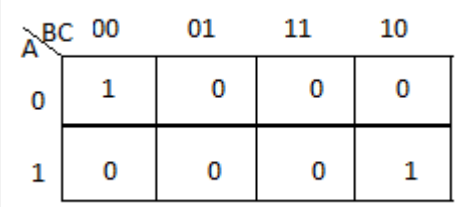
Group - A (Short Answer Questions)

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome
	UNIT-I **DIGITAL SYSTEMS**		
1	**Write** short notes on binary number systems?	Understand	1
2	**Discuss** 1's and 2's complement methods of subtraction?	Understand	1
3	**Discuss** octal number system?	Understand	1
4	**State** and prove transposition theorem?	Knowledge	1
5	**Explain** how do you convert AOI logic to NAND logic?	Understand	2
6	**Write** a short note on five bit BCD codes?	Understand	2
7	**Explain** the specialty of unit –distance code? State where they are used?	Understand	2
8	**Write** a short note on error correcting codes?	Understand	2
9	**State** and prove De-Morgan theorem?	Knowledge	3
10	**Discuss** what a logic design is and what do u mean by positive logic system?	Understand	2
11	**Convert** (4085)9 into base-5?	Understand	1
12	**Write** the first 20 decimal digits in base 3?	Understand	1
13	**Write** the steps involved in unsigned binary subtraction using complements with examples?	Understand	2
14	**Explain** the addition of two signed binary number along with examples?	Understand	2
15	**Differentiate** between binary code and BCD code?	Understand	3
16	**Explain** how binary values are stored in memory?	Understand	2
17	**Write** the Axiomatic Definitions of Boolean Algebra?	Understand	3

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome
18	**Write** a table stating all the postulates and theorems of Boolean Algebra that are required for logic minimization?	Understand	3
19	**Convert** f(x)= x + y'z into canonical form?	Understand	3
20	**State** and prove idempotent laws of Boolean algebra?	Knowledge	3
	UNIT-II **GATE LEVEL MINIMIZATION AND COMBINATION CIRCUITS**		
1	**Define** K-map? Name its advantages and disadvantages?	Knowledge	5
2	**Write** the block diagram of 2-4 and 3-8 decoders?	Understand	8
3	**Define** magnitude comparator?	Knowledge	5
4	**Describe** what do you mean by look-ahead carry?	Understand	5
5	**Summarize** the Boolean function **x′yz + x′yz′ + xy′z′ + xy′z** using K-map?	Understand	4
6	**Explain** how combinatorial circuits differ from sequential circuits?	Understand	5
7	**Explain** what are the IC components used to design combinatorial circuits with MSI and LSI?	Understand	5
8	**Design** the two graphic symbols for NAND gate?	Understand	6
9	**Design** the two graphic symbols for NOR gate?	Understand	6
10	**Summarize** the Boolean function**x′yz + x′yz′ + xy′z′ + xy′z** without using K-map?	Understand	4
11	**Explain** the properties of EX-OR gate?	Understand	6
12	**Solve** the function of fig with AND-OR INVRET implementations?  	Apply	4
13	**Solve** the following using NAND gates? a) (A+B)(C+D) b) A.B+CD(AB^{I}+CD)	Apply	4
14	**Sketch** the following equation using k-map and realize it using NAND gate? Y=∑m(4,5,8,9,11,12,13,15)	Apply	5
15	**Solve Y=AB^{I}+CD+(A^{I}B+C^{I}D^{I})** using NAND gate?	Apply	4
16	**State** that AND-OR network is equivalent to NAND-NAND network?	Knowledge	4
17	**Show** both NAND and NOR gates are called Universal gates?	Apply	4
18	**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)	Apply	5
19	**Summarize** the rules and limitations of K-map simplification?	Understand	5
20	**Analyze** the steps for simplification of POS expression?	Apply	4
	UNIT-III **COMBINATIONAL CIRCUITS**		
1	**Explain** the design procedure for combinational circuits?	Understand	7
2	**Apply** various code conversion methods?	Apply	7
3	**Design** a 4-bit binary to BCD converter?	Understand	7
4	**Design** and implement a 8421 Gray code converter?	Understand	7
5	**Design** a combinational logic circuit with 3 input variables that will produce logic 1 output when more than one input variables are logic 1?	Understand	7
6	**Compose** and explain the block diagram of 4-bit parallel adder?	Understand	7
7	**Design** a logic circuit to convert BCD and gray code?	Understand	7

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome
8	**Design** a full adder using two half adders?	Understand	7
9	**Explain** magnitude comparator? Design a 3-bit comparator using logic gates?	Understand	7
10	**Compose** the circuit for 3 to 8 decoder and explain it with logic gate?	Understand	7
11	**Construct** the logic circuit for full subtractor using decoder?	Understand	7
12	**Define** binary decoder? Explain the working of 2:4 binary decoder?	Knowledge	7
13	**Design** Full adder using a suitable Decoder?	Apply	7
14	**Define** encoder? Design octal to binary encoder?	Knowledge	7
15	**Design** a 4-bit priority encoder?	Understand	7
16	**Design** the block diagram of a 4:1 multiplexer using 2:1 multiplexer?	Understand	7
17	**Summarize** the following Boolean function using 8:1 mux F(A,B,C,D)=πM(0,3,5,8,9,10,12,14)	Knowledge	7
18	**Explain** how decoder acts as a demultiplexer?	Understand	7
19	**Differentiate** multiplexer and demultiplexer?	Apply	7
20	**Explain** the working of 8:1 multiplexer?	Understand	7
	UNIT-IV **SYNCHRONOUS SEQUENTIAL CIRCUITS**		
1	**Differentiate** combinational and sequential logic circuits?	Apply	6
2	**Explain** basic difference between a shift register and counter?	Understand	6
3	**Illustrate** applications of shift registers?	Apply	6
4	**Define** bidirectional shift register?	Knowledge	6
5	**Describe** dynamic shift register?	Knowledge	6
6	**Define** What is a UART?	Knowledge	6
7	**Classify** the basic types of counters?	Understand	6
8	**Differentiate** the advantages and disadvantages of ripple counters?	Apply	6
9	**Explain** what do you mean by terminal count?	Understand	6
10	**Explain** what is a variable modulus counter?	Understand	6
11	**Design** and explain gated latch logic diagram?	Understand	8
12	**Define** race around condition? How it can be avoided?	Knowledge	8
13	**Convert** a JK Flip Flop to i) SR ii) T iii) D	Understand	6
14	**Convert** a SR Flip-Flop to i) JK ii) D iii) T	Understand	6
15	**Explain** what is a synchronous latch?	Understand	6
16	**Construct** a latch using universal gates?	Apply	8
17	**Explain** what do you mean a stable state?	Understand	8
18	**Define** a Flip-Flop?	Knowledge	6
19	**Define** applications of Flip-Flops?	Knowledge	6
20	**Explain** what is meant by clocked flip-flop?	Understand	6
	UNIT-V **MEMORY**		
1	**Explain** the block diagram of memory unit?	Understand	9
2	**Explain** in detail about RAM and types of RAM?	Understand	9
3	**Illustrate** the features of a ROM cell?	Apply	9
4	**Explain** in detail about ROM and types of ROM?	Understand	9
5	**Explain** coincident memory decoding?	Understand	9
6	**Describe** what is meant by memory expansion? Mention its limits?	Understand	9
7	**List** a note on magnetic tape?	Knowledge	9
8	**State** the advantages and disadvantages of magnetic tape and magnetic disk?	Knowledge	9
9	**Differentiate** static and dynamic RAM?	Apply	9
10	**Explain** what is the use of cache memory?	Understand	9
11	**Design** and explain the following mapping techniques of cache: a) Direct mapping b) Associative mapping	Understand	9

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome
12	**Explain** different replacement algorithms in detail?	Understand	9
13	**Explain** LRU algorithm in detail?	Understand	9
14	**List** and explain write policies used with cache memory?	Knowledge	9
15	**List** a note on performance issues of multilevel memory?	Knowledge	9
16	**Explain** HIT and MISS ratio in cache memory?	Understand	9
17	**Explain** the use of an associative-mapped TLB?	Understand	9
18	**Design** and explain how cache read operation is executed?	Understand	9
19	**Explain** PLA with the help of block diagram?	Understand	9
20	**Explain** the advantage of PLA over ROMs?	Understand	9

Group - II (Long Answer Questions)

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT-I **DIGITAL SYSTEMS**		
1	(a) **Solve** the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend: i.100 – 110000 ii. 11010 - 1101. (b) **Construct** a table for 4 -3 -2 -1 weighted code and write 9154 using this code .Write short notes on binary number systems.	Apply	1
2	(a) **Solve** arithmetic operation indicated below. Follow signed bit notation: i. 001110 + 110010 ii. 101011 - 100110. (b) **Explain** the importance of gray code?	Apply	1
3	**Solve** $(3250 - 72532)_{10}$ using 10's complement?	Apply	1
4	As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. Green LED display turns on if all three gears are properly extended when the \gear down" switch has been activated in preparation for landing. Red LED display turns on if any of the gears fail to extend properly prior to landing. When a landing gear is extended, its sensor produces a LOW voltage. When a landing gear is retracted, its sensor produces a HIGH voltage. **Design** a circuit to meet this requirement?	Understand	1
5.	**Solve** (a) Divide 01100100 by 00011001 (b) Given that (292)10 =(1204)b determine `b'	Apply	1
6.	**Solve** (a) What is the gray code equivalent of the Hex Number 3A7 (b) Find the biquinary number code for the decimal numbers from 0 to 9 (c) Find 9's complement $(25.639)_{10}$	Apply	1
7.	**Solve** (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.	Apply	1
8.	Decimal system became popular because we have 10 fingers. A rich person On earth has decided to distribute Rs. one lakh equally to the following persons from various planets. **Find** out the amount each one of them will get in their respective currencies: A from planet VENUS possessing 8 fingers B from planet MARS possessing 6 fingers C from planet JUPITER possessing 14 fingers D from planet MOON possessing 16 fingers	Apply	1
9.	**State** and prove any 4 Boolean theorems with examples?	Knowledge	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
10.	**Solve** a) Simplify to a sum of 3 terms: A'C'D'+AC'+BCD+A'CD'+A'+AB'C' Given AB' + AB = C, Show that AC' + A'C = B	Apply	4
11	**Convert** 10101101.0111 to octal equivalent and hexadecimal equivalent?	Understand	1
12	**Apply** the representation of +65 and -65 in sign magnitude, Sign 1's complement and sign 2's complement representation?	Apply	1
13	**State** different ways for representing the signed binary numbers?	Knowledge	2
14	**Solve** addition and subtraction of (456)8 and (341)8?	Apply	1
15	**Define** weighted codes and non weighted codes with examples?	Knowledge	1
16	**Explain** what do you mean by error detecting and correcting codes?	Understand	3
17	**Illustrate** the rules for XS3 addition and subtraction?	Apply	2
18	**Explain** error occurred in the data transmission can be detected using parity bit?	Understand	3
19	**Illustrate** IEEE standard floating formats for 32-bit and 64 bit with following examples?	Apply	1
20	**Explain** the truth tables of X-OR, NAND and NOR gates?	Understand	2
	UNIT-II **GATE LEVEL MINIMIZATION AND COMBINATION CIRCUITS**		
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 minterm expansion for the X,Y,Z ii. **state** the maxterm expansion for the Y and Z	Knowledge	3
2.	A combinational circuit has four inputs (A,B,C,D), which represent a binary-coded-decimal digit. The circuit has two groups of four outputs - S,T,U,V(MSB digit) and W,X,Y,Z.(LSB digit)Each group represents a BCD digit. The output digits represent a decimal number which is five times the input number. **Illustrate** the minimum expression for all the outputs?	Apply	3
3.	**Summarize** the following Boolean expressions using K-map and implement them 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.	Understand	4
4.	**Design** BCD to Gray code converter and realize using logic gates?	Understand	4
5.	**Design** 2*4 decoder using NAND gates?	Understand	4
6.	**compile** the following expression using Karnaugh map (B 'A + A'B + AB')	Understand	5
7.	**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?	Understand	4
8.	**Implement** the INVERTER gate, OR gate and AND gate using NAND gate, NOR gate?	Understand	3
9.	**Design** a circuit with four inputs and one output where the output is 1 if the input is divisible by 3 or 7?	Understand	4
10.	**Implement** Half adder using 4 NAND gates?	Understand	3
11	**Implement** the Boolean function F = AB + CD + E using NAND gates only?	Understand	3
12	**Summarize** the Boolean function F(w, x, y, z) = Σ(1, 3, 7, 11, 15) + d(w, x, y, z) = Σ(0. 2, 5)	Understand	4
13	**Construct** the logic diagram of a full subtractor using only 2-input NAND gates?	Apply	3
14	**Construct** the logic diagram of a full subtractor using only 2-input NOR gates?	Apply	3
15	**Use** a multiplexer having three data select inputs to solve the logic for the function F = Σ (0, 1, 2, 3, 4, 10, 11, 14, 15)	Apply	4
16	**Identify** all the prime implicants and essential prime implicants of the	Knowledge	5

S. No	Question	Blooms Taxonomy Level	Course Outcome
	following functions Using karnaugh map. F(A,B,C,D) = Σ(0,1,2,5,6,7,8,9,10,13,14,15).		
17	**Construct** a 4 to 16 line decoder using 2 to 4 line decoders?	Apply	3
18	Design a 4-bit Combinational circuit which generates the output as 2's complement of input binary number. Show that the circuit can be constructed with EX-OR gates?	Understand	3
19	**Design** a combinatorial circuit that converts a decimal digit from 2,4,2,1 code to the 8,4,-2,-1 code?	Understand	4
20	**Design** a combinatorial circuit that accepts a three bit number and generates an output Binary number equal to the square of the input number?	Understand	4
	UNIT-III **COMBINATIONAL CIRCUITS**		
1.	**Design** a combinational circuit that generates the 9's complement of BCD digit?	Understand	7
2.	**Design** a combinational circuit to find the 2's complement of given binary number and realize using NAND gates?	Understand	7
3.	**Design** a logic circuit to convert gray code to binary code?	Understand	7
4.	**Design** circuit to detect invalid BCD number and implement using NAND gate only?	Understand	7
5.	**Explain** the design procedure for code converter with the help of example?	Understand	7
6.	**Construct** half subtractor using NAND gates?	Apply	7
7.	**Design** an 8-bit adder using two 74283?	Understand	7
8.	**Explain** the working of carry look-ahead generator?	Understand	10
9.	**Explain** carry propagation in parallel adder with neat diagram?	Understand	7
10.	**Explain** the circuit diagram of full subtractor and full adder?	Understand	7
11	**Construct** and explain the working of decimal adder?	Apply	7
12	**Design** 2-digit BCD adder with the help of binary adders?	Understand	7
13	**Design** Multiply 011_2 by 110_2 using binary multiplication method?	Understand	7
14	**Design** 4-bit comparator using logic gates?	Understand	7
15	**State** the procedure to implement Boolean function using decoder and also mention the uses of decoders?	Knowledge	7
16	**Design** and implement a full adder circuit using a 3:8 decoder?	Understand	7
17	**Describe** the operation performed by the following logic circuit with an example. Encoder?		7
18	**Design** and Implement full adder circuit using Quadruple 2 to 1 multiplexer?	Understand	7
19	**Construct** 16:1 multiplexer using 8:1 and 2:1 multiplexer?	Apply	7
20	**Construct** a full adder using a suitable multiplexer?	Apply	7
	UNIT-IV **SYNCHRONOUS SEQUENTIAL CIRCUITS**		
1.	**Explain** the design of Sequential circuit with an example. Show the state reduction, state assignment?	Understand	6
2.	**Write** short notes on shift register? Mention its application along with the Serial Transfer in 4-bit shift Registers?	Understand	6
3.	**Explain** about Binary Ripple Counter? What is MOD counter?	Understand	10
4.	**Define** BCD Counter and Draw its State table for BCD Counter?	Knowledge	6
5.	**Explain** the state reduction and state assignment in designing sequential circuit. Consider one example in the above process?	Understand	10
6.	**Design** a sequential circuit with two D flip-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?	Understand	6
7.	**Design** a Modulo-12 up Synchronous counter Using T-Flip Flops and draw	Understand	6

S. No	Question	Blooms Taxonomy Level	Course Outcome
	the Circuit diagram?		
8.	**Explain** the Ripple counter design. Also the decade counter design?	Understand	10
9.	**Design** a 3 bit ring counter? Discuss how ring counters differ from twisted ring counter?	Understand	6
10	**Design** a left shift and right shift for the following data 10110101?	Understand	6
11	**Design** Johnson counter and state its advantages and disadvantages?	Understand	6
12	**Explain** with the help of a block diagram, the basic components of a Sequential Circuit?	Understand	6
13	**Explain** about RS and JK flip-flops?	Understand	6
14	**Define** T – Flip-flop with the help of a logic diagram and characteristic table?	Knowledge	6
15	**Define** Latch. Explain about Different types of Latches in detail?	Knowledge	6
16	**Illustrate** pulse mode asynchronous circuit?	Apply	10
17	**List** the characteristic equations for all Flip-Flops?	Knowledge	6
18	**Construct** the transition table for the following flip-flops i) SR FF ii) D FF	Apply	6
19	**Describe** the steps involved in design of asynchronous sequential circuit in detail with an example?	Understand	10
20	**Differentiate** critical and non critical race conditions?	Apply	10
	UNIT-V MEMORY		
1.	**List** How many address bits are needed to operate a 2 K *8 ROM?	Knowledge	9
2.	**Construct** a logic diagram of memory cell?	Apply	9
3.	**Distinguish** between SRAM and DRAM and draw static RAM cell?	Understand	9
4.	**Explain** the read and write operation a RAM can perform?	Understand	9
5.	**Explain** the DRAM organization of 2M*8 memory chip?	Understand	9
6.	**Constuct** 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?	Apply	9
7.	A block set associative cache consists of 64 blocks divided into 4 block sets. The main memory contains 4096 blocks, each consists of 128 words of 16 bits length? **list** many bits are there in main memory **list** many bits are there in each of TAG,SET, and WORD fields?	Knowledge	9
8.	**Explain** the following terms: i) Cache updation policies. ii)cache hit and cache miss.	Understand	9
9.	**Explain** two way set associative mapping and four way set associative mapping techniques with an example for each?	Understand	9
10.	**Explain** how a program gets executed faster using a cache memory?	Understand	9
11	**Design** a BCD to Excess-3 code converter and implement using Suitable PLA?	Understand	9
12	**Construct** the block diagram of PLA. Which are the teams programmable? How inverter is useful in PLA construction at the output?	Apply	9
13	**Sketch** the PLA program table for the four Boolean functions. Minimize the number of product terms? $A(x,y,z)=\sum(0,1,3,5)$ $B(x,y,z)=\sum(2,6)$ $C(x,y,z)=\sum(1,2,3,5,7)$ $D(x,y,z)=\sum(0,1,6)$	Apply	9
14	**Sketch** a PLA circuit to implement the logic functions $A^IBC+AB\ ^IC+AC^I$ and $A^I\ B^I\ C^I+BC$.	Apply	9
15	**Explain** in detail various cache memory organizations?	Understand	9
16	In many computers the cache block size is in the range 32 to 128 bytes.	Understand	9

S. No	Question	Blooms Taxonomy Level	Course Outcome
	Explain What would be the main advantages and disadvantages of making the size of cache blocks larger or smaller?		
17	**Explain** the techniques used to perform the write operations in cache memory?	Understand	9
18	**Explain** about the cache replacement algorithms?	Understand	9
19	**Differentiate** PAL with PLA with following examples?	Understand	9
20	"Memory hierarchy design is based on the principle of Locality of reference". **Explain** the principle?	Understand	9

Group - III (Analytical Questions)

S.No	QUESTIONS	Blooms Taxonomy Level	Course Outcome
	UNIT-I **DIGITAL SYSTEMS**		
1.	In a 32 bit computer, what are the maximum and minimum possible binary numbers? **Convert** these into maximum and minimum possible positive decimal numbers?	Understand	1
2.	**Convert** the octal numbers into binary,decimal,BCD and Hexadecimal numbers (3600)octal,(1200)octal,(0200)octal,(0777)octal.	Understand	1
3.	**Convert** the decimal numbers into binary, BCD and Hexadecimal numbers (3600)d, (1200)d, (0200)d, (0777)d.	Understand	1
4.	Suppose you have a cheque for RS.10000/-.what is the number system used? **Define** base system used and what are the weights of the digits 1,0,0,0,0 and 0 now?	Knowledge	1
5.	**Illustrate** why is (0.5252)octal twice of (0.2525)octal when (0.5050)d is twice of (0.2525)d.	Apply	1
6.	**write** the octal representation of the following fractional numbers:(0.5)d,(1.5)d, (2.333)d,(3.875)d, (13.125)d, (14.666)d.	Understand	1
7.	**Find** the illegal representation in the following: (120A)d, (1010011)BCD, (0208)octal, (10102011)b, (GC0A)h.	Understand	1
8.	**Convert** the binary number to hexadecimal number: 0100001011010011,010110101001111.	Understand	1
9.	**Convert** the hexadecimal number to binary number: 0x5A9F, 42D3.	Understand	1
10	**Understand** by two examples that two's compliment of a number taken twice returns the original number?	Understand	2
	UNIT-II **GATE LEVEL MINIMIZATION AND COMBINATION CIRCUITS**		
1.	**Use** De-morgan theorem to simplify F=A+B+C.D.E.	Apply	3
2.	**State** that for constructing XOR from NANDs we need four NAND gates?	Knowledge	3
3.	**State** X+ (Y.Z) = (X+Y). (X+Z) = (X+Y).(X+Y+Z) a distributive law using De-Morgan theorem?	Knowledge	5
4.	**Convert** A.B.C+A.D expression into standard SOP format?	Understand	4
5.	**Convert** (A+B+C).(A+D) expression into standard POS format?	Understand	4
6.	**Construct** XOR from NOR gates?	Understand	3
7.	**Construct** SOP expression and POS expression for a four input NAND gate?	Understand	4
8.	**Understand** Excess-3 codes for 3 and 7?	Understand	3
9.	**Find** the logic function F using AND-OR two level realization?	Understand	4
10	**Find** transmitted 11 bits for 0110001 when hamming code is used?	Understand	4

S.No	QUESTIONS	Blooms Taxonomy Level	Course Outcome
	UNIT-III **COMBINATIONAL CIRCUITS**		
1.	**Design** a combinational logic circuit that produces the product of 2 binary number ? $A=(A_1,A_0)*B=(B_2, B_1, B_0)$	Understand	7
2.	**Solve** the function using multiplexer $F(x,y,z)=\sum(0,2,6,7)$	Apply	7
3.	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	Understand	7
4.	**Design** a combinational logic circuit with 4 inputs A, B, C, D. The output Y goes High if and only if A and C inputs go High. Draw the truth table. Minimize the Boolean function using K-map. Draw the circuit diagram?	Understand	7
5.	**Design** a logic circuit to convert excess-3 code to BCD code?	Understand	7
6.	**Design** a 24-bit group ripple adder using 74X283 ICs?	Understand	7
7.	**Design** a multiple circuit to multiply the following binary number $A=A_0A_1A_2$ and $B=B_0B_1B_2B_3$ using required number of binary parallel adders?	Understand	7
8.	**Solve** the following Boolean functions using decoder and OR gates: $F_1(A,B,C,D)=\sum(2,4,7,9)$ $F_2(A,B,C,D)=\sum(10,13,14,15)$	Apply	7
9.	**Design** the interfacing diagram of 10 key keypad interfaces to digital system using decimal to BCD encoder?	Understand	7
10	**Solve** the following Boolean function using 4:1 mux $F(A,B,C,D)=\sum m(1,3,5,7,8,9,0,2,10,12,13)$	Apply	7
	UNIT-IV **SYNCHRONOUS SEQUENTIAL CIRCUITS**		
1.	**Explain** the output frequency of T filp-flop if the input clock frequency is 10khz? Give its timing waveform?	Apply	6
2.	A sequential circuit has 3 flip-flops, A,B and C and one input ,X .it is described by the following flip flop input functions? $D_A=(BC^I+B^IC)x+(BC+B^I C^I)x^I$ $D_B=A$ $D_C=B$ i)**Derive** the state table for circuit ii)**Draw** two state diagrams: One for x=0 and for x=1		6
3.	**Design** and implement 4-bit binary counter(using D flip flops) which counts all possible odd numbers only?	Understand	6
4.	**Find** the state assignments for sequence 1101011?	Understand	10
5.	**Design** 2's complementer with a shift register and flip flop. The binary number is shifted outside and its 2's complement shifted other side of the shift register?	Understand	6
6.	**Design** a MOD-5 synchronous counter using flip flops and implement it? Also draw the timing diagram?	Understand	6
7.	**Design** a divide-by-128 counter using 7493 IC's?	Understand	10
8.	**Design** an asynchronous sequential circuit with two inputs X and Y and with one output Z. Whenever Y is 1, input X is transferred to Z. When Y is 0 , The output does not change for any change in X?	Understand	10
9.	**Design** an asynchronous D-type latch with two inputs G and D output Q. Assume fundamental mode of operation?	Understand	6
10	**Design** a T flip flop from logic gates?	Understand	6
	UNIT-V **MEMORY**		

S.No	QUESTIONS	Blooms Taxonomy Level	Course Outcome
1.	**Solve** the following two Boolean functions using a PLA having 3-inputs,4 product terms and 2 outputs? $F_1(A,B,C)=\sum(0,1,2,4)$ $F_2(A,B,C)=\sum(0,5,6,7)$	Apply	9
2.	**Design** 1k*8 RAM using two 1k*4 IC?	Understand	9
3.	**Solve** 2048*8 memories using 256*8 memory chip .Also show the memory address associated with each memory chip?	Apply	9
4.	**Calculate** the utilization factor of tape, if the gap length is 0.5 in, the storage density S=3000 bytes/in and data storage capacity is 6 k bytes?	Apply	9
5.	A two way set associative cache memory uses block of four words. The cache accommodate a total of 2048 words from main memory. The main memory size is 128k*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	9
6.	**Solve** the following multi boolean function using 3*4*2 PLA PLD? $F_1(a_2, a_1, a_0)=\sum m(0,1,3,5)$ $F_2(a_2, a_1, a_0)=\sum m(3,5,7)$	Apply	9
7.	**Design** and implement 3-bit binary to gray code converter using PLA?	Understand	9
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?	Apply	9
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	9
10	**Design** a combinational circuit using PLA. The circuit accepts 3-bit number and generates an output binary number equal to square of input number?	Understand	9