INSTITUTE OF AERONAUTICAL ENGINEERING
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INFORMATION TECHNOLOGY

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Title	ANALOG AND DIGITAL ELECTRONICS				
Course Code	AECB05				
Program	B. Tech				
Semester	THREE				
Course Type	Core				
Regulation	IARE - R18				
Course Structure		Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	-	-
Course Coordinator	Ms. M Saritha, Assistant Professor				

COURSE OBJECTIVES:

	Students will try to learn:
I	The Fundamental knowledge of the operational principles and characteristics of semiconductor devices and their applications.
II	The basic concept of number systems, boolean algebra and optimized implementation of combinational and sequential circuits.
III	The perceive subsequent studies in the area of microprocessors, microcontrollers, VLSI design and embedded systems effectively use of fundamentals of digital electronics.

COURSE OUTCOMES:
At the end of the course the students should be able to:

	Course Outcomes	Knowledge Level (Bloom's Taxonomy)
CO 1	**Recall** the properties of semiconductor materials which form the basis for the formation of PN junction diode.	Remember
CO 2	**Illustrate** the volt-ampere characteristics of semiconductor devices for finding cut-in voltage, static, dynamic resistance and transition, diffusion capacitance.	Understand
CO 3	**Apply** the PN junction characteristics for the diode applications such as switch and rectifiers.	Apply

CO 4	**Explain** half wave and full wave rectifier circuits with filter and without filters for conversion of alternating current in to direct current.	Understand
CO 5	**Interpret** DC and AC load line analysis of different amplifiers for optimal operating level regardless of input, load placed on the device.	Understand
CO 6	**Analyze** the input and output characteristics of transistor configurations and small signal h-parameter models for determining the input - output resistances, current gain and voltage gain	Analyze
CO 7	**Compare** the binary decimal, octal and hexadecimal number systems in terms of basic arithmetic operations.	Analyze
CO 8	**Identify** the functionality of logic gates, parity code and hamming code techniques for error detection and correction of single bit in digital systems.	Apply
CO 9	**Apply** Boolean postulates and theorems, k-map and tabular methods for obtaining minimized Boolean expressions.	Apply
CO 10	**Develop** gate level combinational circuits to built adders, subtractors, multiplexers, demultiplexers, encoder and decoders.	Apply
CO 11	**Describe** the operation of Flip-Flops and latches for constructing sequential circuits .	Understand
CO 12	**Implement** the synchronous& asynchronous counters for memory storing applications.	Apply

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S. No	QUESTION	ANSWER	Blooms Level	CO
MODULE – I				
1	Define Electronics	The branch of engineering which deals with conduction of current through vacuum or gas or a semiconductor.	Remember	CO 1
2	Define conductivity	Conductivity is the ability of a metal to conduct electricity when a potential difference (Voltage) is applied.	Remember	CO 1
3	Define voltage	Potential difference in charge between two points in an electrical field. The MODULE of voltage is Volt (V).	Remember	CO 1
4	Define current	Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms.	Remember	CO 1
5	Define Resistance	The opposition offered to the flow of electrons.	Remember	CO 1
6	Define circuit	Circuit comes from the word circle. A circuit is a collection of real components, power sources, and signal sources, all connected so current can flow in a complete circle.	Remember	CO 1
7	Define electronic circuit	An electronic circuit is composed of individual electronic components such as resistors, transistors, capacitors, inductors and diodes.	Remember	CO 1
8	Define conductor	A conductor is a material which has very high conductivity. Ex: Copper, Aluminum, Silver.	Remember	CO 1

S. No	QUESTION	ANSWER	Blooms Level	CO
9	Define semiconductor	A semiconductor is a material that has its conductivity lies between the insulator and conductor. Ex: Si & Ge.	Remember	CO 1
10	What is an insulator	An insulator is a material that offers a very low level of conductivity when voltage is applied. Ex: Wood, Glass.	Remember	CO 1
11	Define Intrinsic Semiconductor	A pure form of semiconductor is called as intrinsic semiconductor. Ex: Si and Ge	Remember	CO 1
12	Define Extrinsic Semiconductor	The current conduction capability of intrinsic semiconductor can be increased significantly by adding a small amount of impurity to the intrinsic semiconductor.	Remember	CO 1
13	Define Diode	A p-n junction diode is a basic semiconductor device that controls the flow of electric current in a circuit.	Remember	CO 1
14	What is Static resistance?	The resistance of a diode at a particular operating point is called the dc or static resistance diode. RD =VD/ID	Remember	CO 2
15	What is Dynamic resistance?	The ac resistance is determined by a straight line drawn between the two intersections of the maximum and minimum values of input voltage.rd= ΔVD/ ΔID	Remember	CO 2
16	Define Drift current	Drift current is the electric current, or movement of charge carriers, which is due to the applied electric field, often stated as the electromotive force over a given distance.	Remember	CO 1
17	Define Diffusion current	Diffusion Current is a current in a semiconductor caused by the diffusion of charge carriers (holes and/or electrons). This is the current which is due to the transport of charges occurring because of non-uniform concentration of charged particles in a semiconductor.	Remember	CO 1
18	What is Capacitance?	Capacitance is the ability of a component or circuit to collect and store energy in the form of an electrical charge.	Remember	CO 2
19	Define Diffusion capacitance	Diffusion Capacitance is the capacitance due to transport of charge carriers between two terminals of a device. CD = dQ / dV	Remember	CO 2
20	Define Transition capacitance	The amount of capacitance changed with increase in voltage is called transition capacitance. CT = dQ / dV	Remember	CO 2
21	What is load line?	A load line is a line drawn on the characteristic curve, a graph of the current vs. voltage in a nonlinear device like a diode.	Remember	CO 2
22	Define storage time	The time period for which the diode remains in the conduction state even in the reverse biased state, is called as Storage time.	Remember	CO 2

S. No	QUESTION	ANSWER	Blooms Level	CO
23	Define transition time	The time elapsed in returning back to the state of non-conduction, i.e. steady state reverse bias, is called Transition time.	Remember	CO 2
24	Define forward recovery time	The time required for the diode to change from reverse bias to forward bias is called as Forward recovery time.	Remember	CO 2
25	Define reverse recovery time	The time required for the diode to change from forward bias to reverse bias is called as Reverse recovery time.	Remember	CO 3
26	What is a rectifier?	A circuit that converts ac voltage of main supply into pulsating dc voltage using one or more PN junction diodes is called rectifier.	Remember	CO 3
27	Define PIV	Peak inverse voltage (PIV) or peak reverse voltage (PRV) is the maximum value of reverse voltage which occurs at the peak of the input cycle when the diode is reverse-biased.	Remember	CO 3
28	Define ripple factor	The ratio of the root mean square (rms) value of the ripple voltage to the absolute value of the DC component of the output voltage.	Remember	CO 3
29	Define efficiency	Efficiency signifies a level of performance that describes using the least amount of input to achieve the highest amount of output.	Remember	CO 3
30	Define Form Factor	The form factor of an alternating current waveform (signal) is the ratio of the RMS (root mean square) value to the average value (mathematical mean of absolute values of all points on the waveform).	Remember	CO 3
31	Define TUF	It is defined as a ratio of dc power delivered to the load to the ac power rating of the transformer.	Remember	CO 3
32	Define cut-in voltage.	The forward voltage at which the current through the junction starts increasing rapidly, is called the knee-voltage or cut-in voltage.	Remember	CO 3
33	Define Voltage Regulation	It is the factor which tells us about the change in DC output voltage as load changes from no load to full load condition.	Remember	CO 3
34	Define Filter	It is an electronic circuit composed of L,C,LC components connected between the rectifier and the load so as to convert pulsating DC to pure DC	Remember	CO 3
35	Define Pulsating DC	Pulsating direct current is a periodic current which changes in value but never changes direction.	Remember	CO 3
36	Define Zener Breakdown	The Zener breakdown can be defined as the flow of electrons across the p kind material barrier of the valence band to the evenly filled n-type material conduction band.	Remember	CO 1

S. No	QUESTION	ANSWER	Blooms Level	CO
37	Define Avalanche Beakdown	The avalanche breakdown is an occurrence of raising the flow of electric current or electrons in insulating material or semiconductor by giving the high voltage.	Remember	CO 1
38	Define Fermi Level	Fermi level is the term used to describe the top of the collection of electron energy levels at absolute zero temperature	Remember	CO 1
39	What is Cut in voltage for si & ge	si-0.7, ge- 0.3	Remember	CO 1
40	What is doping?	The process of adding impurities to the intrinsic semiconductor is called as doping.	Remember	CO 3
		MODULE -II		
1	Define Transistor	Transistor is a three terminal semiconductor device.	Remember	CO 6
2	Define Base	Base is lightly doped.	Remember	CO 6
3	Define Emitter	Emitter is heavily doped	Remember	CO 6
4	Define Collector	Collector is moderately doped	Remember	CO 6
5	Define Alpha	It is a large signal current gain in common base configuration. It is the ratio of collector current (output current) to the emitter current (input current).	Remember	CO 6
6	Define Beta	It is a current gain factor in the common emitter configuration. It is the ration of collector current (output current) to base current (output current).	Remember	CO 6
7	Define Gamma	It is a current gain in common collector configuration and it is the ration of emitter current (output current) to base current (input current).	Remember	CO 6
8	What is the other name of Base width modulation	Early Effect	Remember	CO 6
9	Define Punch Through Effect	It is defined as with the increase in collector voltage, effective base width is reduced to zero, and the emitter barrier voltage becomes smaller than Vo |VEB| as the collector voltage reaches through the base region. Due to lowering of emitter junction voltage, an extensively large emitter current flows. Therefore, there is an upper limit on the magnitude of collector voltage. This phenomenon is called punch-through.	Remember	CO 6
10	Define Active Region	Active region is one in which Base emitter junction is forward biased and Base Collector junction will be reverse biased in a transistor	Remember	CO 6
11	Define Saturation Region	The transistor operates in saturation region when both the emitter and collector junctions are forward biased.	Remember	CO 4

S. No	QUESTION	ANSWER	Blooms Level	CO
12	Define Cut off Region	The transistor operates in cutoff region when both the emitter and collector junctions are reverse biased.	Remember	CO 4
13	Define Early Effect	The Early effect, named after its discoverer James M. Early, is the variation in the effective width of the base in a bipolar junction transistor(BJT) due to a variation inthe applied base-to- collector voltage	Remember	CO 4
14	Define Reverse Saturation Current	In a PN junction diode, the reverse saturation current is due to the diffusive flow of minority electrons from the p-side to the n-side and the minority holes from the n-side to the p-side. Hence, the reverse saturation current depends on the diffusion coefficient of electrons and holes.	Remember	CO 4
15	Define Operating Point	The operating point of a device, also known as a bias point, quiescent point or Q-point, is the steady-state DC voltage or current at a specified terminal of an active device such as a transistor with no input signal applied.	Remember	CO 4
16	Define Load Line	A load line is used in graphical analysis of nonlinear electronic circuits, representing the constraint other parts of the circuit place on a non-linear device, like a diode or transistor. It is usually drawn on a graph of the current vs the voltage in the nonlinear device, called the device's characteristic curve.	Remember	CO 4
17	Define Z Parameters	The Z-parameters are defined as a impedance parameters with voltage as dependent and current as independent variables	Remember	CO 6
18	Define Y Parameters	The Y-parameters are defined as admittance parameters with current as dependent and voltage as independent parameters	Remember	CO 6
19	What is CE configuration	In common emitter configuration, base is the input terminal, collector is the output terminal and emitter is the common terminal for both input and output.	Remember	CO 6
20	What is CB Configuration	In common base configuration, emitter is the input terminal, collector is the output terminal and base terminal is connected as a common terminal for both input and output.	Remember	CO 6
21	What is CC Configuration	In CC configuration, the input circuit is connected between emitter and base and the output is taken from the collector and emitter. The collector is common to both the input and output circuit	Remember	CO 6
22	Define Amplifier	An amplifier, is an electronic device that can increase the voltage , current & power of a signal	Remember	CO 6

S. No	QUESTION	ANSWER	Blooms Level	CO
23	Justify BJT as Current controlled Device	A BJT is a current controlled device because its output characteristics are determined by the input current.	Remember	CO 6
24	Current Transfer Characteristics	This characteristic curve shows the variation of output current in accordance with the input current, keeping output voltage constant.	Remember	CO 6
25	Define BJT	A Bipolar Junction Transistor, or BJT, is a solid-state device in which the current flow between two terminals (the collector and the emitter) is controlled by the amount of current that flows through a third terminal (the base).	Remember	CO 6
26	Define NPN	A bipolar transistor in which the p-type (positively charged) material causing the base is sandwiched between two n-type (negatively charged) material causing the emitter and the collector respectively	Remember	CO 6
27	Define PNP	The PNP transistor has two crystal diodes connected back to back. The left side of the diode in known as the emitter-base diode and the right side of the diode is known as the collector-base diode.	Remember	CO 6
28	What is Thermal Runaway	The problem with increasing temperature causing increasing collector current is that more current increase the power dissipated by the transistor which, in turn, increases its temperature. This self-reinforcing cycle is known as thermal run away, which may destroy the transistor.	Remember	CO 2
29	Define Current Gain(A_i)	Current gain of an amplifier is defined as the ratio of output current to input current	Remember	CO 6
30	Define Voltage Gain(A_v)	Voltage gain of an amplifier is defined as the ratio of output voltage to input voltage	Remember	CO 6
31	Define input Impedance(Z_i)	Input impedance of a circuit is defined as the ratio of input voltage to input current	Remember	CO 6
32	Define Output Admittance(Y_0)	Output impedance of a circuit is defined as the ratio of output voltage to output current	Remember	CO 6
33	Define Input Characteristics	The changes in input current with the variation in the values of input voltage keeping the output voltage constant.	Remember	CO 6
34	Define Output Characteristics	This is a plot of output current versus output voltage with constant input current.	Remember	CO 6
35	Explain Transistor as a switch	In a transistor, unless a current flows in the base circuit, there is no current can flow in the collector circuit. This property will allow a transistor to be used as a switch. The transistor can be switched ON or OFF by changing the base.	Remember	CO 6
36	Define hi	It is defined as a short circuit input impedance	Remember	CO 6

S. No	QUESTION	ANSWER	Blooms Level	CO
37	Define hr	It is defined as a open circuit reverse voltage transfer ratio	Remember	CO 6
38	Define ho	It is defined as a open circuit output admittance	Remember	CO 6
39	Define hf	It is defined as a short circuit forward current gain	Remember	CO 6
40	Define two-port network	Two-port network of an equivalent circuit is defined as circuit having input port and output port	Remember	CO 6
	MODULE - III			
1	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.	Remember	CO 7
2	What is decimal number?	A number system that uses a notation in which each 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.	Remember	CO 7
3	What is octal number?	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	Remember	CO 7
4	What is 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.	Remember	CO 7
5	Define 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 7
6	Define 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 7
7	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.	Remember	CO 7
8	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. Note 1: Use of one of the many unit-distance codes can minimize	Remember	CO 8

S. No	QUESTION	ANSWER	Blooms Level	CO
		errors at symbol transition points when converting analog quantities into digital quantities.		
9	Define parity bit?	It is easy to include (append) one parity bit either to the left of MSB or to the right of 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.	Remember	CO 8
10	What are error Detection codes?	Error detection codes − are used to detect the error(s) present in the received data (bit stream). These codes contain some bit(s), which are included (appended) 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 8
11	What is error correction?	Error correction codes − are used to correct the error(s) present in the received data (bit stream) so that, we will get the original data. Error correction codes also use the similar strategy of error detection codes. Example – Hamming code.	Remember	CO 8
12	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. There only three basis binary operations, AND, OR and NOT by which all simple as well as complex binary mathematical operations are to be done. There are many rules in Boolean algebra by which those mathematical operations are done.	Remember	CO 9
13	What is De Morgan's Theorem,	The compliment of a product is equal to the sum of the products and viceversa.	Remember	CO 9
14	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.	Remember	CO 9
15	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.	Remember	CO 9
16	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	Remember	CO 9

S. No	QUESTION	ANSWER	Blooms Level	CO
		represent True (1) or False (0) in Boolean logic.		
17	Define number system?	A number system is a collection of various symbols which are called digits. Different types of Number System.	Remember	CO 9
18	Define Gray code?	A Gray code is an encoding of numbers so 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.	Remember	CO 9
19	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 9
20	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 (i.e., by complementing each bit in the pattern).	Remember	CO 9
21	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.	Remember	CO 9
22	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. $2k \geq n+k+1$	Remember	CO 9
23	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 every Boolean function, there will be a corresponding Dual function	Remember	CO 8
24	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 7
25	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	Remember	CO 7

S. No	QUESTION	ANSWER	Blooms Level	CO
		decimal number, just by interchanging 1's and 0's in its equivalent 2421 representation.		
26	State idempoten law of Boolean algebra.	Ax A = A means that A is idempotent under the AND operator. As examples, 0 is idempotent under addition and 0 and 1 are idempotent for multiplication. With Boolean algebras, every element is idempotent under both binary operations in the Boolean algebra.	Remember	CO 9
27	State distributive law of Boolean algebra.	This law permits the multiplying or factoring out of an expression. A(B + C) = A.B + A.C (OR Distributive Law) A + (B.C) = (A + B).(A + C) (AND Distributive Law)	Remember	CO 9
28	State commutative law of Boolean algebra.	The order of application of two separate terms is not important A . B = B . A The order in which two variables are AND'ed makes no difference A + B = B + A The order in which two variables are OR'ed makes no difference	Remember	CO 9
29	Write 1's complement of	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 7
30	State identity law of Boolean algebra.	A term OR´ed with a "0" or AND´ed with a "1" will always equal that term A + 0 = A A variable OR'ed with 0 is always equal to the variable A . 1 = A A variable AND'ed with 1 is always equal to the variable	Remember	CO 9
31	State absorption law of Boolean algebra.	This law enables a reduction in a complicated expression to a simpler one by absorbing like terms. A + (A.B) = A (OR Absorption Law) A(A + B) = A (AND Absorption Law)	Remember	CO 9
32	State associative law of Boolean algebra.	This law allows the removal of brackets from an expression and regrouping of the variables. A + (B + C) = (A + B) + C = A + B + C (OR Associate Law) A(B.C) = (A.B)C = A.B.C (AND Associate Law)	Remember	CO 9
33	Which gates are called as universal gates? Why?	NAND and NOR are called universal gates because all the other gates like and,or,not,xor and xnor can be derived from it.	Remember	CO 9
34	Define weighted code.	The weighted codes are those that obey the position weighting principle, which states that the position of each number represent a specific weight. In these codes each decimal digit is represented by a group of four bits. Examples:8421,2421,84-2-1 are all weighted codes	Remember	CO 7
35	Define Non- weighted codes.	The non-weighted codes are not positionally weighted . In other words codes that are not assigned with any weight to each digit	Remember	CO 7

S. No	QUESTION	ANSWER	Blooms Level	CO
		position.Examples:Exess-3,gray code.		
36	Define even parity.	Even parity refers to a parity checking mode in asynchronous communication systems in which an extra bit, called a parity bit, is set to zero if there is an even number of one bits in a one- byte data item. If the number of one bits adds up to an odd number, the parity bit is set to one.	Remember	CO 8
37	Define odd parity.	In asynchronous communication systems, odd parity refers to parity checking modes, where each set of transmitted bits has an odd number of bits. If the total number of ones in the data plus the parity bit is an odd number of ones, it is called odd parity	Remember	CO 8
38	What is standard form?	A Boolean variable can be expressed in either true form or complemented form. In standard form Boolean function will contain all the variables in either true form or complemented form.	Remember	CO 8
39	What is canonical form?	In a Boolean expression a literal is an input variable or its complement. A Boolean function is in canonical sum of product form when each product term contains each of the literal.	Remember	CO 8
40	Write any two Boolean algebraic laws.	Distributive law: A + BC = (A + B)(A + C) A (B+C) = (A B) + (A C) Commutative law: A + B = B + A A * B = B * A	Remember	CO 8
MODULE – IV				
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.	Remember	CO 10
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 9
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 9
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 9

S. No	QUESTION	ANSWER	Blooms Level	CO
5	Define Hazards.	A dynamic hazard is the possibility of an output changing more than once as a result of a single input change.	Remember	CO 11
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	Remember	CO 11
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).	Remember	CO 11
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.	Remember	CO 11
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 to one of the outputs depending on the values of the selection inputs.	Remember	CO 11
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.	Remember	CO 10
11	Define an encoder.	The n output lines generate the binary code for the possible 2n input lines. Let us take an example of an octal-to-binary encoder.	Remember	CO 10
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.	Remember	CO 10
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.	Remember	CO 10
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 2n cells for 'n' variables. The adjacent cells are differed only in single bit position.	Remember	CO 9
15	Define Prim 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	Remember	CO 9

S. No	QUESTION	ANSWER	Blooms Level	CO
		essential prime implicant, if at least single '1' is not covered with any other groupings but only that grouping covers.		
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'.	Remember	CO 9
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.	Remember	CO 9
18	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.	Remember	CO 10
19	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.	Remember	CO 10
20	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.	Remember	CO 10
21	Define full adder.	Full adder is a combinational circuit, which performs the addition of three bits A, B and Cin. Where, A & B are the two parallel significant bits and Cin is the carry bit, which is generated from previous stage.	Remember	CO 10
22	Define multiplexer.	Multiplexer is a combinational circuit that has maximum of 2n 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.	Remember	CO 10
23	Define De-multiplexer	De-Multiplexer is a combinational circuit that performs the reverse operation of Multiplexer. It has single input, 'n' selection lines and maximum of 2n outputs. The input will be connected to one of these outputs based on the values of selection lines.	Remember	CO 10
24	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.	Remember	CO 10
25	What is code converter?	Codes and code converters Coding is the process of translating the input information	Remember	CO 10

S. No	QUESTION	ANSWER	Blooms Level	CO
		which can be understandable by the machine or a particular device. Coding can be used for security purpose to protect the information from steeling or interrupting.		
26	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.	Remember	CO 10
27	What are the applications of multiplexer and de-multiplexer	Multiplexer is used in communication systems to carry out the process of data transmission.	Remember	CO 10
28	What are the limitations of k- map.	The K map does not necessarily "fail" for higher dimensions. The problem is that it is so difficult to visualize for more than five variables. A 4 variable K-map is 2 dimensional and easy to visualize.	Remember	CO 9
29	What is meant by Karnaugh map	The Karnaugh map, also known as the K-map, is a method to simplify Boolean algebra expressions.	Remember	CO 9
30	What are the applications of full adders?	It is used in ALU in processor chip to perform arithmetic and logical operations.	Remember	CO 10
31	What are the Advantages of K- map	1. Minimizes Boolean expressions without the need using various Boolean theorems & computations. 2. Minimizes number of Logical gates used.	Remember	CO 9
32	What are the disadvantages of K- map	It is not suitable for computer reduction. It is not suitable when the number of variables involved exceed four. Care must be taken to field in every cell with the relevant entry, such as a 0, 1 (or) don't care terms.	Remember	CO 9
33	Define K- map	A Karnaugh map (K-map) is a pictorial method used to minimize Boolean expressions without having to use Boolean algebra theorems and equation manipulations.	Remember	CO 9
34	What is Magnitude comparator	A magnitude comparator is a digital comparator which has three output terminals, one each for equality, $a = b$ greater than, $a > b$ and less than $a < b$	Remember	CO 10
35	What are the applications of encoder	Encoders are used to translate rotary or linear motion into a digital signal. Usually this is for the purpose of monitoring or controlling motion parameters such as speed, rate, direction, distance or position.	Remember	CO 10
36	What are the applications of decoder	Used in electronic circuits to convert instructions into CPU control signals. They mainly used in logical circuits, data transfer.	Remember	CO 10
37	Define Structure of k-map	The structure of a Karnaugh map is grid shaped. The two most typical sizes used for instruction or for small projects is the three variable (a 2x4 grid or 4x2 depending on the user) and the four variable map (4x4 grid). .	Remember	CO 9

S. No	QUESTION	ANSWER	Blooms Level	CO
38	What are the Applications of digital comparator	Digital Comparator are used widely in Analogue-to-Digital converters, (ADC) and Arithmetic Logic MODULEs, (ALU) to perform a variety of arithmetic operations.	Remember	CO 10
39	What is digital comparator	The Digital Comparator is another very useful combinational logic circuit used to compare the value of two binary digits.	Remember	CO 10
40	What are the applications of digital systems	Communication systems	Remember	CO 7
MODULE –V				
1	What is a counter?	Counts those pulses which are driven by a clock.	Remember	CO 12
2	What are the categories of Counters?	(i) Asynchronous and Synchronous counters. (ii) Single and multi mode counters. (iii) Modulus counters.	Remember	CO 12
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 12
4	What is a Asynchronous Counters?	Each flip flop is triggered by the previous flip flop.	Remember	CO 12
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 12
6	Where the ripple counter is used explain?	It can also be used for Frequency divider, time measurement, frequency Measurement, and distance measurement and also for generating square waveforms.	Remember	CO 12
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 synchronized with the internal clock.	Remember	CO 12
8	What is the major Disadvantage of asynchronous counters?	Disadvantages of Asynchronous Counters: An extra "re-synchronizing" output flip-flop may be required.	Remember	CO 12
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 12
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.	Remember	CO 12
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 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.	Remember	CO 12
12	What are universal shift registers?	A Universal shift register is a register which	Remember	CO 12

S. No	QUESTION	ANSWER	Blooms Level	CO
		has both the right shift and left shift with parallel load capabilities. Universal shift registers are used as memory elements in computers.		
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 12
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	Remember	CO 12
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 12
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.	Remember	CO 12
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 11
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.	Remember	CO 11
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 prevent this invalid condition, a clock circuit is introduced	Remember	CO 11
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 11
21	Define T flip-flop.	The T or "toggle" flip-flop changes its output on each clock edge, giving an output	Remember	CO 11

S. No	QUESTION	ANSWER	Blooms Level	CO
		which is half the frequency of the signal to the T input		
22	What is clock?	A clock signal is a particular type of signal that oscillates between a high and a low state	Remember	CO 11
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.	Remember	CO 11
24	What is Binary cell?	An elementary MODULE of computer storage that can have one or the other of two stable states and can thus store one bit of information.	Remember	CO 11
25	What is parallel to serial converter	Shift register is used as Parallel to serial converter, which converts the parallel data into serial data. It is utilized at the transmitter section after Analog to Digital Converter ADC block.	Remember	CO 9
26	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.	Remember	CO 11
27	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.	Remember	CO 11
28	What is JK Flip- flop characteristic Equation	$Q(t+1) = K'(t)Q(t) + J(t)Q'(t)$	Remember	CO 11
29	What is serial shift register?	The Shift Register. . Serial-in to Parallel-out (SIPO) - the register is loaded with serial data, one bit at a time, with the stored data being available at the output in parallel form.	Remember	CO 11
30	What is Triggering?	The output of a flip flop can be changed by a small change in the input signal. This small change can be brought with the help of a clock pulse or commonly known as a trigger pulse. When such a trigger pulse is applied to the input, the output changes and thus the flip flop is said to be triggered.	Remember	CO 11
31	Define Level Triggering?	We can have a negative level triggering in which the circuit is active when the clock signal is low or a positive level triggering in which the circuit is active when the clock signal is high	Remember	CO 11
32	Define Edge Triggering?	Edge triggering the circuit becomes active at negative or positive edge of the clock signal.	Remember	CO 11
33	What is Excitation Table?	An excitation table shows the minimum inputs that are necessary to generate a	Remember	CO 11

S. No	QUESTION	ANSWER	Blooms Level	CO
		particular next state (in other words, to "excite" it to the next state) when the current state is known. They are similar to truth tables and state tables.		
34	What is SR Flip-flop?	An SR Flip Flop is an arrangement of logic gates that maintains a stable output even after the inputs are turned off. This simple flip flop circuit has a set input (S) and a reset input (R). The set input causes the output of 0 (top output) and 1 (bottom output).	Remember	CO 11
35	What is D Flip-flop?	A D-type flip-flop is a clocked flip-flop which has two stable states. A D-type flip-flop operates with a delay in input by one clock cycle A D-type flip-flop is also known as a D flip-flop or delay flip-flop.	Remember	CO 11
36	Define Positive Edge Triggering?	In edge triggering the circuit becomes active at negative or positive edge of the clock signal. For example if the circuit is positive edge triggered, it will take input at exactly the time in which the clock signal goes from low to high.	Remember	CO 11
37	Define Negative Edge Triggering?	Negative-Edge-Triggered Describing a circuit or component that changes its state only when an input signal becomes low.	Remember	CO 11
38	What is Timing diagram?	A timing diagram is the graphical representation of input and output signals as functions of time. Since the inputs and outputs can only take the values 0 or 1, their graphical representations are series of square pulses with a variety of time lengths.	Remember	CO 11
39	What is SR Flip- flop characteristic Equation	$Q(t+1) = R'(t)Q(t) + S(t)$	Remember	CO 11
40	Applications of flip-flops	data storage, data transfer, latch, registers, counters, frequency division, memory, etc	Remember	CO 10

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