# INSTITUTE OF AERONAUTICAL ENGINEERING

**(Autonomous)**

Dundigal, Hyderabad - 500 043

**INFORMATION TECHNOLOGY**

## DEFINITIONS AND TERMINOLOGY QUESTION BANK

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| **Course Name** | : | **ANALOG AND DIGITAL ELECTRONICS** |
| **Course Code** | : | **AECB05** |
| **Program** | : | **B.Tech** |
| **Semester** | : | **III** |
| **Branch** | : | **INFORMATION TECHNOLOGY** |
| **Section** | : | **A,B** |
| **Academic Year** | : | **2019 - 2020** |
| **Course Faculty** | : | **Ms. M Saritha, Assistant Professor** |

## COURSE OBJECTIVES:

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| I | Introduce components such as diodes, BJTs and FETs. |
| II | Know the applications of components. |
| III | Understand common forms of number representation in logic circuits |
| IV | Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems. |
| V | Understand the concepts of combinational logic circuits and sequential circuits. |

## DEFINITIONS AND TERMINOLOGY QUESTION BANK

| S.No | Question | Answer | Blooms Taxonomy Level | CLO | CLO Code |
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| **MODULE-I** | | | | | |
| 1 | Define Electronics | The branch of engineering which deals with conduction of current through vacuum or gas or a semiconductor. | Understand | CLO 1 | AECB05.01 |
| 2 | Define conductivity | Conductivity is the ability of a metal to conduct electricity when a potential difference (Voltage) is applied. | Understand | CLO1 | AECB05.01 |
| 3 | Define voltage | Potential difference in charge between two points in an electrical field. The MODULE of voltage is Volt (V). | Understand | CLO1 | AECB05.01 |
| 4 | Define current | Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms. | Understand | CLO1 | AECB05.01 |
| 5 | Define Resistance | The opposition offered to the flow of electrons. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |

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| 7 | Define electronic circuit | An electronic circuit is composed of individual electronic components such as resistors, transistors, capacitors, inductors and diodes. | Understand | CLO1 | AECB05.01 |
| 8 | Define conductor | A conductor is a material which has very high conductivity. Ex: Copper, Aluminum, Silver. | Understand | CLO1 | AECB05.01 |
| 9 | Define semiconductor | A semiconductor is a material that has its conductivity lies between the insulator and conductor. Ex: Si & Ge. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 11 | Define Intrinsic Semiconductor | A pure form of semiconductor is called as intrinsic semiconductor. Ex: Si and Ge | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 13 | Define Diode | A p-n junction diode is a basic semiconductor device that controls the flow of electric current in a circuit. | Understand | CLO1 | AECB05.01 |
| 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 | Understand | CLO1 | AECB05.01 |
| 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 | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 19 | Define Diffusion capacitance | Diffusion Capacitance is the capacitance due to transport of charge carriers between two terminals of a device. CD = dQ / dV | Understand | CLO1 | AECB05.01 |
| 20 | Define Transition capacitance | The amount of capacitance changed with increase in voltage is called transition capacitance. CT = dQ / dV | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO1 | AECB05.01 |

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| 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. | Understand | CLO1 | AECB05.01 |
| 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. | Understand | CLO2 | AECB05.02 |
| 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. | Understand | CLO2 | AECB05.02 |
| 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. | Understand | CLO2 | AECB05.02 |
| 29 | Define efficiency | Efficiency signifies a level of performance that describes using the least amount of input to achieve the highest amount of output. | Understand | CLO2 | AECB05.02 |
| 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). | Understand | CLO2 | AECB05.02 |
| 31 | Define TUF | It is defined as a ratio of dc power delivered to the load to the ac power rating of the transformer. | Understand | CLO2 | AECB05.02 |
| 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. | Understand | CLO2 | AECB05.02 |
| 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 . | Understand | CLO3 | AECB05.03 |
| 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 | Understand | CLO4 | AECB05.04 |
| 35 | Define Pulsating DC | Pulsating direct current is a periodic current which changes in value but never changes direction. | Understand | CLO2 | AECB05.02 |
| 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. | Understand | CL04 | AECB05.04 |
| 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. | Understand | CLO4 | AECB05.04 |
| 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 | Understand | CLO1 | AECB05.01 |
| 39 | What is Cut in voltage for si & ge | si-0.7, ge- 0.3 | Understand | CLO1 | AECB05.01 |
| 40 | What is doping? | The process of adding impurities to the intrinsic semiconductor is called as doping. | Understand | CLO1 | AECB05.01 |
| **MODULE-II** | | | | | |
| 1 | Define Transistor | Transistor is a three terminal semiconductor device. | Understand | CLO5 | AECB05.05 |
| 2 | Define Base | Base is lightly doped . | Remember | CLO5 | AECB05.05 |
| 3 | Define Emitter | Emitter is heavily doped | Understand | CLO5 | AECB05.05 |
| 4 | Define Collector | Collector is moderately doped | Understand | CLO5 | AECB05.05 |
| 5 | Define Alpha | It is a large signal current gain in common base | Understand | CLO5 | AECB05.05 |

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| | | configuration. It is the ratio of collector current (output current) to the emitter current (input current). | | | |
| 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). | Understand | CLO5 | AECB05.05 |
| 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). | Understand | CLO5 | AECB05.05 |
| 8 | What is the other name of Base width modulation | Early Effect | Understand | CLO5 | AECB05.05 |
| 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. | Understand | CLO5 | AECB05.05 |
| 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 | Understand | CLO5 | AECB05.05 |
| 11 | Define Saturation Region | The transistor operates in saturation region when both the emitter and collector junctions are forward biased. | Understand | CLO5 | AECB05.05 |
| 12 | Define Cut off Region | The transistor operates in cutoff region when both the emitter and collector junctions are reverse biased. | Understand | CLO5 | AECB05.05 |
| 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 | Understand | CLO6 | AECB05.06 |
| 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 | CLO6 | AECB05.06 |
| 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. | Understand | CLO7 | AECB05.07 |
| 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 | CLO7 | AECB05.07 |
| 17 | Define Z Parameters | The Z-parameters are defined as a impedance parameters with vltage as dependent and current as independent variables | Remember | CLO9 | AECB05.09 |

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| 18 | Define Y Parameters | The Y-parameters are defined as admittance parameters with current as dependent and voltage as independent parameters | Remember | CLO9 | AECB05.09 |
| 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. | Understand | CLO8 | AECB05.08 |
| 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. | Understand | CLO8 | AECB05.08 |
| 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 | Understand | CLO8 | AECB05.08 |
| 22 | Define Amplifier | An amplifier, is an electronic device that can increase the voltage , current & power of a signal | Understand | CLO7 | AECB05.07 |
| 23 | Justify BJT as Current controlled Device | A BJT is a current controlled device because its output characteristics are determined by the input current. | Understand | CLO7 | AECB05.07 |
| 24 | Current Transfer Characteristics | This characteristic curve shows the variation of output current in accordance with the input current, keeping output voltage constant. | Understand | CLO7 | AECB05.07 |
| 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). | Understand | CLO7 | AECB05.07 |
| 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 | Understand | CLO5 | AECB05.05 |
| 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. | Understand | CLO5 | AECB05.05 |
| 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. | Understand | CLO6 | AECB05.06 |
| 29 | Define Current Gain(Ai) | Current gain of an amplifier is defined as the ratio of output current to input current | Remember | CLO9 | AECB05.09 |
| 30 | Define Voltage Gain(Av) | Voltage gain of an amplifier is defined as the ratio of output voltage to input voltage | Remember | CLO9 | AECB05.09 |
| 31 | Define input Impedance(Zi) | Input impedance of a circuit is defined as the ratio of input voltage to input current | Remember | CLO9 | AECB05.09 |
| 32 | Define Output Admittance(Y0) | Output impedance of a circuit is defined as the ratio of output voltage to output current | Remember | CLO9 | AECB05.09 |
| 33 | Define Input Characteristics | The changes in input current with the variation in the values of input voltage keeping the output voltage constant. | Understand | CLO8 | AECB05.08 |
| 34 | Define Output Characteristics | This is a plot of output current versus output voltage with constant input current. | Understand | CLO8 | AECB05.08 |

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| 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. | Understand | CLO7 | AECB05.07 |
| 36 | Define hi | It is defined as a short circuit input impedance | Remember | CLO9 | AECB05.09 |
| 37 | Define hr | It is defined as a open circuit reverse voltage transfer ratio | Remember | CLO9 | AECB05.09 |
| 38 | Define ho | It is defined as a open circuit output admittance | Remember | CLO9 | AECB05.09 |
| 39 | Define hf | It is defined as a short circuit forward current gain | Remember | CLO9 | AECB05.09 |
| 40 | Define two-port network | Two-port network of an equivalent circuit is defined as circuit having input port and output port | Remember | CLO9 | AECB05.09 |
| **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. | Understand | CLO10 | AECB05.10 |
| 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. | Understand | CLO10 | AECB05.10 |
| 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 | CLO10 | AECB05.10 |
| 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. | Understand | CLO10 | AECB05.10 |
| 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 | CLO10 | AECB05.10 |
| 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. | Understand | CLO10 | AECB05.10 |
| 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. | Understand | CLO11 | AECB05.11 |

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| 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 errors at symbol transition points when converting analog quantities into digital quantities.. | Understand | CLO11 | AECB05.11 |
| 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 | CLO10 | AECB05.10 |
| 10 | What is error correction? | 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. | Understand | CLO12 | AECB05.12 |
| 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. | Understand | CLO12 | AECB05.12 |
| 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. | Understand | CLO10 | AECB05.10 |
| 13 | What is De Morgan's Theorem, | The compliment of a product is equal to the sum of the products and viceversa. | Understand | CLO10 | AECB05.10 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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 represent True (1) or False (0) in Boolean logic. | Understand | CLO11 | AECB05.11 |
| 17 | Define number system? | A number system is a collection of various symbols which are called digits. Different types of Number System. | Understand | CLO11 | AECB05.11 |

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| 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. | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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). | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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. $2k \geq n+k+1$ | Understand | CLO12 | AECB05.12 |
| 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 | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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 decimal number, just by interchanging 1's and 0's in its equivalent 2421 representation. | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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) | Understand | CLO11 | AECB05.11 |

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| 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 | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO11 | AECB05.11 |
| 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 | Understand | CLO13 | AECB05.13 |
| 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) | Understand | CLO13 | AECB05.13 |
| 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 (ANDAssociate Law) | Understand | CLO13 | AECB05.13 |
| 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. | Understand | CLO13 | AECB05.13 |
| 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 | Understand | CLO11 | AECB05.11 |
| 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 position.Examples:Exess-3,gray code. | Understand | CLO11 | AECB05.11 |
| 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. | Understand | CLO10 | AECB05.10 |
| 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 | Understand | CLO10 | AECB05.10 |
| 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. | Understand | CLO14 | AECB05.14 |
| 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. | Understand | CLO13 | AECB05.13 |

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| 40 | Write any two Boolean algebraic laws. | Distributive law:<br>A + BC = (A + B)(A + C) A (B+C) = (A B) + (A C)<br>Commutative law: A + B = B + A<br>A * B = B * A | Understand | CLO13 | AECB05.13 |
| | | 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. | Understand | CLO18 | AECB05.18 |
| 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 | CLO15 | AECB05.15 |
| 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 | CLO15 | AECB05.15 |
| 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 | CLO15 | AECB05.15 |
| 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 | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 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. | Understand | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 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. | Understand | CLO18 | AECB05.18 |

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| 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 atany 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 | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 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. | Understand | CLO15 | AECB05.15 |
| 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 essential prime implicant, if at least single '1' is not covered with any other groupings but only that grouping covers. | Remember | CLO16 | AECB05.16 |
| 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 | CLO16 | AECB05.16 |
| 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 | CLO16 | AECB05.16 |
| 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. | Understand | CLO17 | AECB05.17 |
| 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. | Understand | CLO17 | AECB05.17 |
| 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. | Understand | CLO17 | AECB05.17 |
| 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. | Understand | CLO17 | AECB05.17 |
| 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. | Understand | CLO18 | AECB05.18 |
| 23 | 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 2n outputs. The input will be connected to one of these outputs based on the | Understand | CLO18 | AECB05.18 |

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| | | values of selection lines. | | | |
| 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. | Understand | CLO18 | AECB05.18 |
| 25 | 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 steeling or interrupting. | Remember | CLO18 | AECB05.18 |
| 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. | Understand | CLO17 | AECB05.17 |
| 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 | CLO18 | AECB05.18 |
| 28 | What are the limitations of karnaugh 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 dimenisional and easy to visualize. | Remember | CLO16 | AECB05.16 |
| 29 | What is meant by Karnaugh map | The Karnaugh map, also known as the K-map, is a method to simplify boolean algebra expressions. | Understand | CLO15 | AECB05.15 |
| 30 | What are the applications of full adders? | It is used in ALU in processor chip to perform arithmetic and logical operations. | Remember | CLO17 | AECB05.17 |
| 31 | What are the Advantages of Karnaugh map | 1. Minimizes Boolean expressions without the need using various Boolean theorems & computations.<br>2.Minimizes number of Logical gates used. | Remember | CLO16 | AECB05.16 |
| 32 | What are the disadvantages of Karnaugh map | It is not suitable for computer reduction.<br>It is not suitable when the number of variables involved exceed four.<br>Care must be taken to field in every cell with the relevant entry, such as a 0, 1 (or) don't care terms. | Remember | CLO16 | AECB05.16 |
| 33 | Define Karnaugh 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. | Understand | CLO15 | AECB05.15 |
| 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 | Understand | CLO16 | AECB05.16 |
| 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 | CLO18 | AECB05.18 |
| 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 | CLO18 | AECB05.18 |
| 37 | Define Structure of k-map | The structure of a Karnaugh map is grid shaped. The two most typical sizes used for instruction | Understand | CLO15 | AECB05.15 |

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| | | or for small projects is the three variable (a 2x4 grid or 4x2 depending on the user) and the four variable map (4x4 grid). . | | | |
| 39 | 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 | CLO16 | AECB05.16 |
| 40 | What is digital comparator | The Digital Comparator is another very useful combinational logic circuit used to compare the value of two binary digits. | Remember | CLO16 | AECB05.16 |
| | | MODULE V | | | |
| 1 | What is a counter? | Counts those pulses which are driven by a clock. | Understand | CLO19 | AECB05.19 |
| 2 | What are the categories of Counters? | (i) Asynchronous and Synchronous counters. (ii) Single and multi mode counters. (iii) Modulus counters. | Understand | CLO19 | AECB05.19 |
| 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 | CLO19 | AECB05.19 |
| 4 | What is a Asynchronous Counters? | Each flip flop is triggered by the previous flip flop. | Remember | CLO19 | AECB05.19 |
| 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 | Understand | CLO20 | AECB05.20 |
| 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. | Remember | CLO20 | AECB05.20 |
| 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 | CLO20 | AECB05.20 |
| 8 | What is the major Disadvantage of asynchronous counters? | Disadvantages of Asynchronous Counters:An extra “re-synchronizing” output flip-flop may be required. | Understand | CLO20 | AECB05.20 |
| 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. | Understand | CLO20 | AECB05.20 |
| 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 | CLO20 | AECB05.20 |
| 12 | 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 | CLO20 | AECB05.20 |
| 13 | What are universal shift registers? | A Universal shift register is a register which has both the right shift and leftshift with parallel load capabilities. Universal shift registers are used as memory elements in computers. | Understand | CLO20 | AECB05.20 |

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| 14 | 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 | CLO20 | AECB05.20 |
| 15 | 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 | CLO20 | AECB05.20 |
| 16 | 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 | CLO20 | AECB05.20 |
| 17 | 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 | CLO21 | AECB05.20 |
| 18 | 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 | CLO21 | AECB05.21 |
| 19 | 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 | CLO21 | AECB05.21 |
| 20 | 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 | CLO21 | AECB05.21 |
| 21 | 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 | CLO21 | AECB05.21 |
| 22 | 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 | CLO21 | AECB05.21 |
| 23 | What is clock? | A clock signal is a particular type of signal that oscillates between a high and a low state | Understand | CLO21 | AECB05.21 |
| 24 | 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 | CLO21 | AECB05.21 |
| 25 | 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. | Understand | CLO21 | AECB05.21 |

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| 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. | Understand | CLO20 | AECB05.20 |
| 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. | Understand | CLO20 | AECB05.20 |
| 28 | What is JK Flip- flop characteristic Equation | Q(t+1) = K'(t)Q(t) + J(t)Q'(t) | Remember | CLO20 | AECB05.20 |
| 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. | Understand | CLO20 | AECB05.20 |
| 30 | Define parallel shift register? | For parallel in – parallel out shift registers, all data bits appear on the parallel output immediately following the simultaneous entry of the data bits. The following circuit is a four- bit parallel in – parallel out shift register. | Understand | CLO20 | AECB05.20 |
| 31 | 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. | Understand | CLO21 | AECB05.21 |
| 32 | 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 | CLO21 | AECB05.21 |
| 33 | Define Edge Triggering? | Edge triggering the circuit becomes active at negative or positive edge of the clock signal. | Remember | CLO21 | AECB05.21 |
| 34 | What is Excitation Table? | An excitation table shows the minimum inputs that are necessary to generate a 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. | Understand | CLO21 | AECB05.21 |
| 35 | What is SR Flipflop? | 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). | Understand | CLO21 | AECB05.21 |
| 36 | What is D Flipflop? | 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. | Understand | CLO21 | AECB05.21 |

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| 37 | 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. | Understand | CLO21 | AECB05.21 |
| 38 | Define Negative EdgeTriggering? | Negative-Edge-Triggered Describing a circuit or component that changes its state only when an input signal becomes low. | Understand | CLO21 | AECB05.21 |
| 39 | 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. | Understand | CLO21 | AECB05.21 |
| 40 | What is SR Flip- flop characteristic Equation | Q(t+1) = R'(t)Q(t) + S(t) | Remember | CLO21 | AECB05.21 |

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