



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

ASSIGNMENT QUESTIONS

Course Title	DIGITAL LOGIC DESIGN			
Course Code	AEC020			
Class	B.TECH III Sem-CSE			
Regulation	IARE-R16			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	1	-	4
Course Coordinator	Mr. K.Ravi, Assistant Professor, ECE			
Course Faculty	Ms. L.Sruthi, Assistant Professor, ECE Ms. V.Bindusree, Assistant Professor, ECE Ms. J.Swetha, Assistant Professor, ECE Ms. Shreyaverma, Assistant Professor, ECE			

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

ASSIGNMENT – I

S. No	Question	Blooms Taxonomy Level	Course Outcome
UNIT-I NUMBER SYSTEMS AND CODES			
1	Convert the following to Decimal and then to Hexadecimal, Octal and Binary? (i) 744_8 (ii) 1552_8 (iii) 11011001_2 (iv) 11110011_2 (v) DEC_{16}	Understand	CAEC020.1
2	Solve the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend: i. $100-110000$ ii. $11010-1101$.	Understand	CAEC020.1
3	Convert the following numbers: i. 10101100111.0101 to Base 10 ii. $(153.513)_{10} = ()_8$	Understand	CAEC020.1
4	Write the gray code equivalent of the Hex Number 3A7?	Remember	CAEC020.2
5	Find the biquinary of number code for the decimal numbers from 0 to 9?	Understand	CAEC020.2
6	Find $(72532 - 03250)$ using 9's complement?	Remember	CAEC020.1
7	Construct a sum of 3 terms: $A'B'C' + ABD + A'C + A'CD' + AC'D + AB'C'$	Remember	CAEC020.1

8	Find the possible terms which could be added to the expression using the consensus theorem. Then reduce to a minimum SOP $A'C'D' + BCD + AB'C'$.	Remember	CAEC020.1
9	State and prove any 4 Boolean theorems with examples?	Understand	CAEC020.1
10	Construct a sum of 3 terms: $A'C'D' + AC' + BCD + A'CD' + A'BC + AB'C'$	Remember	CAEC020.1
11	Solve and add $(28)_{10}$ and $(15)_{10}$ by converting them into binary?	Remember	CAEC020.1
12	Solve and multiply $(101.11)_2$ and $(110.01)_2$ using binary multiplication method?	Understand	CAEC020.2
13	Solve and add two decimal numbers 123 and 658 in excess-3 code?	Remember	CAEC020.1
14	Define unit distance code. Explain binary to grey conversion with an example?	Remember	CAEC020.2
15	Show that grey code is both unit distance and reflective code methods	Remember	CAEC020.2
UNIT-II			
BOOLEAN ALGEBRA AND GATE LEVEL MINIMIZATION			
1	Analyze the function $T(w,x,y,z) = \sum(0,1,2,3,4,6,7,8,9,11,15)$: Find all prime implicants and indicate which are essential through the K- map.	Understand	CAEC020.3
2	Solve the following expression using sum of products method. $(abc)^1 + a(bc)^1 + \text{don't cares } abc + a^1bc^1 + a^1b^1c$	Remember	CAEC020.3
3	Construct the Boolean algebra expression for a getting network that will have outputs 0 only when $X=1, Y=0, Z=0$. The outputs are to be 1 for all other cases.	Remember	CAEC020.4
4	Solve the expression when $f = \sum(5,6,13)$ and $f1 = \sum(0,1,2,3,5,6,8,9,10,11,13)$. Find $f2$ such that $f = f1 \times$	Understand	CAEC020.4
5	Develop the following Boolean function for minimal SOP form using k- map and implementation using NAND gates $F(w, x, y, z)$	Remember	CAEC020.5
6	For the given function $F(w, x, y, z) = \sum(0,1,2,3,4,6,7,8,9,11,15)$ Show the map Find all the prime implicants and indicate which are essential. Find the minimal expression for F and realize using basic	Remember	CAEC020.5
7	Describe don't care conditions and explain its advantage with one simple example by taking a,b,c as the inputs?	Understand	CAEC020.4
8	Summarize the following Boolean function for minimal POS form using K-map and implementation using NOR gates $F(w, x, y, z) = \pi(1,3,11,15) + d(0,2,5)$.	Understand	CAEC020.4
9	Summarize the five variable switching function $F(e, d, c, b, a) = \sum m(3,5,6,8,9,12,13,14,19,22,24,25,30)$	Remember	CAEC020.3
10	Define K-map along with the advantages and disadvantages for k maps?	Understand	CAEC020.5
11	Explain any four basic theorems of Boolean algebra with necessary proofs?	Understand	CAEC020.3
UNIT-III			
DESIGN OF COMBINATIONAL CIRCUITS			
1	Design a combinational logic circuit with three input variables that will produce logic 1 output when more than one input variables are logic 1?	Remember	CAEC020.6
2	Design a combinational circuit that generates the 9's complement of a BCD digit?	Understand	CAEC020.7
3	Design a 4-bit binary to BCD code converter with the help of logic diagram?	Understand	CAEC020.6
4	Design a logic circuit that converts BCD code to gray code?	Remember	CAEC020.7
5	Sketch Half adder using NAND gates and NOR gates.	Understand	CAEC020.6
6	Sketch full subtractor using NAND gates only.	Understand	CAEC020.7

7	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. Find the minterm expansion for the X,Y,Z ii. Find the maxterm expansion for the Y and Z	Remember	CAEC020.9
8	Explain how you design a combinational circuit. Show a combinational circuit for a Binary multiplier?	Understand	CAEC020.10
9	Explain the working of carry look ahead adder generator with the help of a neat circuit diagram?	Understand	CAEC020.11
10.	Solve following Boolean function using decoder and logic OR gate $F1 = \sum m(1,5,6,8,9)$ $F2 = \sum m(2,3,12,13,14,15)$	Understand	CAEC020.10
11	Design a 16:1 MUX using 8:1 MUX?	Remember	CAEC020.11
12	Design full adder circuit using 8:1 MUX?	Understand	CAEC020.11
13	Design a circuit with four inputs and one output where the output is 1 if the Input is divisible by 3 or 7?	Remember	CAEC020.11
14	Design a circuit with three inputs(A,B,C) and two outputs(X,Y) where the outputs are the binary count of the number of "ON" (HIGH) inputs?	Remember	CAEC020.10
UNIT-IV			
DESIGN OF SEQUENTIAL CIRCUITS			
1	Describe the design of Sequential circuit with an example and Show the state table, state diagram for sequential circuits?	Understand	CAEC020.12
2	Explain the analysis of clocked sequential circuits?	Understand	CAEC020.12
3	Explain with the help of a block diagram, the basic components of a Sequential Circuit?	Understand	CAEC020.13
4	Explain about RS and JK flip-flops with the help of circuit diagram and truth tables?	Remember	CAEC020.13
5	Define T – Flip-flop with the help of a logic diagram and characteristic table. Derive a T-flip-flop from JK and D flip-flops?	Understand	CAEC020.13
6	Define Latch and Explain about Different types of Latches in detail?	Understand	CAEC020.13
7	Explain about S-R,J-K,T,D flip flops in detail with diagrams?	Remember	CAEC020.13
8	Describe the characteristic equations for all Flip-Flops?	Understand	CAEC020.13
9	Differentiate combinational circuits with sequential circuit?	Understand	CAEC020.12
10	Explain the working principle of JK Flip-Flop in detail?	Remember	CAEC020.13
11	Explain the state reduction and state assignment in designing sequential circuit. Consider one example in the above process?	Remember	CAEC020.12
12	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 from 00 to 11 to 11 to 10 back to 00 and repeats?	Remember	CAEC020.13
13	Discuss about Serial Transfer in 4-bit shift Registers?	Remember	CAEC020.14
14	Explain about Binary Ripple Counter?	Remember	CAEC020.14
15	Define BCD counter and draw its State table for BCD Counter?	Understand	CAEC020.14
16	Explain about 4-bit Universal Shift Registers?	Understand	CAEC020.14
17	Design a Modulo-12 up Synchronous counter using T-Flip Flops and draw the circuit diagram?	Understand	CAEC020.14
18	Explain the Ripple counter design. Also design a decade counter. ?	Understand	CAEC020.14
19	Define race around condition? How it can be avoided?	Understand	CAEC020.14
20	Explain how is race around condition satisfied by master slave flip-flops?	Understand	CAEC020.14
21	Explain the difference between asynchronous and synchronous sequential circuits?	Understand	CAEC020.14

UNIT-V MEMORY			
1	Explain the block diagram of memory unit along with memory hierarchy concepts?	Understand	CAEC020.15
2	Explain in detail about RAM? Explain about types of RAM memories?	Remember	CAEC020.15
3	Distinguish between SRAM and DRAM .Also draw static RAM cell.	Understand	CAEC020.15
4	List and explain the different types of read only memory cell?	Understand	CAEC020.15
5	Design 1K X 8 RAM using 2 1K X 4 IC's?	Remember	CAEC020.16
6	For 120 track tape with storage density per track of 100 Kb /in and tape speed of 50 inches per second .calculate the maximum data transfer rate if tape length is 450 feet. Also calculate the storage capacity of the tape.	Remember	CAEC020.16
7	State the advantages and disadvantages of magnetic tape?	Understand	CAEC020.15
8	Explain the three types of mapping procedures related to cache memory organization at length?	Remember	CAEC020.15
9	Explain cache memory? Why has it become an integrated part of modern CPU's? What is a hit and miss ratio CPU? What is meant by hit ratio?	Remember	CAEC020.15
10	Explain the main advantages and disadvantages of making the size of cache blocks larger or smaller?	Remember	CAEC020.15
11	Design a BCD to Excess-3 code converter and implement it by using suitable PLA diagram?	Remember	CAEC020.16
12	“Memory hierarchy design is based on the principle of Locality of Reference”. Explain the principle of locality of reference?	Understand	CAEC020.16

**HEAD OF THE DEPARTMENT,
COMPUTER SCIENCE AND ENGINEERING.**