



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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ELECTRONICS AND COMMUNICATION ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Title	DIGITAL SYSTEM DESIGN				
Course Code	AECB07				
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Semester	III	ECE			
Course Type	Core				
Regulation	R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Practicals	Credits
	3	1	4	-	-
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Course Faculty	Dr. P Munaswamy, Professor Dr. Lalit Kumar Kaul, Professor				

OBJECTIVES:

I	Understand common forms of number representation in logic circuits.
II	Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
III	Understand the concepts of combinational logic circuits and sequential circuits.
IV	Understand the Realization of Logic Gates Using Diodes & Transistors.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
MODULE-I						
1	Define POS form.	Canonical PoS form means Canonical Product of Sums form. In this form, each sum term contains all literals. So, these sum terms are nothing but the Max terms. Hence, canonical PoS form is also called as product of Max terms form.	Understand	CO 1	CLO 3	AECB07.03
2	What is binary?	Binary (or base-2) a numeric system that only uses two digits — 0 and 1. Computers operate in binary, meaning they store data and perform calculations using only zeros and ones. A single binary digit can only represent True (1) or False (0) in Boolean logic.	Understand	CO 1	CLO 1	AECB07.01
3	Define number system.	A number system is a collection of various symbols which are called digits. Different types of Number System.	Understand	CO 1	CLO 1	AECB07.01
4	Define Gray code.	A Gray code is an encoding of numbers so	Understand	CO 1	CLO 1	AECB07.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		that adjacent numbers have a single digit differing by 1. The term Gray code is often used to refer to a "reflected" code, or more specifically still, the binary reflected Gray code.				
5	Define Excess-3 code.	Excess-3, also called XS3, is a non-weighted code. is a self- complementary binary-coded decimal (BCD) code and numeral system. It is a self- complementing code.	Remember	CO 1	CLO 3	AECB07.03
6	What is self complementing code?	Self-Complementing Codes (Excess 3, 84-2-1, 2*421) Such codes have the property that the 9's complement of a decimal number is obtained directly by changing 1's to 0's and 0's to 1's	Remember	CO 1	CLO 1	AECB07.01
7	Define codes.	In the coding, when numbers or letters are represented by a specific group of symbols, it is said to be that number or letter is being encoded. The group of symbols is called as code. The digital data is represented, stored and transmitted as group of bits. This group of bits is also called as binary code.	Understand	CO 1	CLO 1	AECB07.01
8	Define signed numbers.	Signed numbers contain both sign and magnitude of the number. Generally, the sign is placed in front of number. So, we have to consider the positive sign for positive numbers and negative sign for negative numbers. Therefore, all numbers can be treated as signed numbers if the corresponding sign is assigned in front of the number.	Understand	CO 1	CLO 1	AECB07.01
9	What is unsigned number system?	Unsigned numbers contain only magnitude of the number. They don't have any sign. That means all unsigned binary numbers are positive. As in decimal number system, the placing of positive sign in front of the number is optional for representing positive numbers. Therefore, all positive numbers including zero can be treated as unsigned numbers if positive sign is not assigned in front of the number.	Understand	CO 1	CLO 1	AECB07.01
10	Define sign magnitude form.	The Most significant bit (MSB) is used for representing sign of the number and the remaining bits represent the magnitude of the number. So, just include sign bit at the left most side of unsigned binary number. This representation is similar to the signed decimal numbers representation.	Understand	CO 1	CLO 1	AECB07.01
11	What is hamming code?	Hamming code is useful for both detection and correction of error present in the received data. This code uses multiple parity bits and we have to place these parity bits in the positions of powers of 2. The minimum value of 'k' for which the following relation is correct (valid) is nothing but the required number of parity bits.	Remember	CO 1	CLO 1	AECB07.01
12	What is Duality theorem?	This theorem states that the dual of the Boolean function is obtained by interchanging the logical AND operator with logical OR operator and zeros with ones. For	Remember	CO 1	CLO 2	AECB07.02

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		every Boolean function, there will be a corresponding Dual function				
13	What is 8421 code?	The weights of this code are 8, 4, 2 and 1. This code has all positive weights. So, it is a positively weighted code. This code is also called as natural BCD (Binary Coded Decimal) code.	Remember	CO 1	CLO 1	AECB07.01
14	What is 2421 code?	This code has all positive weights. So, it is a positively weighted code. It is an unnatural BCD code. Sum of weights of unnatural BCD codes is equal to 9. It is a self-complementing code. Self-complementing codes provide the 9's complement of a decimal number, just by interchanging 1's and 0's in its equivalent 2421 representation.	Remember	CO 1	CLO 1	AECB07.01
15	Define Binary Number.	The binary number system is a numbering system that represents numeric values using two unique digits (0 and 1). Most computing devices use binary numbering to represent electronic circuit voltage state, (i.e., on/off switch), is the base-2 number system.	Understand	CO 1	CLO 1	AECB07.01
16	Define Decimal number system.	A number is expressed in base 10 by using one of the first nine integers or 0 in each place and letting each place value be a power of 10.	Understand	CO 1	CLO 1	AECB07.01
17	Define octal number system.	The octal numeral system, or oct for short, is the base-8 number system, and uses the digits 0 to 7. Octal numerals can be made from binary numerals	Understand	CO 1	CLO 1	AECB07.01
18	Define Hexa decimal number system.	The hexadecimal numeral system, also known as just hex, is a numeral system made up of 16 symbols (base 16). The standard numeral system is called decimal (base 10) and uses ten symbols: 0,1,2,3,4,5,6,7,8,9. Hexadecimal uses the decimal numbers and includes six extra symbols.	Understand	CO 1	CLO 1	AECB07.01
19	What is one's compliment?	The ones' complement of a binary number is defined as the value obtained by inverting all the bits in the binary representation of the number.	Remember	CO 1	CLO 1	AECB07.01
20	What is Two's compliment?	The 2's complement of a binary number is obtained by adding one to the 1's complement of signed binary number. So, 2's complement of positive number gives a negative number. Similarly, 2's complement of negative number gives a positive number.	Remember	CO 1	CLO 1	AECB07.01
21	What is binary coded decimal?	Binary coded decimal (BCD) is a system of writing numerals that assigns a four-digit binary code to each digit 0 through 9 in a decimal (base-10) numeral. The four-bit BCD code for any particular single base-10 digit is its representation in binary notation.	Understand	CO 1	CLO 1	AECB07.01
22	Define Unit distance code.	An un weighted code that changes at only one digit position when going from one number to the next in a consecutive sequence of numbers. Use of one of the many unit-distance codes can minimize errors at symbol transition points when converting analog quantities into digital quantities.	Understand	CO 1	CLO 1	AECB07.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
23	Define parity bit.	It is easy to include one parity bit either to the left of Most significant bit (MSB) or to the right of Least significant bit (LSB) of original bit stream. There are two types of parity codes, namely even parity code and odd parity code based on the type of parity being chosen.	Understand	CO 1	CLO 1	AECB07.01
24	What is error Detection?	It is used to detect the error(s) present in the received data (bit stream). These codes contain some bits, which are included to the original bit stream. These codes detect the error, if it is occurred during transmission of the original data (bit stream). Example – Parity code, Hamming code.	Remember	CO 1	CLO 1	AECB07.01
25	Define Boolean algebra.	Boolean algebra or switching algebra is a system of mathematical logic to perform different mathematical operations in binary system. These are only two elements 1 and 0 by which all the mathematical operations are to be performed.	Remember	CO 1	CLO 2	AECB07.02
26	Define sop form.	Canonical Sop form means Canonical Sum of Products form. In this form, each product term contains all literals. So, these product terms are nothing but the min terms. Hence, canonical Sop form is also called as sum of min terms form.	Understand	CO 1	CLO 3	AECB07.03
27	What is CRC?	a single-burst-error-detecting cyclic code and non-secure hash function designed to detect accidental changes to digital data in computer networks	Understand	CO 1	CLO 1	AECB07.01
28	What is Boolean variable?	Takes only two values – either true (1) or false (0). They are used as basic units of formal logic.	Remember	CO 1	CLO 1	AECB07.01
29	What is Logic diagram?	Composed of graphic symbols for logic gates.	Remember	CO 1	CLO 1	AECB07.01
30	What is base 5 called?	Quinary (base-5 or pental) is a numeral system with five as the base.	Understand	CO 1	CLO 1	AECB07.01
31	What does 10 mean in binary?	decimal 10 means 1010 in binary. binary 10 means 2 in decimal. 10 in any base stands for the base of the number system.	Understand	CO 1	CLO 2	AECB07.02
32	What is base 4 called?	Quaternary is the base-4 numeral system. It uses the digits 0, 1, 2 and 3 to represent any real number.	Remember	CO 1	CLO 2	AECB07.02
33	What is SoP and POS form?	The term "Sum of Products" or "SoP" is widely used for the canonical form that is a disjunction (OR) of minterms.	Remember	CO 1	CLO 2	AECB07.02
34	What are Minterms and Maxterms?	A minterm is a Boolean expression resulting in 1 for the output of a single cell, and 0s for all other cells in a Karnaugh map, or truth table.	Understand	CO 1	CLO 2	AECB07.02
35	Which is known as universal gate?	A universal gate is a gate which can implement any Boolean function without need to use any other gate type.	Understand	CO 1	CLO 3	AECB07.03
36	What is Karnaugh map?	a diagram consisting of a rectangular array of squares each representing a different combination of the variables of a Boolean function.	Remember	CO 1	CLO 3	AECB07.03
37	What are the	Minimizes boolean expressions without the	Remember	CO 1	CLO 3	AECB07.03

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	advantages of K Map?	need using various boolean theorems & computations. Minimizes number of Logical gates used				
38	Why is Gray code used in K map?	Gray code sequence only changes one binary bit as we go from one number to the next in the sequence, unlike binary. That means that adjacent cells will only vary by one bit, or Boolean variable. This is what we need to organize the outputs of a logic function so that we may view commonality.	Understand	CO 1	CLO 3	AECB07.03
39	What is dont care condition?	a don't-care term for a function is an input-sequence (a series of bits) for which the function output does not matter	Understand	CO 1	CLO 3	AECB07.03
40	Why do we use gray code?	used to facilitate error correction in digital communications such as digital terrestrial television and some cable TV systems.	Remember	CO 1	CLO 3	AECB07.03
MODULE-II						
1	What is parallel adder?	A parallel adder is an arithmetic combinational logic circuit that is used to add more than one bit of data simultaneously.	Understand	CO 2	CLO 4	AECB07.04
2	Define 5-variable k-map.	The number of cells in 5 variable K-map is thirty-two, since the number of variables is 5. The following figure shows 5 variable K-Map. here is only one possibility of grouping 32 adjacent min terms. There are two possibilities of grouping 16 adjacent min terms. i.e., grouping of min terms from m0 to m15 and m16 to m31.	Remember	CO 2	CLO 4	AECB07.04
3	Define 4-variable k-map.	The number of cells in 4 variables K-map is sixteen, since the number of variables is four. There is only one possibility of grouping 16 adjacent min terms.	Remember	CO 2	CLO 4	AECB07.04
4	Define 3-variable k-map.	The number of cells in 3 variable K-map is eight, since the number of variables is three. The following figure shows 3 variable K-Map. There is only one possibility of grouping 8 adjacent min terms.	Remember	CO 2	CLO 4	AECB07.04
5	Define Hazards.	A dynamic hazard is the possibility of an output changing more than once as a result of a single input change.	Understand	CO 2	CLO 4	AECB07.04
6	What is static hazard?	static hazard takes place when change in an input causes the output to change momentarily before stabilizing to its correct	Understand	CO 2	CLO 4	AECB07.04
7	What is dynamic hazard?	A dynamic hazard is the possibility of an output changing more than once as a result of a single input change. Dynamic hazards often occur in larger logic circuits where there are different routes to the output (from the input).	Understand	CO 2	CLO 4	AECB07.04
8	What is select line?	A multiplexer (or mux) is a device that selects one of several analog or digital input signals and forwards the selected input into a single line. A multiplexer of 2 ⁿ inputs has n select lines, which are used to select which input line to send to the output.	Understand	CO 2	CLO 4	AECB07.04
9	Define data selector.	Data Selector take one data input and a number of selection inputs, and they have several outputs. They forward the data input	Understand	CO 2	CLO 4	AECB07.04

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		to one of the outputs depending on the values of the selection inputs.				
10	Define decoder.	A decoder is a circuit that changes a code into a set of signals. It is called a decoder because it does the reverse of encoding, but we will begin our study of encoders and decoders with decoders because they are simpler to design.	Understand	CO 2	CLO 4	AECB07.04
11	Define an encoder.	The n output lines generate the binary code for the possible 2^n input lines. Let us take an example of an octal-to-binary encoder.	Understand	CO 2	CLO 4	AECB07.04
12	Define priority encoder.	Binary Encoders generally have a number of inputs that must be mutually exclusive, i.e. only one of the inputs can be active at any one time. The encoder then produces a binary code on the output pins, which changes in response to the input that has been activated.	Understand	CO 2	CLO 4	AECB07.04
13	What is Enable?	Enable pin in multiplexers, de multiplexer, decoder and encoder ensures the functioning of the hardware i.e. “enables” the function of the logic circuit.	Understand	CO 2	CLO 4	AECB07.04
14	Define k-map.	Karnaugh introduced a method for simplification of Boolean functions in an easy way. This method is known as Karnaugh map method or K-map method. It is a graphical method, which consists of 2^n cells for ‘n’ variables. The adjacent cells are differed only in single bit position.	Understand	CO 2	CLO 4	AECB07.04
15	Define Prime implicant and Essential prime implicant.	Each grouping will give either a literal or one product term. It is known as prime implicant. The prime implicant is said to be essential prime implicant, if at least single ‘1’ is not covered with any other groupings but only that grouping covers.	Remember	CO 2	CLO 4	AECB07.04
16	What is don't care condition?	If outputs are not defined for some combination of inputs, then those output values will be represented with don't care symbol ‘x’. That means, we can consider them as either ‘0’ or ‘1’.	Understand	CO 2	CLO 4	AECB07.04
17	Define tabular method.	Quine-McClukey tabular method is a tabular method based on the concept of prime implicants. We know that prime implicant is a product (or sum) term, which can't be further reduced by combining with any other product (or sum) terms of the given Boolean function.	Understand	CO 2	CLO 5	AECB07.05
18	What is universal gate?	NAND & NOR gates are called as universal gates. Because we can implement any Boolean function, which is in sum of products form by using NAND gates alone. Similarly, we can implement any Boolean function, which is in product of sums form by using NOR gates alone.	Understand	CO 2	CLO 5	AECB07.05
19	Define logic gates?	The basic digital electronic circuit that has one or more inputs and single output is known as Logic gate. Hence, the Logic gates are the building blocks of any digital system. We can classify these Logic gates into the following three categories.	Understand	CO 2	CLO 5	AECB07.05

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
20	Define combinational circuit.	Combinational circuits consist of Logic gates. These circuits operate with binary values. The output(s) of combinational circuit depends on the combination of present inputs.	Understand	CO 2	CLO 5	AECB07.05
21	Define half adder.	Half adder is a combinational circuit, which performs the addition of two binary numbers A and B are of single bit. It produces two outputs sum, S & carry, C.	Understand	CO 2	CLO 5	AECB07.05
22	What is binary adder?	The most basic arithmetic operation is addition. The circuit, which performs the addition of two binary numbers, is known as Binary adder.	Understand	CO 2	CLO 5	AECB07.05
23	Define full adder.	Full adder is a combinational circuit, which performs the addition of three bits A, B and C _{in} . Where, A & B are the two parallel significant bits and C _{in} is the carry bit, which is generated from previous stage.	Understand	CO 2	CLO 5	AECB07.05
24	Define multiplexer.	Multiplexer is a combinational circuit that has maximum of 2 ⁿ data inputs, 'n' selection lines and single output line. One of these data inputs will be connected to the output based on the values of selection lines.	Understand	CO 2	CLO 5	AECB07.05
25	Define Demultiplexer	De-Multiplexer is a combinational circuit that performs the reverse operation of Multiplexer. It has single input, 'n' selection lines and maximum of 2 ⁿ outputs. The input will be connected to one of these outputs based on the values of selection lines.	Understand	CO 2	CLO 5	AECB07.05
26	Define comparator.	Digital Comparator. A magnitude digital comparator is a combinational circuit that compares two digital or binary numbers (consider A and B) and determines their relative magnitudes in order to find out whether one number is equal, less than or greater than the other digital number.	Understand	CO 2	CLO 5	AECB07.05
27	What is code converter?	Codes and code converters Coding is the process of translating the input information which can be understandable by the machine or a particular device. Coding can be used for security purpose to protect the information from stealing or interrupting.	Remember	CO 2	CLO 5	AECB07.05
28	What is parallel adder?	A parallel adder is an arithmetic combinational logic circuit that is used to add more than one bit of data simultaneously.	Understand	CO 2	CLO 5	AECB07.05
29	What is one-to-one mapping?	each input code word produces a different output code word	Understand	CO 2	CLO 5	AECB07.05
30	What is binary decoder?	has an n-bit binary input code and a 1-out-of-2 ⁿ output code	Understand	CO 2	CLO 5	AECB07.05
31	What is binary encoder?	If the device's output code has fewer bits than the input code, the device is usually called an encoder	Remember	CO 2	CLO 6	AECB07.06
32	What is multiplexer?	a digital switch—it connects data from one of n sources to its output	Understand	CO 2	CLO 6	AECB07.06
33	What is comparator?	A circuit that compares two binary words and indicates whether they are equal is called a comparator	Understand	CO 2	CLO 6	AECB07.06

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
34	What is ALU?	arithmetic logic unit (ALU) is a digital circuit used to perform arithmetic and logic operations	Understand	CO 2	CLO 6	AECB07.06
35	What is Barrel shifter?	A barrel shifter is a digital circuit that can shift a data word by a specified number of bits without the use of any sequential logic, only pure combinational logic	Remember	CO 2	CLO 6	AECB07.06
36	What is meant by BCD adder?	BCD adder A 4-bit binary adder that is capable of adding two 4-bit words having a BCD (binary-coded decimal) format	Understand	CO 2	CLO 6	AECB07.06
37	Where is BCD used?	Binary-coded Decimal or BCD is a way of representing a decimal number as a string of bits suitable for use in electronic systems.	Understand	CO 2	CLO 6	AECB07.06
38	What is a 4 bit parallel adder?	a combinational circuit which is used to add two N-bit binary numbers	Remember	CO 2	CLO 6	AECB07.06
39	What is a in binary code?	A binary code represents text, computer processor instructions, or any other data using a two-symbol system.	Understand	CO 2	CLO 6	AECB07.06
40	What is fast adder?	A carry-lookahead adder (CLA) or fast adder is a type of adder used in digital logic.	Understand	CO 2	CLO 6	AECB07.06
MODULE-III						
1	What is a counter?	Counts those pulses which are driven by a clock.	Remember	CO 3	CLO 7	AECB07.7
2	What are the categories Counters?	(i) Asynchronous and Synchronous counters. (ii) Single and multi mode counters. (iii) Modulus counters.	Understand	CO 3	CLO 7	AECB07.7
3	What is a multimode counter?	If the same counter circuit can be operated in both the UP and DOWN modes, it is called a multimode counters.	Remember	CO 3	CLO 7	AECB07.7
4	What is a asynchronous counters?	Each flip flop is triggered by the previous flip flop.	Understand	CO 3	CLO 7	AECB07.7
5	What is a Ripple Counter?	A ripple counter is an asynchronous counter where only the first flip-flop is clocked by an external clock	Remember	CO 3	CLO 7	AECB07.7
6	Where the ripple counter is used explain?	It can also be used for Frequency divider, time measurement, frequency measurement, distance measurement and also for generating square waveforms.	Understand	CO 3	CLO 7	AECB07.7
7	What is the difference between ripple counter and synchronous counter?	In a synchronous counter however, the external event is used to produce a pulse that is synchronised with the internal clock.	Remember	CO 3	CLO 7	AECB07.7
8	What is the major disadvantage of asynchronous counters?	Disadvantages of Asynchronous Counters: An extra "re-synchronizing" output flip-flop may be required.	Understand	CO 3	CLO 7	AECB07.7
9	What is a Johnson counter?	A Johnson counter is a modified ring counter, where the inverted output from the last flip flop is connected to the input to the first. The register cycles through a sequence of bit-patterns.	Remember	CO 3	CLO 7	AECB07.7
10	What is a ring counter?	A ring counter is a type of counter composed of flip-flops connected into a shift register, with the output of the last flip-flop fed to the input of the first, making a "circular" or "ring" structure.	Understand	CO 3	CLO 8	AECB07.8
11	What is the purpose of a shift register?	When a bit is input on the right, all the bits move one place to the left, and the leftmost	Remember	CO 3	CLO 8	AECB07.8

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		bit disappears. Shift registers are commonly used in converters that translate parallel data to serial data, or vice-versa. Shift registers can also function as delay circuits and digital pulse extenders.				
12	What are universal shift registers?	A Universal shift register is a register which has both the right shift and left shift with parallel load capabilities. Universal shift registers are used as memory elements in computers.	Understand	CO 3	CLO 8	AECB07.8
13	What is the difference between register and shift register?	Both shift registers and counters are made of flip-flops. A shift register is simply a chain of FFs where the Q output of one FF connects to the D input of the next. A shift register will transfer data from one FF to the next on each clock event	Remember	CO 3	CLO 8	AECB07.8
14	What is bidirectional shift register?	A bidirectional shift register is one in which the data can be shifted either left or right. It can be implemented by using gate logic that enables the transfer of a data bit from one stage to the next stage to the right or to the left, depending on the level of a control line.	Understand	CO 3	CLO 8	AECB07.8
15	What is a dynamic shift register?	A dynamic shift register circuit comprises an input terminal and an output terminal. The logic circuit is made operative by an output signal of the signal follower circuit and produces an inverter function at the output terminal, in response to an output signal of the second transfer gate circuit.	Remember	CO 3	CLO 8	AECB07.8
16	Define Sequential circuits.	Sequential circuit has memory so output can vary based on input. This type of circuits uses previous input, output, clock and a memory element.	Understand	CO 3	CLO 9	AECB07.9
17	Define flip-flop.	A flip-flop is a circuit that has two stable states and can be used to store state information. The circuit can be made to change state by signals applied to one or more control inputs and will have one or two outputs. It is the basic storage element in sequential logic. flip flop has a clock signal,	Remember	CO 3	CLO 9	AECB07.9
18	Define latch.	The output of the latch depends on its input. It continuously checks its inputs and changes its output correspondingly. It is not depending on clock.	Understand	CO 3	CLO 9	AECB07.9
19	What is jk flip-flop?	The JK Flip Flop is basically a gated RS flip flop with the addition of the clock input circuitry. When both the inputs S and R are equal to logic "1", the invalid condition takes place. Thus to prevent this invalid condition, a clock circuit is introduced	Remember	CO 3	CLO 9	AECB07.9
20	What is master slave jk flip- flop?	Master slave JK FF is a cascade of two S-R FF with feedback from the output of second to input of first. Master is a positive level triggered. But due to the presence of the inverter in the clock line, the slave will respond to the negative level. Master-slave flip flop is designed using two separate flip flops.	Remember	CO 3	CLO 9	AECB07.9

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
21	Define T flip-flop.	The T or "toggle" flip-flop changes its output on each clock edge, giving an output which is half the frequency of the signal to the T input	Understand	CO 3	CLO 9	AECB07.9
22	What is clock?	A clock signal is a particular type of signal that oscillates between a high and a low state	Understand	CO 3	CLO 10	AECB07.10
23	What is memory cell?	The memory cell is an electronic circuit that stores one bit of binary information and it must be set to store a logic 1 (high voltage level) and reset to store a logic 0 (low voltage level). Its value is maintained/stored until it is changed by the set/reset process.	Understand	CO 3	CLO 10	AECB07.10
24	What is Binary cell?	An elementary unit of computer storage that can have one or the other of two stable states and can thus store one bit of information.	Understand	CO 3	CLO 10	AECB07.10
25	Define clock skew.	Clock skew is a phenomenon in synchronous digital circuit systems in which the same sourced clock signal arrives at different components at different times i.e. the instantaneous difference between the readings of any two clocks is called their skew.	Understand	CO 3	CLO 10	AECB07.10
26	What is sequential machine?	It has inputs and outputs that can each take on any value from a finite set and are of interest only at certain instants of time, and in which the output depends on previous inputs as well as the concurrent input.	Understand	CO 3	CLO 10	AECB07.10
27	What is register?	A collection of two or more D flip-flops with a common clock input is called a register	Remember	CO 3	CLO 11	AECB07.11
28	What is divide-by-m counter?	A counter with m states is called a modulo-m counter or, sometimes, a divide-by-m counter	Understand	CO 3	CLO 11	AECB07.11
29	What is Shift-Register?	A shift register is an n-bit register with a provision for shifting its stored data by one bit position at each tick of the clock	Remember	CO 3	CLO 11	AECB07.11
30	What is ROM?	ROM is a type of memory that normally can only be read, as opposed to RAM which can be both read and written	Remember	CO 3	CLO 11	AECB07.11
31	What is PROM?	This is a type of ROM that can be programmed using special equipment; it can be written to, but only once.	Understand	CO 3	CLO 11	AECB07.11
32	What is EPROM?	An EPROM is a ROM that can be erased and reprogrammed	Remember	CO 3	CLO 10	AECB07.10
33	What is EEPROM?	Electrically Erasable Programmable ROM	Understand	CO 3	CLO 10	AECB07.10
34	What is DRAM?	Dynamic random-access memory	Remember	CO 3	CLO 10	AECB07.10
35	What is Synchronous DRAM?	An asynchronous DRAM chip has power connections, some number of address inputs (typically 12), and a few (typically one or four) bidirectional data lines.	Understand	CO 3	CLO 9	AECB07.9
36	What is Synchronous DRAM?	An asynchronous DRAM chip has power connections, some number of address inputs (typically 12), and a few (typically one or four) bidirectional data lines.	Understand	CO 3	CLO 9	AECB07.9
37	What is called latch?	A latch is an electronic logic circuit that has two inputs and one output. One of the inputs is called the SET input; the other is called the RESET input. Latch circuits can be either active-high or active-low.	Remember	CO 3	CLO 9	AECB07.9
38	What are the different types of latches?	there are four types of latches and flip flops: SR, D, JK and T.	Remember	CO 3	CLO 8	AECB07.8

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
39	What is master slave FF?	This circuit is a master-slave D flip-flop. A D flip flop takes only a single input, the D (data) input. The master-slave configuration has the advantage of being edge-triggered, making it easier to use in larger circuits, since the inputs to a flip-flop often depend on the state of its output.	Understand	CO 3	CLO 7	AECB07.7
40	What is toggling in JK flip flop?	In the case of JK flip flop (master slave) when your input is J=K=1, then flip flop is to be called in toggle state	Remember	CO 3	CLO 10	AECB07.10
MODULE-IV						
1	What is Transition Time?	The amount of time that the output of a logic circuit takes to change from one state to another is called the Transition Time.	Remember	CO 4	CLO 12	AECB07.12
2	What is Rise time?	Time interval when waveform is changing from a logic low to a logic high level.	Remember	CO 4	CLO 12	AECB07.12
3	What is Fall time?	Time interval when waveform is changing from a logic high to a logic low level.	Understand	CO 4	CLO 12	AECB07.12
4	What are Rise time and Transition Time depending parameters?	ON transistor resistance and Load capacitance	Remember	CO 4	CLO 12	AECB07.12
5	How Stray Capacitance occurs?	Output circuits' transistors internal wiring and packing have capacitance in the range.	Remember	CO 4	CLO 12	AECB07.12
6	What is Propagation Delay?	The amount of time that it takes for a change at the input of a device to produce a change at the output of the same	Remember	CO 4	CLO 12	AECB07.12
7	What is t_{pLH} ?	propagation delay when the output changes from LOW to HIGH	Understand	CO 4	CLO 12	AECB07.12
8	What is t_{pHL} ?	Propagation delay when the output changes from HIGH to LOW	Remember	CO 4	CLO 12	AECB07.12
9	What is Dynamic Power Dissipation?	Power consumed during transition is called Dynamic Power Dissipation	Remember	CO 4	CLO 12	AECB07.12
10	What is P_T ?	Circuit internal power	Remember	CO 4	CLO 12	AECB07.12
11	What is C_{PD} ?	power dissipation capacitance	Understand	CO 4	CLO 12	AECB07.12
12	What is C_L ?	capacitive load on the output	Remember	CO 4	CLO 12	AECB07.12
13	What is Load power?	Load power (PL) during charging and discharging current flows through transition.	Remember	CO 4	CLO 12	AECB07.12
14	What are basic building blocks in CMOS logic circuits?	The basic building blocks in CMOS logic circuits are MOS transistors NMOS and PMOS	Remember	CO 4	CLO 12	AECB07.12
15	What is Leakage current?	The resistance between the gate and the other terminals of the device is extremely high, well over a mega ohm. The small amount of current that flows across this resistance is very small, typically less than one microampere, and is called a leakage current.	Understand	CO 4	CLO 12	AECB07.12
16	What is AOI gate?	AND OR INVERT gate	Remember	CO 4	CLO 13	AECB07.13
17	What is OAI gate?	OR AND INVERT gate	Understand	CO 4	CLO 13	AECB07.13
18	What are Characteristics of Electrical Behavior of CMOS?	Logic Levels, Noise Margin, Fan out, Speed, Power Consumption, Effect of Loading, Unused Inputs, Electrostatic Discharge, Open Drain Outputs, Three State Outputs.	Remember	CO 4	CLO 13	AECB07.13
19	What is V_{OHmin} ?	The minimum Output voltage produced in the High sate	Understand	CO 4	CLO 13	AECB07.13
20	What is V_{IHmin} ?	The minimum Input Voltage guaranteed to be recognized as a High	Remember	CO 4	CLO 13	AECB07.13
21	What is V_{ILmax} ?	The maximum Input Voltage guaranteed to be recognized as a Low	Understand	CO 4	CLO 13	AECB07.13

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
22	What is V_{OLmax} ?	The maximum Output voltage produced in the High state	Remember	CO 4	CLO 13	AECB07.13
23	What is Fan-out?	The no. of inputs that the gate can drive without exceeding its worst – case loading specifications	Remember	CO 4	CLO 13	AECB07.13
24	What is TTL?	Transistor-Transistor Logic	Understand	CO 4	CLO 13	AECB07.13
25	What is ECL?	emitter-coupled logic	Remember	CO 4	CLO 13	AECB07.13
26	What are n-channel MOS (NMOS) transistor terminals?	gate, source, and drain	Understand	CO 4	CLO 13	AECB07.13
27	What is gate to source voltage (V_{gs}) in an NMOS transistor?	is normally zero or positive	Remember	CO 4	CLO 13	AECB07.13
28	How to form CMOS logic?	NMOS and PMOS transistors are used together in a complementary way to form CMOS logic	Remember	CO 4	CLO 13	AECB07.13
29	What is fan-in?	The number of inputs that a gate can have in a particular logic family is called the logic family's fan-in	Remember	CO 4	CLO 13	AECB07.13
30	What is DC Noise Margin?	It is a measure of how much noise it takes to corrupt a worst-case output voltage into a value that may not be recognized properly by an input	Understand	CO 4	CLO 13	AECB07.13
31	What is ESD?	ESD is the sudden and momentary unwanted electric currents that flows between two objects and that may cause damage to electronic equipment	Understand	CO 4	CLO 14	AECB07.14
32	What is Bipolar logic?	Bipolar logic families use semiconductor diodes and bipolar junction transistors as the basic building blocks of logic circuits	Understand	CO 4	CLO 14	AECB07.14
33	What is Diode?	A semiconductor diode is fabricated from two types of semiconductor material, called p-type and n-type that are brought into contact with each other	Remember	CO 4	CLO 14	AECB07.14
34	What is Bipolar Junction Transistors?	A bipolar junction transistor is a three-terminal device (Base, Emitter and Collector) that, in most logic circuits, acts like a current-controlled switch	Remember	CO 4	CLO 14	AECB07.14
35	What is CML?	current-mode logic	Understand	CO 4	CLO 14	AECB07.14
36	What is on resistance of MOSFET?	the total resistance between the drain and source in a Metal Oxide Field Effect Transistor	Understand	CO 4	CLO 14	AECB07.14
37	What is Schottky-clamped transistors?	By placing a Schottky diode between the base and collector of each transistor that might saturate. The resulting transistors, which do not saturate, are called Schottky-clamped transistors.	Remember	CO 4	CLO 14	AECB07.14
38	What is noise margin in MOSFET?	the amount of noise that a CMOS circuit could withstand without compromising the operation of circuit.	Remember	CO 4	CLO 14	AECB07.14
39	What is Programmable logic device?	an electronic component used to build reconfigurable digital circuits	Understand	CO 4	CLO 14	AECB07.14
40	What is programmable logic array (PLA)?	a kind of programmable logic device used to implement combinational logic circuits	Understand	CO 4	CLO 14	AECB07.14
MODULE-V						
1	What is acronym of VHDL?	Very High Speed Integrated Circuits Hardware Description Language	Remember	CO 5	CLO 15	AECB07.15

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
2	What are VHDL features?	Designs may be decomposed hierarchically. The logical operation and timing behavior of a design can be simulated.	Understand	CO 5	CLO 15	AECB07.15
3	What is design flow in VHDL?	VHDL-based design process	Remember	CO 5	CLO 15	AECB07.15
4	What is Compiler?	A VHDL compiler analyzes your code for syntax errors and also checks your code for compatibility with other modules on which it relies	Understand	CO 5	CLO 15	AECB07.15
5	What is Simulator?	VHDL simulator allows you to define and apply inputs to your design, and to observe its outputs, without ever having to build the physical circuit	Remember	CO 5	CLO 15	AECB07.15
6	What are types of verification?	Functional Verification and Timing Verification	Remember	CO 5	CLO 15	AECB07.15
7	What are steps in back-end?	Synthesis, Fitting/Place + Route, Timing Verification	Understand	CO 5	CLO 15	AECB07.15
8	What is Synthesis?	converting the VHDL description into a set of primitives or components that can be assembled in the target technology	Remember	CO 5	CLO 15	AECB07.15
9	What is Place and Route?	assigning equations to available AND-OR elements	Remember	CO 5	CLO 15	AECB07.15
10	What is final step in fitted circuit?	timing verification	Understand	CO 5	CLO 15	AECB07.15
11	What is entity?	declaration of a module's inputs and outputs	Remember	CO 5	CLO 16	AECB07.16
12	What is architecture?	detailed description of the module's internal structure or behavior	Understand	CO 5	CLO 16	AECB07.16
13	What is entity declaration?	to define its external interface signals or ports in its port declaration part	Understand	CO 5	CLO 16	AECB07.16
14	How comments begins in VHDL?	with two hyphens (--)	Remember	CO 5	CLO 16	AECB07.16
15	What is entity declaration?	to define its external interface signals or ports in its port declaration part	Understand	CO 5	CLO 16	AECB07.16
16	What is entity-name?	A user-selected identifier to name the entity	Remember	CO 5	CLO 16	AECB07.16
17	What are signal-names?	A comma-separated list of one or more user-selected identifiers to name external-interface signals	Understand	CO 5	CLO 16	AECB07.16
18	What is "IN" in VHDL?	The signal is an input to the entity	Remember	CO 5	CLO 16	AECB07.16
19	What is "OUT" in VHDL?	The signal is an output of the entity	Remember	CO 5	CLO 16	AECB07.16
20	What is "BUFFER" in VHDL?	The signal is an output of the entity, and its value can also be read inside the entity's architecture	Understand	CO 5	CLO 16	AECB07.16
21	What is "INOUT" in VHDL?	The signal can be used as an input or an output of the entity	Understand	CO 5	CLO 17	AECB07.17
22	What is "signal-type" in VHDL?	A built-in or user-defined signal type	Understand	CO 5	CLO 17	AECB07.17
23	What is "bit" in VHDL stores?	can have the value 0 and 1	Understand	CO 5	CLO 17	AECB07.17
24	What is "bit_vector" in VHDL stores?	is a vector of bit values	Understand	CO 5	CLO 17	AECB07.17
25	What is "boolean" in VHDL stores?	can have the value TRUE and FALSE	Understand	CO 5	CLO 17	AECB07.17
26	What is "time" in VHDL?	to indicate time	Remember	CO 5	CLO 17	AECB07.17
27	What are VHDL predefined types?	Bit, character, severity_level, bit_vector, integer, string, Boolean, real, time	Remember	CO 5	CLO 17	AECB07.17

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
28	What is “abs” in VHDL?	absolute value	Understand	CO 5	CLO 17	AECB07.17
29	What is “rem” in VHDL?	modulo remainder	Remember	CO 5	CLO 17	AECB07.17
30	What is “Mod” in VHDL?	modulo division	Remember	CO 5	CLO 16	AECB07.16
31	What is “**” in VHDL?	exponentiation	Understand	CO 5	CLO 16	AECB07.16
32	What is an array in VHDL?	an ordered set of elements of the same type, where each element is selected by an <i>array index</i>	Remember	CO 5	CLO 16	AECB07.16
33	What is “string” in VHDL?	a sequence of ISO characters enclosed in double quotes	Remember	CO 5	CLO 16	AECB07.16
34	What is library in VHDL?	a place where the VHDL compiler stores information about a particular design project, including intermediate files that are used in the analysis, simulation, and synthesis of the design	Understand	CO 5	CLO 16	AECB07.16
35	What is package in VHDL?	a file containing definitions of objects that can be used in other programs	Remember	CO 5	CLO 15	AECB07.15
36	What is structural description or structural design in VHDL?	it defines the precise interconnection structure of signals and entities that realize the entity	Remember	CO 5	CLO 15	AECB07.15
37	What is Dataflow Modeling in VHDL?	Behavioral modeling can be done with sequential statements using the process construct or with concurrent statements	Understand	CO 5	CLO 15	AECB07.15
38	What is Null statement in VHDL?	The null statement states that no action will occur	Remember	CO 5	CLO 15	AECB07.15
39	What is wait statement in VHDL?	The wait statement will halt a process until an event occurs	Remember	CO 5	CLO 15	AECB07.15
40	What is Next and Exit Statement in VHDL?	The next statement skips execution to the next iteration of a loop statement and proceeds with the next iteration.	Understand	CO 5	CLO 15	AECB07.15

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