INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

ASSIGNMENT

Course Name	**DIGITAL LOGIC DESIGN**
Course Code	A30401
Class	II B. Tech I Semester
Branch	Computer Science Engineering
Year	2016 - 17
Course Coordinator	Mr.Krishnaiah,Professor, CSE
Course Faculty	Mrs.C.Deepthi, Associate Professor, ECE Mr. C. Srihari, Assistant Professor, ECE Ms. Parvathy Sreekumar, Assistant Professor, ECE Mr. R.Gangadhar Reddy, Assistant Professor, CE

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 & II

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT-I **DIGITAL**		
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)$DEC6_{16}$	understand	1
2	**Solve** the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend: i. $100 – 110000$ ii. $11010 - 1101$.	Apply	1
3	**Convert** the following numbers: i. 10101100111.0101 to Base 10 ii. $(153.513)10 = ( )8$	Understand	1
4	**Write** the gray code equivalent of the Hex Number 3A7?	Analyze	1
5	**Find** the biquinary of number code for the decimal numbers from 0 to 9?	Apply	1
6	**Find** (72532 - 03250) using 9's complement?	Apply	1
7	**Construct** a sum of 3 terms: A'B'C' +ABD+A'C +A'CD' +AC'D +	Apply	4

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'	Apply	4
9	**State** and prove any 4 Boolean theorems with examples?	Knowledge	3
10	**Construct** a sum of 3 terms: A'C'D' +AC' +BCD + A'CD' + A'BC +	Apply	4
11	**Solve** and add $(28)_{10}$ and $(15)_{10}$ by converting them into binary?	Apply	2
12	**Solve** and multiply $(101.11)_2$ and $(110.01)_2$ using binary multiplication method?	Apply	2
13	**Solve** and add two decimal numbers 123 and 658 in exces-3 code?	Apply	2
14	**Define** unit distance code. Explain binary to grey conversion with an example?	Knowledge	3
15	**Show** that grey code is both unit distance and reflective code?	Apply	3

UNIT-II
GATE LEVEL

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	Apply	8
2	**Solve** the following expression using sum of products method. (abc)'+a(bc)' +don't cares abc+a'bc'+a'b'c	Apply	5
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.	Apply	5
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 x	Understand	5
5	**Develop** the following Boolean function for minimal SOP form using k-map and implementation using NAND gates F(w, x, y,	Apply	4
6	For the given function F(w, x, y, z)=$\sum$(0,1,2,3,4,6,7,8,9,11,15) i)**Show** the map ii)**Find** all the prime implicants and indicate which are essential iii)**Find** the minimal expression for F and realize using basic	Apply	3
7	**Describe** don't care conditions and explain its advantage with example	Understand	5
8	**Summarize** the following Boolean function for minimal POS form using K- map and implementation using NOR gates F(w, x, y, z) = π(1,3,11,15) + d(0,2,5).	Apply	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)	Apply	8
10	**Define** K-map along with the advantages and disadvantages?	Knowledge	8
11	**Explain** any four basic theorems of Boolean algebra with necessary proofs.	Understand	8

UNIT-III
COMBINATIONAL

1	**Design** a combinational logic circuit with three input variables that will produce a logic 1 output when more than one input variables are logic 1?	Apply	7
2	**Design** a combinational circuit that generates the 9's complement of a BCD digit?	Apply	3
3	**Design** a 4-bit binary to BCD converter?	Apply	3
4	**Design** a logic circuit to convert BCD to gray code?	Apply	3
5	**Sketch** Half adder using i)NAND gates ii)NOR gates	Apply	3
6	**Sketch** full subtractor using NAND gates only.	Apply	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
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	Apply	7
8	**Explain** how you design a combinational circuit. Show a combinational circuit for a Binary multiplier.	Understand	7
9	**Explain** the working of carry look ahead generator	Understand	7
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	3
11	**Design** a 16:1 MUX using 8:1 MUX?	Apply	7
12	**Design** full adder circuit using 8:1 MUX?	Apply	7
13	**Design** a circuit with four inputs and one output where the output is 1 if the Input is divisible by 3 or 7?	Apply	7
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?	Apply	7

UNIT-IV
SYNCHRONOUS SEQUENTIAL

1	**Explain** the design of Sequential circuit with an example. Show the state reduction, state assignment?	Understand	6
2	**Explain** the analysis of clocked sequential circuits?	Understand	7
3	**Explain** with the help of a block diagram, the basic components of a Sequential Circuit?	Understand	7
4	**Explain** about RS and JK flip-flops?	Understand	6
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?	Knowledge	6
6	**Define** Latch. Explain about Different types of Latches in detail?	Knowledge	6
7	**Explain** about all flip flops in detail with diagram?	Remember	6
8	**Describe** the characteristic equations for all Flip-Flops?	Understand	6
9	**Differentiate** combinational and sequential circuit?	Understand	6
10	**Explain** the working principle of JK Flip-Flop in detail?	Apply	6
11	**Explain** the state reduction and state assignment in designing sequential circuit. Consider one example in the above process?	Apply	7
12	**Design** a sequential circuit with two D ip-ops 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?	Apply	7
13	**Explain** about Serial Transfer in 4-bit shift Registers?	Apply	7
14	**Explain** about Binary Ripple Counter?	Apply	7
15	**Define** BCD counter and draw its State table for BCD Counter?	Knowledge	7
16	**Explain** about 4-bit Universal Shift Registers?	Apply	7
17	**Design** a Modulo-12 up Synchronous counter using T-Flip Flops and draw the circuit diagram?	Apply	10
18	**Explain** the Ripple counter design. Also design a decade counter. ?	Apply	10
19	**Define** race around condition? How it can be avoided?	Knowledge	10
20	**Explain** how is race around condition satisfied by master slave flip-flops?	Apply	10
21	**Explain** the difference between asynchronous and synchronous sequential circuits?	Apply	10

	UNIT-V MEMO		
1	**Explain** the block diagram of memory unit along with memory hierarchy concepts?	Apply	9
2	**Explain** in detail about RAM? Explain about types of RAM memories?	Apply	9
3	**Distinguish** between SRAM and DRAM .Also draw static RAM cell.	Understand	9
4	**List** and explain the different types of ROM	Knowledge	9
5	**Design** 1K X 8 RAM using 2 1K X 4 IC's	Apply	10
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.	Apply	10
7	**State** the advantages and disadvantages of magnetic tape.	Knowledge	10
8	**Explain** the three types of mapping procedures related to cache memory organization at length.	Apply	9
9	**Explain** cache memory? Why has it become an integrated part of modern CPU's? what is a hit and miss? What is meant by hit ratio?	Apply	9
10	**Explain** the main advantages and disadvantages of making the size of cache blocks larger or smaller?	Apply	10
11	**Design** a BCD to Excess-3 code converter and implement using suitable PLA.	Apply	9
12	''Memory hierarchy design is based on the principle of Locality of Reference''. **Explain** the principle.	Apply	9

Prepared By: Mr F K Pavan Kumar

Mr C Srihari

HOD, COMPUTER SCIENCE AND ENGINEERING