AECB03.15
10	Define off set error in DAC.	Understand	CO 4	AECB03.15
11	What are the main advantages of integrating type ADCs?	Understand	CO 4	AECB03.16
12	Define linearity error in DAC	Understand	CO 4	AECB03.15
13	Explain in brief the principle of operation of successive approximation ADC	Understand	CO 4	AECB03.11
14	List the broad classification of ADCs	Understand	CO 4	AECB03.11
15	Calculate the values of the full scale output for an 8 bit DAC for the 0 to 10V range	Understand	CO 4	AECB03.10
16	Define integrating type ADCs?	Remember	CO 4	AECB03.10
17	Define nonlinearity in output of adc/dac	Remember	CO 4	AECB03.10
18	List out the drawback to overcome charge balancing ADC?	Understand	CO 4	AECB03.11

19	What is settling time	Remember	CO 4	AECB03.10
20	Define full scale error	Remember	CO 4	AECB03.10
PART-B(Long Answer Questions)				
1	Explain the working of a Weighted resistor D/A converter using neat circuit diagram.	Understand	CO 4	AECB03.16
2	Discuss the successive approximation A/D converter and list the advantages of successive approximation A/D converter	Remember	CO 4	AECB03.16
3	Discuss the working principal of a dual slope A/D converter with neat circuit diagram	Understand	CO 4	AECB03.16
4	With neat diagram, explain the working principle of inverter R-2R ladder DAC.	Remember	CO 4	AECB03.16
5	Explain the working of a counter type A/D converter and state it‟s important feature	Understand	CO 4	AECB03.16
6	Describe the specifications, advantages and applications of Digital to Analog converters.	Remember	CO 4	AECB03.16
7	Discuss the specifications, advantages and applications of Analog to Analog Digital converters.	Understand	CO 4	AECB03.16
8	With neat diagram, explain the working principle of R-2R ladder type DAC.	Understand	CO 4	AECB03.16
9	Discuss the operation of parallel comparator type ADC with circuit diagram.	Remember	CO 4	AECB03.16
10	Discuss the operation of comparator type ADC with circuit diagram.	Remember	CO 4	AECB03.16
11	A 10-bit D/A converter have an output range from 0-9v. Calculate the output voltage produced when the input binary number is 1110001010.	Understand	CO 4	AECB03.11
12	Explain the working and principle of a ic1408 with a neat pin diagram	Understand	CO 4	AECB03.11
13	Explain the DAC applications of digital circuit has provide an analog voltage or current to drive an analog device?	Understand	CO 4	AECB03.11
14	Explain the digital ramp ADC by binary counter and allow clock to increment the counter?	Understand	CO 4	AECB03.11
15	Explain settling time, linearity error, resolution	Remember	CO 4	AECB03.11
16	Discuss the function of the EOC signal and SOC signal	Understand	CO 4	AECB03.11
17	Explain and Draw digital ramp ADC and write down its operation.	Remember	CO 4	AECB03.11
18	Describe offset error and its effect on a DAC output.	Understand	CO 4	AECB03.11
19	Explain the application of ADC and DAC in signal reconstruction	Remember	CO 4	AECB03.11
20	Discuss the application of data converters interfacing with the analog world	Understand	CO 4	AECB03.11
PART-C(Problem Solving Critical Thinking Questions)				
1.	Design a dual slope ADC uses a16-bit counter and a 4MHz clock rate. The maximum input voltage is+10v. The maximum integrator output voltage should be-8v when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1 μF Find the value of the resistor R of the integrator.	Remember	CO 4	AECB03.16

2.	Find the voltage at all nodes 0, 1, 2... And at the output of a 5-bit R- 2R ladder DAC. The least Significant bit is 1 and all other bits are equal to 0. Assume VR = -10V and R=10KΩ.	Understand	CO 4	AECB03.16
3.	Design a dual slope ADC uses an 18 bit counter with a 5MHz clock. The maximum integrator input voltage in +12V and maximum integrator output voltage at 2n count is -10V. If R=100KO, find the size of the capacitor to be used for integrator.	Remember	CO 4	AECB03.16
4.	Calculate basic step of 9 bit DAC is 10.3 mV. If 000000000 represents 0V, what output produced if the input is 101101111.	Understand	CO 4	AECB03.16
5.	Calculate the values of the LSB,MSB and full scale output for an 8 bit DAC for the 0 to 10V range.	Remember	CO 4	AECB03.16
6.	Design an ADC converter has a binary input of 0010 and an analog output of 20mv. What is the resolution .	Understand	CO 4	AECB03.16
7.	How many levels are possible in a two bit DAC what is its resolution if the output range is 0 to 3V.	Remember	CO 4	AECB03.16
8.	Design a 4 – bit R-2R ladder type D/A convertor and plot the transfer characteristics that is binary input versus output voltage and calculate the resolution and linearity.	Understand	CO 4	AECB03.16
9	How many levels are possible in a two bit DAC what is its resolution if the output range is 0 to 4V.	Remember	CO 4	AECB03.11
10	Calculate what is the conversion time of a 10 bit successive approximation A/D converter if its 6.85V.	Understand	CO 4	AECB03.16
MODULE- V				
PART-A(Short Answer Questions)				
1	Explain what is PROM?	Remember	CO 5	AECB03.18
2	Explain in detail about RAM and types of RAM?	Understand	CO 5	AECB03.18
3	Illustrate the features of a ROM cell?	Remember	CO 5	AECB03.18
4	Explain in detail about ROM and types of ROM?	Understand	CO 5	AECB03.18
5	Explain is ROM is volatile Memory?	Remember	CO 5	AECB03.18
6	Describe what is meant by memory expansion? Mention its limits?	Understand	CO 5	AECB03.18
7	List a note on magnetic tape?	Remember	CO 5	AECB03.19
8	State the advantages and disadvantages of magnetic tape and Magnetic disk?	Understand	CO 5	AECB03.19
9	Differentiate static and dynamic RAM?	Remember	CO 5	AECB03.19
10	Explain what is the use of cache memory?	Understand	CO 5	AECB03.19
11	Design and explain the following mapping techniques of cache: a) Direct mapping b) Associative mapping	Remember	CO 5	AECB03.19
12	Explain different replacement algorithms in detail?	Understand	CO 5	AECB03.19
13	Explain FPGA?	Remember	CO 5	AECB03.20
14	Differentiate between PROM and EPROM?	Understand	CO 5	AECB03.20
15	Explain CAM?	Remember	CO 5	AECB03.20
16	Explain what is PLA? Explain types of Programmable logic devices with examples?	Understand	CO 5	AECB03.20
17	Explain the capacity of Programmable logic array specified in memory unit?	Remember	CO 5	AECB03.21
18	Explain what are Programmable logic devices and explain in brief?	Understand	CO 5	AECB03.21
19	Explain PLA with the help of block diagram?	Remember	CO 5	AECB03.21

20	Explain the advantage of PROM over PLD?	Understand	CO 5	AECB03.21
PART-B(Long Answer Questions)				
1	List How many address bits are needed to operate a 2 K *8 ROM?	Remember	CO 5	AECB03.18
2.	Differentiate Static RAM cell with Dynamic RAM cell with functional diagrams?	Understand	CO 5	AECB03.18
3.	Explain the read and write operations of Random access memory and how can it perform?	Remember	CO 5	AECB03.18
4.	Explain the operation of DRAM with suitable functional diagram and examples?	Understand	CO 5	AECB03.18
5.	Construct the signals of a 32*8 RAM with control input. Show the external connections necessary to have a 128*8 RAM using decoder and replication of this RAM?	Remember	CO 5	AECB03.18
6.	Implement 2-bit squaring time no of address lines and data lines used in ROM?	Understand	CO 5	AECB03.18
7.	Implement 2-bit multiplication time no of address lines and data lines used in ROM?	Remember	CO 5	AECB03.19
8.	Explain two ways set associative mapping and four way set associative mapping techniques with an example for each?	Understand	CO 5	AECB03.19
9.	Explain how a program gets executed faster using a cache memory?	Remember	CO 5	AECB03.18
10	Design a BCD to Excess-3 code converter and implement using suitable PLA?	Understand	CO 5	AECB03.18
11	Construct the block diagram of PLA. Which are the teams programmable? How inverter is useful in PLA construction at the output?	Remember	CO 5	AECB03.18
12	Sketch the PLA program table for the four Boolean functions. Minimize the number of product terms? $A(x,y,z)=\sum(0,1,3,5)$ $B(x,y,z)=\sum(2,6)$ $C(x,y,z)=\sum(1,2,3,5,7)$ $D(x,y,z)=\sum(0,1,6)$	Understand	CO 5	AECB03.18
13	Sketch a PLA circuit to implement the logic functions A'BC+AB'C+AC' and A' B'C' +BC.	Remember	CO 5	AECB03.18
14	Explain in detail about various cache memory organizations?	Understand	CO 5	AECB03.19
15	Explain in detail about various programmable memory organizations?	Understand	CO 5	AECB03.19
16.	Sketch the ROM for the four Boolean functions. Minimize the number of product terms? $A(x,y,z)=\sum(1,2,4,7)$ $B(x,y,z)=\sum(0,1,3,5,6)$ $C(x,y,z)=\sum(0,2,4,5,7)$ $D(x,y,z)=\sum(3,5,6,7)$	Remember	CO 5	AECB03.18
17	Explain the techniques used to perform the write operations in cache memory?	Understand	CO 5	AECB03.18
18	Explain in detail about the operation of Static RAM cell?	Remember	CO 5	AECB03.18
19	Differentiate PAL with PLA with following examples?	Understand	CO 5	AECB03.18
20	"Memory hierarchy design is based on the principle of Locality of reference". Explain the principle?	Remember	CO 5	AECB03.19
PART-C(Problem Solving Critical Thinking Questions)				
1.	Solve the following two Boolean functions using a PLA having 3-inputs,4 product terms and 2 outputs? $F_1(A,B,C)=\sum(0,1,2,4)$ $F_2(A,B,C)=\sum(0,5,6,7)$	Understand	CO 5	AECB03.20
2.	Design 1k*8 RAM using two 1k*4 IC?	Remember	CO 5	AECB03.20
3.	Solve 2048*8 memories using 256*8 memory chip .Also show the memory address associated with each memory chip?	Understand	CO 5	AECB03.20

4.	Calculate the utilization factor of tape, if the gap length is 0.5in, the storage density S=3000 bytes/in and data storage capacity is 6kbytes?	Remember	CO 5	AECB03.20
5.	A two way set associative cache memory uses block of four words. The cache accommodates a total of 2048 words from main memory. The main memory size is128k*32 i. Find how many bits are there in tag index, block and word field of address format? ii. Find the size of cache memory?	Understand	CO 5	AECB03.18
6.	Solve the following multi Boolean function using 3*4*2 PLA PLD? $F_1(a_2, a_1, a_0)=\sum m(0,1,3,5)$ $F_2(a_2, a_1, a_0)=\sum m(3,5,7)$	Remember	CO 5	AECB03.19
7.	Design and implement 3-bit binary to gray code converter using PLA?	Understand	CO 5	AECB03.19
8.	Calculate the average access time of memory for a computer with cache access time of 100ns,a main memory access of 1000ns and a hit ratio is 0.9?	Remember	CO 5	AECB03.19
9.	A direct mapped cache has the following parameters: cache size=1k words, Block size=128 words and main memory size is 64 k words. Find the number of bits in TAG, WORD and BLOCK in main memory address?	Understand	CO 5	AECB03.18
10.	Design a combinational circuit using PLA. The circuit Accepts3- bit number and generates an output binary number equal to square of input number?	Remember	CO 5	AECB03.21

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